Saunders

NURSING DRUG HANDBOOK 2016

- Detailed drug data and Evolve website for students
- Updated Black Box Alerts
- Latest FDA Safety Recommendations

ELSEVIER

http://evolve.elsevier.com

Lifespan Considerations in each monograph note factors to be considered for geriatric, pediatric, pregnant, or nursing populations. Appendix H provides additional resources.

Black Box Alerts advise about the increased risks of a particular drug.

morphine

HIGH ALERT

mor-feen

(Astramorph PF, Avinza, DepoDur, Duramorph PF, Infumorph, Kadian, M-Eslon, MS Contin, MSIR, Oramorph SR, Roxanol)

BLACK BOX ALERT Be alert for signs of abuse, misuse, diversion. ***Epidural:*** Monitor for delayed sedation. ***Sustained-release:*** Do not crush or chew. ***MS Contin:*** Use only in opioid-tolerant pts requiring over 400 mg/day. ***Kadian:*** Use only in opioid-tolerant pts. ***Avinza:*** Alcohol disrupts extended-release timing. ***Duramorph PF:*** Risk of severe and/or sustained cardiopulmonary depression.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Narcotic agonist. **CLINICAL:** Opiate analgesic **(Schedule II)** (see p. 142C).

M

ACTION

Binds with opioid receptors within CNS. **Therapeutic Effect:** Alters pain perception, emotional response to pain.

PHARMACOKINETICS

Variably absorbed from GI tract. Readily absorbed after IM, subcutaneous administration. Protein binding: 20%–35%. Widely distributed. Metabolized in liver. Primarily excreted in urine. Removed by hemodialysis. **Half-life:** 2–4 hrs (increased in hepatic disease).

USES

Relief of moderate to severe, acute, or chronic pain; analgesia during labor. Drug of choice for pain due to MI, dyspnea from pulmonary edema not resulting from chemical respiratory irritant. **DepoDur:** Epidural (lumbar) single dose management of surgical pain.

PRECAUTIONS

Contraindications: Acute or severe asthma, GI obstruction, paralytic ileus, severe hepatic/renal impairment, severe respiratory depression. **Cautions:** Biliary tract disease, pancreatitis, Addison's disease, hypothyroidism, urethral stricture, prostatic hyperplasia, debilitated pts, those with CNS depression, toxic psychosis, seizure disorders, alcoholism.

LIFESPAN CONSIDERATIONS

Pregnancy/Lactation: Crosses placenta. Distributed in breast milk. **Pregnancy Category C (D if used for prolonged periods or at high dosages at term). Children:** Paradoxical excitement may occur; those younger than 2 yrs are more susceptible to respiratory depressant effects. **Elderly:** Paradoxical excitement may occur.

INTERACTIONS

DRUG: Alcohol, other CNS depressants may increase CNS effects, respiratory depression, hypotension. **HERBAL: Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depression. **FOOD:** None known. **LAB VALUES:** May increase serum amylase, lipase.

AVAILABILITY (Rx)

Injection, Liposomal Suspension (DepoDur): 10 mg/ml. **Injection, Solution:** 2 mg/ml, 4 mg/ml, 5 mg/ml, 10 mg/ml, 15 mg/ml, 25 mg/ml, 50 mg/ml. **Injection, Solution (Epidural, Intrathecal, IV Infusion) (Astramorph PF, Duramorph PF):** 0.5 mg/ml, 1 mg/ml.

Capsules, Extended-Release (Avinza): 30 mg, 45 mg, 60 mg, 75 mg, 90 mg, 120 mg. **Capsules, Sustained-Release (Kadian):** 20 mg, 30 mg, 50 mg, 60 mg, 80 mg, 100 mg, 200 mg.

ADMINISTRATION/HANDLING

IV

Reconstitution • May give undiluted. • For IV injection, may dilute 2.5–15 mg morphine in 4–5 ml Sterile Water for Injection. • For continuous IV infusion, dilute to concentration of 0.1–1 mg/ml in D_5W and give through controlled infusion device. **Rate of administration** • Always administer very slowly. Rapid IV increases risk of severe adverse reactions (apnea, chest wall

underlined – top prescribed drug

Interactions identify potential herbal, drug, and food interactions with a particular drug.

Uses section in each monograph notes the standard and off-label uses for a particular drug.

Top prescribed drugs are underlined.

rigidity, peripheral circulatory collapse, cardiac arrest, anaphylactoid effects).
Storage • Store at room temperature.

Epidural, Liposomal
• May give either diluted or undiluted. • Do not use an in-line filter. • Store solution in refrigerator; do not freeze. May store at room temperature for 7 days. • Following withdrawal from vial, use within 4 hrs. • Gently invert vial to resuspend drug; avoid aggressive agitation.

IV INCOMPATIBILITIES

Amphotericin B complex (Abelcet, AmBisome, Amphotec), cefepime (Maxipime), doxorubicin (Doxil), lipids, phenytoin (Dilantin), thiopental.

IV COMPATIBILITIES

Amiodarone (Cordarone), atropine, bumetanide (Bumex), bupivacaine (Marcaine, Sensorcaine), diltiazem (Cardizem), diphenhydramine (Benadryl), dobutamine (Dobutrex), dopamine (Intropin), glycopyrrolate (Robinul), heparin, hydroxyzine (Vistaril), lidocaine, lorazepam (Ativan), magnesium, midazolam (Versed), milrinone (Primacor), nitroglycerin, potassium, propofol (Diprivan), total parenteral nutrition (TPN).

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Dosage should be titrated to desired effect.

Analgesia

PO (IMMEDIATE-RELEASE): ADULTS, ELDERLY: 10–30 mg q3–4h as needed. **CHILDREN:** 0.15–0.3 mg/kg q3–4h as needed.

PO (EXTENDED-RELEASE [AVINZA]): ADULTS, ELDERLY: Dosage requirement should be established using prompt-release formulations and is based on total daily dose. Avinza is given once a day only.

PO (EXTENDED-RELEASE [KADIAN]): ADULTS, ELDERLY: Dosage requirement should be established using prompt-release formulations and is based on total daily dose. Dose is given once a day or divided and given q12h.

Patient-Controlled Analgesia (PCA)

IV: ADULTS, ELDERLY: Loading dose: 5–10 mg. **Intermittent bolus:** 0.5–3 mg. **Lockout interval:** 5–12 min. **Continuous infusion:** 1–10 mg/hr. **4-hr limit:** 20–30 mg.

SIDE EFFECTS

Frequent: Sedation, decreased B/P (including orthostatic hypotension), diaphoresis, facial flushing, constipation, dizziness, drowsiness, nausea, vomiting. **Occasional:** Allergic reaction (rash, pruritus), dyspnea, confusion, palpitations, tremors, urinary retention, abdominal cramps, vision changes, dry mouth, headache, decreased appetite, pain/burning at injection site. **Rare:** Paralytic ileus.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose results in respiratory depression, skeletal muscle flaccidity, cold/clammy skin, cyanosis, extreme drowsiness progressing to seizures, stupor, coma. Tolerance to analgesic effect, physical dependence may occur with repeated use.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Pt should be in recumbent position before drug is given by parenteral route. Assess onset, type, location, duration of pain.

INTERVENTION/EVALUATION

Monitor vital signs 5–10 min after IV administration, 15–30 min after subcutaneous, IM. Be alert for decreased respirations, B/P. Check for adequate voiding. Monitor daily pattern of bowel activity and stool consistency. Avoid constipation.

PATIENT/FAMILY TEACHING

• Discomfort may occur with injection. • Change positions slowly to avoid orthostatic hypotension. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol, CNS depressants.

♣ Canadian trade name Non-Crushable Drug High Alert drug

IV Incompatibilities/ Compatibilities present important information for IV drugs.

Side Effects section in each drug monograph specifies the frequency of particular side effects.

Adverse Reactions highlight the particularly dangerous side effects.

High Alert drugs are shaded in blue for easy identification.

New to this Edition!
- Nearly 30 drugs recently approved by the FDA
- Hundreds of updates and revisions
- Over 270 updated Black Box Alerts

Saunders

NURSING DRUG HANDBOOK 2016

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Knowledge and best practice in this field are constantly changing. As new research and experience broaden our understanding, changes in research methods, professional practices, or medical treatment may become necessary.

Practitioners and researchers must always rely on their own experience and knowledge in evaluating and using any information, methods, compounds, or experiments described herein. In using such information or methods, they should be mindful of their own safety and the safety of others, including parties for whom they have a professional responsibility.

With respect to any drug or pharmaceutical products identified, readers are advised to check the most current information provided (i) on procedures featured or (ii) by the manufacturer of each product to be administered, to verify the recommended dose or formula, the method and duration of administration, and contraindications. It is the responsibility of practitioners, relying on their own experience and knowledge of their patients, to make diagnoses, to determine dosages and the best treatment for each individual patient, and to take all appropriate safety precautions.

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Bob graduated from the University of Illinois School of Pharmacy and is licensed to practice in the state of Illinois. He has worked as a hospital pharmacist for more than 40 years at Alexian Brothers Medical Center in Elk Grove Village, Illinois—a suburb of Chicago. Bob is the Pharmacy Surgery Coordinator for the Department of Pharmacy, where he participates in educational programs for pharmacists, nurses, physicians, and patients. He plays a major role in coordinating pharmacy services in the OR satellite. Bob is a former adjunct faculty member at William Rainey Harper Community College in Palatine, Illinois.

An avid fan of Big Ten college athletics, Bob also has eclectic tastes in music that range from classical, big band, rock 'n' roll, and jazz to country and western. Bob spends much of his free time reviewing the professional literature to stay current on new drug information.

Keith J. Hodgson, RN, BSN, CCRN

Keith was born into a loving family in Chicago, Illinois. His mother, Barbara B. Hodgson, was an author and publisher of several medication products, and her work has been a part of his life since he was a child. By the time he was four years old, Keith was already helping his mother with the drug cards by stacking the draft pages that were piled up throughout their home.

Because of his mother's influence, Keith contemplated becoming a nurse in college, but his mind was fully made up after he shadowed his sister in the Emergency Department. Keith received his Associates Degree in Nursing from Hillsborough Community College and his Bachelor of Science in Nursing from the University of South Florida in Tampa, Florida. Keith started his career in the Emergency Department and now works in the Trauma/Neurological/Surgical Intensive Care Unit at St. Joseph's Hospital in Tampa, Florida.

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Keith J. Hodgson, RN, BSN, CCRN

DEDICATION

I dedicate my work to the practicing nurse, those aspiring to become nurses, and to all health care professionals who are dedicated to the art and science of healing.

Bob Kizior, BS, RPh

I dedicate this work to my sister, Lauren, a foundation for our family; my sister, Kathryn, for her love and support; my father, David Hodgson, the best father a son could have; my brothers-in-law, Andy and Jim, great additions to the family; the grandchildren, Paige Olivia, Logan James, Ryan James, and Dylan Boyd; to Jen Nicely for always being there; and to my band of brothers, Peter, Jamie, Miguel, Ritch, George, Jon, Domingo, Ben, Craig, Pat, and Shay.

We also make a special dedication to Barbara B. Hodgson, RN, OCN. She truly was a piece of something wonderful. Barbara often gave her love and support without needing any in return, and would do anything for a smile. Not only was she a colleague and a friend, she was also a small business owner, an artist, a dreamer, and an innovator. We hope the pride we offer in her honor comes close to what she always gave us. Her dedication and perseverance lives on.

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PREFACE

Nurses are faced with the ever-challenging responsibility of ensuring safe and effective drug therapy for their patients. Not surprisingly, the greatest challenge for nurses is keeping up with the overwhelming amount of new drug information, including the latest FDA-approved drugs and changes to already approved drugs, such as new uses, dosage forms, warnings, and much more. Nurses must integrate this information into their patient care quickly and in an informed manner.

Saunders Nursing Drug Handbook 2016 is designed as an easy-to-use source of current drug information to help the busy nurse meet these challenges. What separates this book from others is that it guides the nurse through patient care to better practice and better care.

This handbook contains the following:

1. **An IV compatibility chart.** This handy chart is bound into the handbook to prevent accidental loss.
2. **The Drug Classifications section.** The action and uses for some of the most common clinical and pharmacotherapeutic classes are presented. Unique to this handbook, each class provides an at-a-glance table that compares all the generic drugs within the classification according to product availability, dosages, side effects, and other characteristics. Its half-page color tab ensures you can't miss it!
3. **An alphabetical listing of drug entries by generic name.** Blue letter thumb tabs help you page through this section quickly. Information on medications that contain a Black Box Alert is an added feature of the drug entries. This alert identifies those medications for which the FDA has issued a warning that the drugs may cause serious adverse effects. Tall Man lettering, with emphasis on certain syllables to avoid confusing similar sounding/looking medications, is shown in slim blue capitalized letters (e.g., *aceta**ZOLAMIDE**). High Alert drugs with a blue icon HIGH ALERT are considered dangerous by The Joint Commission and the Institute for Safe Medication Practices (ISMP) because if they are administered incorrectly, they may cause life-threatening or permanent harm to the patient. The entire High Alert generic drug entry sits on a blue-shaded background so that it's easy to spot! To make scanning pages easier, each new entry begins with a shaded box containing the generic name, pronunciation, trade name(s), fixed combination(s), and classification(s).
4. **A comprehensive reference section.** Appendixes include vital information on calculation of doses; controlled drugs; chronic wound care; drugs of abuse; equianalgesic dosing; FDA pregnancy categories; herbals: common natural medicines; lifespan, cultural aspects, and pharmacogenomics of drug therapy; normal laboratory values; cytochrome P450 enzymes; poison antidotes; preventing medication errors; parenteral fluid administration; and (new to 2016 edition) Common Terminology Criteria for Adverse Events (CTCAE).
5. **Drugs by Disorder.** You'll find Drugs by Disorder in the front of the book for easy reference. It lists common disorders and the drugs most often used for treatment.
6. **The index.** The comprehensive index is located at the back of the book on light blue pages. Undoubtedly the best tool to help you navigate the handbook, the comprehensive index is organized by showing generic drug names in **bold,** trade names in regular type, classifications in *italics,* and the page number of the main drug entry listed first and in **bold.**

A DETAILED GUIDE TO THE SAUNDERS NURSING DRUG HANDBOOK

An intensive review by consultants and reviewers helped us to revise the **Saunders Nursing Drug Handbook** so that it is most useful in both educational and clinical practice. The main objective of the handbook is to provide essential drug information in a user-friendly format. The bulk of the handbook contains an alphabetical listing of drug entries by generic name.

To maintain the portability of this handbook and meet the challenge of keeping content current, we have also included additional information for some medications on the Evolve® Internet site. Users can also choose from 100 monographs for the most commonly used medications and customize and print drug cards. Evolve® also includes drug alerts (e.g., medications removed from the market) and drug updates (e.g., new drugs, updates on existing entries). Information is periodically added, allowing the nurse to keep abreast of current drug information.

We have incorporated the IV Incompatibilities/Compatibilities heading. The drugs listed in this section are compatible or incompatible with the generic drug when administered directly by IV push, via a Y-site, or via IV piggyback. We have highlighted the intravenous drug administration and handling information with a special heading icon and have broken it down by Reconstitution, Rate of Administration, and Storage.

We present entries in an order that follows the logical thought process the nurse undergoes whenever a drug is ordered for a patient:

- What is the drug?
- How is the drug classified?
- What does the drug do?
- What is the drug used for?
- Under what conditions should you **not** use the drug?
- How do you administer the drug?
- How do you store the drug?
- What is the dose of the drug?
- What should you monitor the patient for once he or she has received the drug?
- What do you assess the patient for?
- What interventions should you perform?
- What should you teach the patient?

The following are included within the drug entries:

Generic Name, Pronunciation, Trade Names. Each entry begins with the generic name and pronunciation, followed by the U.S. and Canadian trade names. Exclusively Canadian trade names are followed by a blue maple leaf. Trade names that were most prescribed in the year 2014 are underlined in this section.

Black Box Alert. This feature highlights drugs that carry a significant risk of serious or life-threatening adverse effects. Black Box Alerts are ordered by the FDA.

Do Not Confuse With. Drug names that sound similar to the generic and/or trade names are listed under this heading to help you avoid potential medication errors.

Fixed-Combination Drugs. Where appropriate, fixed-combinations, or drugs made up of two or more generic medications, are listed with the generic drug.

Pharmacotherapeutic and Clinical Classification Names. Each entry includes both the pharmacotherapeutic and clinical classifications for the generic drug.

Action/Therapeutic Effect. This section describes how the drug is predicted to behave, with the expected therapeutic effect(s) under a separate heading.

Pharmacokinetics. This section includes the absorption, distribution, metabolism, excretion, and half-life of the medication. The half-life is bolded in blue for easy access.
Uses/Off-Label. The listing of uses for each drug includes both the FDA uses and the off-label uses. The off-label heading is shown in bold blue for emphasis.
Precautions. This heading incorporates a discussion about when the generic drug is contraindicated or should be used with caution. The cautions warn the nurse of specific situations in which a drug should be closely monitored.
Lifespan Considerations

We welcome any comments you may have that would help us to improve future editions of the handbook. Please contact us via the publisher at *http://evolve.elsevier.com/SaundersNDH.*

Robert J. Kizior, BS, RPh
Keith J. Hodgson, RN, BSN, CCRN

NEWLY APPROVED MEDICATIONS

Name	Indication
Albiglutide (Tanzeum)	An injectable GLP-1 agonist for type 2 diabetes
Apremilast (Otezla)	A phosphodiesterase 4 (PDE4) inhibitor for psoriatic arthritis
Belinostat (Beleodaq)	A histone deacetylase inhibitor for advanced peripheral T-cell lymphoma
Ceritinib (Zykadia)	A kinase inhibitor for treatment of certain type of metastatic non–small-cell lung cancer
Cobicistat (Tybost)	Pharmaco-enhancing or "boosting" agent for antiviral drugs used in treatment of HIV infection
Dalbavancin (Dalvance)	Antibiotic for treatment of adult patients with complicated skin and skin structure infections, including MRSA
Dapagliflozin (Farxiga)	A sodium glucose co-transporter 2 (SGLT-2) inhibitor for type 2 diabetes
Droxidopa (Northera)	A synthetic amino acid analogue for neurogenic orthostatic hypotension
Dulaglutide (Trulicity)	A glucagon-like peptide receptor agonist for the treatment of type 2 diabetes
Elvitegravir (Vitekta)	Integrase inhibitor for treatment of HIV-1 infection
Empagliflozin (Jardiance)	An SGLT-2 inhibitor for type 2 diabetes
Idelalisib (Zydelig)	A kinase inhibitor for treatment of chronic lymphocytic leukemia, relapsed follicular B-cell non-Hodgkin's lymphoma, and relapsed small lymphocytic lymphoma
Metreleptin (Myalept)	A leptin analogue for patients with lipodystrophy
Naloxegol (Movantik)	A peripherally acting opioid receptor antagonist indicated for the treatment of opioid-induced constipation
Olodaterol (Striverdi Respimat)	A long-acting beta agonist oral inhaler for COPD
Oritavancin (Orbactiv)	An injectable lipoglycopeptide antibiotic for skin and skin structure infections
Peginterferon beta-1a (Plegridy)	An interferon beta for treatment of relapsing forms of multiple sclerosis

Continued

Name	Indication
Pembrolizumab (Keytruda)	A human PD1-blocking antibody indicated for the treatment of metastatic melanoma
Ramucirumab (Cyramza)	An angiogenesis inhibitor for gastric cancer
Suvorexant (Belsomra)	An orexin receptor antagonist indicated for the treatment of insomnia
Tedizolid (Sivextro)	An antibiotic for skin infections
Umeclidinium (Incruse Ellipta)	New anticholinergic oral inhaler for maintenance treatment of COPD
Vedolizumab (Entyvio)	An integrin receptor antagonist for treatment of Crohn's disease and ulcerative colitis
Vorapaxar (Zontivity)	An antiplatelet agent for pts with history of MI or with peripheral arterial disease (PAD)

DRUGS BY DISORDER

Note: Not all medications appropriate for a given condition are listed, nor are those not listed inappropriate.
Generic names appear first, followed by brand names in parentheses.

Alcohol dependence
Acamprosate (Campral)
Disulfiram (Antabuse)
Naltrexone (Depade, ReVia, Vivitrol)

Allergic rhinitis
Azelastine (Astepro)
Azelastine/fluticasone (Dymista)
Beclomethasone (Beconase AQ)
Budesonide (Rhinocort Aqua)
Ciclesonide (Omnaris)
Flunisolide (Nasarel)
Fluticasone (Flonase)
Mometasone (Nasonex)
Olopatadine (Patanase)
Triamcinolone (Nasacort)

Allergy
Beclomethasone (Beclovent, Vanceril)
Betamethasone (Celestone)
Brompheniramine (Dimetane)
Budesonide (Pulmicort, Rhinocort)
Cetirizine (Zyrtec)
Chlorpheniramine (Chlor-Trimeton)
Clemastine (Tavist)
Cyproheptadine (Periactin)
Desloratadine (Clarinex)
Dexamethasone (Decadron)
Dimenhydrinate (Dramamine)
Diphenhydramine (Benadryl)
Epinephrine (Adrenalin)
Fexofenadine (Allegra)
Flunisolide (AeroBid, Nasalide)
Fluticasone (Flovent)
Hydrocortisone (Solu-Cortef)
Levocetirizine (Xyzal)
Loratadine (Claritin)
Prednisolone (Prelone)
Prednisone (Deltasone)
Promethazine (Phenergan)
Triamcinolone (Kenalog)

Alzheimer's disease
Donepezil (Aricept, Aricept ODT)
Galantamine (Razadyne, Razadyne ER)
Memantine (Namenda, Namenda XR)
Rivastigmine (Exelon, Exelon Patch)

Angina
Amlodipine (Norvasc)
Atenolol (Tenormin)
Diltiazem (Cardizem, Dilacor)
Isosorbide (Imdur, Isordil)
Metoprolol (Lopressor)
Nadolol (Corgard)
Nicardipine (Cardene)
Nifedipine (Adalat, Procardia)
Nitroglycerin
Propranolol (Inderal)
Verapamil (Calan, Isoptin)

Anxiety
Alprazolam (Xanax)
Buspirone (BuSpar)
Diazepam (Valium)
Hydroxyzine (Atarax, Vistaril)
Lorazepam (Ativan)
Oxazepam (Serax)
Paroxetine (Paxil)
Trazodone (Desyrel)
Venlafaxine (Effexor)

Arrhythmias
Adenosine (Adenocard)
Amiodarone (Cordarone, Pacerone)
Digoxin (Lanoxin)
Diltiazem (Cardizem, Dilacor)
Disopyramide (Norpace)
Dofetilide (Tikosyn)
Dronedarone (Multaq)
Esmolol (Brevibloc)
Flecainide (Tambocor)
Ibutilide (Corvert)

Lidocaine
Metoprolol (Lopressor)
Mexiletine (Mexitil)
Procainamide (Procan, Pronestyl)
Propafenone (Rythmol)
Propranolol (Inderal)
Sotalol (Betapace)
Verapamil (Calan, Isoptin)

Arthritis, rheumatoid (RA)
Abatacept (Orencia)
Adalimumab (Humira)
Anakinra (Kineret)
Azathioprine (Imuran)
Certolizumab (Cimzia)
Etanercept (Enbrel)
Golimumab (Simponi)
Hydroxychloroquine (Plaquenil)
Infliximab (Remicade)
Leflunomide (Arava)
Methotrexate
Prednisone (Deltasone)
Rituximab (Rituxan)
Sulfasalazine (Azulfidine-EN)
Tocilizumab (Actemra)
Tofacitinib (Xeljanz)

Asthma
Albuterol (Proventil, Ventolin)
Aminophylline (Theophylline)
Arformoterol (Brovana)
Beclomethasone (Beclovent, Vanceril)
Budesonide (Pulmicort)
Ciclesonide (Alvesco)
Cromolyn (Crolom, Intal)
Epinephrine (Adrenalin)
Flunisolide (AeroBid)
Fluticasone (Flovent)
Formoterol (Foradil)
Hydrocortisone (Solu-Cortef)
Ipratropium (Atrovent)
Levalbuterol (Xopenex)
Metaproterenol (Alupent)
Methylprednisolone (Solu-Medrol)
Mometasone (Asmanex)
Montelukast (Singulair)
Nedocromil (Tilade)
Prednisolone (Prelone)
Prednisone (Deltasone)
Salmeterol (Serevent)
Terbutaline (Brethine)
Theophylline (SloBid)
Zafirlukast (Accolate)
Zileuton (Zyflo, Zyflo CR)

Attention-deficit hyperactivity disorder (ADHD)
Atomoxetine (Strattera)
Clonidine (Catapres, Kapvay)
Desipramine (Norpramin)
Dexmethylphenidate (Focalin, Focalin XR)
Dextroamphetamine (Dexedrine, Dextrostat)
Guanfacine (Intuniv)
Lisdexamfetamine (Vyvanse)
Methylphenidate (Concerta, Daytrana, Focalin, Methylin, Ritalin)
Mixed amphetamine (dextroamphetamine and amphetamine salts) (Adderall, Adderall XR)

Benign prostatic hypertrophy (BPH)
Alfuzosin (Uroxatral)
Doxazosin (Cardura)
Dutasteride (Avodart)
Finasteride (Proscar)
Mirabegron (Myrbetriq)
Silodosin (Rapaflo)
Tadalafil (Cialis)
Tamsulosin (Flomax)
Terazosin (Hytrin)

Bipolar disorder (mania)
Carbamazepine (Tegretol)
Lamotrigine (Lamictal)
Lithium (Lithobid)
Oxcarbazepine (Trileptal)
Quetiapine (Seroquel)
Valproic acid (Depakene, Depakote)

Bladder hyperactivity
Darifenacin (Enablex)
Oxybutynin (Ditropan, Gelnique)
Solifenacin (VESIcare)
Tolterodine (Detrol)
Trospium (Sanctura)

Bronchospasm
Albuterol (Proventil, Ventolin)
Bitolterol (Tornalate)
Levalbuterol (Xopenex)
Metaproterenol (Alupent)
Salmeterol (Serevent)
Terbutaline (Brethine)

Cancer
Abarelix (Plenaxis)
Abiraterone (Zytiga)

Ado-trastuzumab (Kadeyla)
Afatinib (Gilotrif)
Aldesleukin (Proleukin)
Alemtuzumab (Campath)
Alitretinoin (Panretin)
Altretamine (Hexalen)
Anastrozole (Arimidex)
Arsenic trioxide (Trisenox)
Asparaginase (Elspar)
Axitinib (Inlyta)
Azacitidine (Vidaza)
BCG (TheraCys, Tice BCG)
Belinostat (Beleodaq)
Bendamustine (Treanda)
Bevacizumab (Avastin)
Bexarotene (Targretin)
Bicalutamide (Casodex)
Bleomycin (Blenoxane)
Bortezomib (Velcade)
Bosutinib (Bosulif)
Brentuximab (Adcetris)
Busulfan (Myleran)
Cabazitaxel (Jevtana)
Cabozantinib (Cometriq)
Capecitabine (Xeloda)
Carboplatin (Paraplatin)
Carfilzomib (Kyprolis)
Carmustine (BiCNU)
Ceritinib (Zykadia)
Cetuximab (Erbitux)
Chlorambucil (Leukeran)
Cisplatin (Platinol)
Cladribine (Leustatin)
Clofarabine (Clolar)
Crizotinib (Xalkori)
Cyclophosphamide (Cytoxan)
Cytarabine (Ara-C, Cytosar)
Dabrafenib (Tafinlar)
Dacarbazine (DTIC)
Dactinomycin (Cosmegen)
Dasatinib (Sprycel)
Daunorubicin (Cerubidine, DaunoXome)
Degarelix (Firmagon)
Denileukin (Ontak)
Docetaxel (Taxotere)
Doxorubicin (Adriamycin, Doxil)
Enzalutamide (Xtandi)
Epirubicin (Ellence)
Eribulin (Halaven)
Erlotinib (Tarceva)
Estramustine (Emcyt)
Etoposide (VePesid)
Everolimus (Afinitor)
Fludarabine (Fludara)
Fluorouracil
Flutamide (Eulexin)
Fulvestrant (Faslodex)
Gefitinib (Iressa)
Gemcitabine (Gemzar)
Goserelin (Zoladex)
Hydroxyurea (Hydrea)
Ibritumomab (Zevalin)
Ibrutinib (Imbruvica)
Idarubicin (Idamycin)
Idelalisib (Zydelig)
Ifosfamide (Ifex)
Imatinib (Gleevec)
Interferon alfa-2b (Intron A)
Ipilimumab (Yervoy)
Irinotecan (Camptosar)
Ixabepilone (Ixempra)
Lapatinib (Tykerb)
Letrozole (Femara)
Leuprolide (Lupron)
Lomustine (CeeNU)
Mechlorethamine (Mustargen)
Megestrol (Megace)
Melphalan (Alkeran)
Mercaptopurine (Purinethol)
Methotrexate
Mitomycin (Mutamycin)
Mitotane (Lysodren)
Mitoxantrone (Novantrone)
Nelarabine (Arranon)
Nilotinib (Tasigna)
Nilutamide (Nilandron)
Obinutuzumab (Gazyva)
Ofatumumab (Arzerra)
Omacetaxine (Synribo)
Oxaliplatin (Eloxatin)
Paclitaxel (Taxol)
Panitumumab (Vectibix)
Pazopanib (Votrient)
Pegaspargase (Oncaspar)
Pembrolizumab (Keytruda)
Pemetrexed (Alimta)
Pentostatin (Nipent)
Pertuzumab (Perjeta)
Plicamycin (Mithracin)
Pomalidomide (Pohmalyst)
Ponatinib (Iclusig)
Pralatrexate (Folotyn)
Procarbazine (Matulane)
Ramucirumab (Cyramza)
Rasburicase (Elitek)
Regorafenib (Stivarga)
Rituximab (Rituxan)
Romidepsin (Istodax)

Sipuleucel-T (Provenge)
Sorafenib (Nexavar)
Streptozocin (Zanosar)
Sunitinib (Sutent)
Tamoxifen (Nolvadex)
Temozolomide (Temodar)
Temsirolimus (Torisel)
Teniposide (Vumon)
Thioguanine
Thiotepa (Thioplex)
Tipifarnib (Zarnestra)
Topotecan (Hycamtin)
Toremifene (Fareston)
Tositumomab (Bexxar)
Trametinib (Mekinest)
Trastuzumab (Herceptin)
Tretinoin (ATRA, Vesanoid)
Valrubicin (Valstar)
Vandetanib (Caprelsa)
Vemurafenib (Zelboraf)
Vinblastine (Velban)
Vincristine (Oncovin)
Vinorelbine (Navelbine)
Vismodegib (Erivedge)
Vorinostat (Zolinza)

Cerebrovascular accident (CVA)

Aspirin
Clopidogrel (Plavix)
Heparin
Nimodipine (Nimotop)
Prasugrel (Effient)
Ticlopidine (Ticlid)
Warfarin (Coumadin)

Chronic obstructive pulmonary disease (COPD)

Aclidinium (Tudorza)
Albuterol (Proventil HFA, Ventolin HFA)
Aminophylline (Theophylline)
Arformoterol (Brovana)
Budesonide (Pulmicort)
Budesonide/formoterol (Symbicort)
Formoterol (Foradil)
Indacaterol (Arcapta)
Ipratropium (Atrovent HFA)
Levalbuterol (Xopenex)
Olodaterol (Striverdi Respimat)
Pirbuterol (Maxair)
Roflumilast (Daliresp)
Salmeterol (Serevent)
Salmeterol/fluticasone (Advair)
Theophylline (Theochron, Theo ZY)
Tiotropium (Spiriva)
Umeclidinium (Incruse Ellipta)

Constipation

Bisacodyl (Dulcolax)
Docusate (Colace)
Lactulose (Kristalose)
Lubiprostone (Amitiza)
Methylcellulose (Citrucel)
Milk of magnesia (MOM)
Polyethylene glycol (MiraLax)
Psyllium (Metamucil)
Senna (Senokot)
Tegaserod (Zelnorm)

Deep vein thrombosis (DVT)

Dalteparin (Fragmin)
Enoxaparin (Lovenox)
Heparin
Tinzaparin (Innohep)
Warfarin (Coumadin)

Depression

Amitriptyline (Elavil, Endep)
Bupropion (Aplenzin, Wellbutrin)
Citalopram (Celexa)
Desipramine (Norpramin)
Desvenlafaxine (Khedezla, Pristiq)
Doxepin (Sinequan)
Duloxetine (Cymbalta)
Escitalopram (Lexapro)
Fluoxetine (Prozac)
Fluvoxamine (Luvox)
Ievomilnacipram (Fetzima)
Imipramine (Tofranil)
Mirtazapine (Remeron)
Nortriptyline (Aventyl, Pamelor)
Paroxetine (Paxil)
Selegiline (Emsam)
Sertraline (Zoloft)
Trazodone (Desyrel)
Venlafaxine (Effexor)
Vilazodone (Viibryd)
Vortioxetene (Brintellix)

Diabetes mellitus

Acarbose (Precose)
Albiglutide (Tanzeum)
Alogliptin (Nesina)
Bromocriptine (Cycloset)
Canaglifozin (Invokana)
Colesevelam (Welchol)
Dapagliflozin (Farxiga)

Dulaglutide (Trulicity)
Empagliflozin (Jardiance)
Exenatide (Byetta)
Glimepiride (Amaryl)
Glipizide (Glucotrol)
Glyburide (Micronase)
Insulin preparations (see Classification section)
Linagliptin (Tradjenta)
Liraglutide (Victoza)
Metformin (Glucophage)
Nateglinide (Starlix)
Pioglitazone (Actos)
Pramlintide (Symlin)
Repaglinide (Prandin)
Rosiglitazone (Avandia)
Saxagliptin (Onglyza)
Sitagliptin (Januvia)

Diabetic peripheral neuropathy

Amitriptyline (Elavil)
Bupropion (Wellbutrin)
Capsaicin (Trixaicin)
Carbamazepine (Tegretol)
Citalopram (Celexa)
Desipramine (Norpramin)
Duloxetine (Cymbalta)
Gabapentin (Neurontin)
Lamotrigine (Lamictal)
Lidocaine patch (Lidoderm)
Nortriptyline (Pamelor)
Oxcarbazepine (Trileptal)
Oxycodone (OxyContin)
Paroxetine (Paxil)
Pregabalin (Lyrica)
Tramadol (Ultram)
Valproic acid (Depakote)
Venlafaxine, extended-release (Effexor XR)

Diarrhea

Bismuth subsalicylate (Pepto-Bismol)
Diphenoxylate and atropine (Lomotil)
Fidaxomicin (Dificid)
Kaolin-pectin (Kaopectate)
Loperamide (Imodium)
Octreotide (Sandostatin)
Rifaximin (Xifaxan)

Duodenal, gastric ulcer

Cimetidine (Tagamet)
Esomeprazole (Nexium)
Famotidine (Pepcid)
Lansoprazole (Prevacid)
Misoprostol (Cytotec)
Nizatidine (Axid)
Omeprazole (Prilosec)
Pantoprazole (Protonix)
Rabeprazole (Aciphex)
Ranitidine (Zantac)
Sucralfate (Carafate)

Edema

Amiloride (Midamor)
Bumetanide (Bumex)
Chlorthalidone (Hygroton)
Ethacrynic acid (Edecrin)
Furosemide (Lasix)
Hydrochlorothiazide (HydroDIURIL)
Indapamide (Lozol)
Metolazone (Zaroxolyn)
Spironolactone (Aldactone)
Torsemide (Demadex)
Triamterene (Dyrenium)

Epilepsy

Carbamazepine (Tegretol)
Clobazam (Onfi)
Clonazepam (Klonopin)
Clorazepate (Tranxene)
Diazepam (Valium)
Eslicarbazepine (Aptiom)
Ethosuximide (Zarontin)
Ezogabine (Potiga)
Fosphenytoin (Cerebyx)
Gabapentin (Neurontin)
Lacosamide (Vimpat)
Lamotrigine (Lamictal, Lamictal ODT, Lamictal XR)
Levetiracetam (Keppra)
Lorazepam (Ativan)
Midazolam (Versed)
Oxcarbazepine (Trileptal)
Perampanel (Fycompa)
Phenobarbital
Phenytoin (Dilantin)
Pregabalin (Lyrica)
Primidone (Mysoline)
Rufinamide (Banzel)
Tiagabine (Gabitril)
Topiramate (Qudexy XR, Topamax Trokendi XR)
Valproic acid (Depakene, Depakote)
Vigabatrin (Sabril)
Zonisamide (Zonegran)

Esophageal reflux, esophagitis
Cimetidine (Tagamet)
Dexlansoprazole (Kapidex)
Esomeprazole (Nexium)
Famotidine (Pepcid)
Lansoprazole (Prevacid)
Nizatidine (Axid)
Omeprazole (Prilosec)
Pantoprazole (Protonix)
Rabeprazole (Aciphex)
Ranitidine (Zantac)

Fever
Acetaminophen (Tylenol)
Aspirin
Ibuprofen (Advil, Caldolor, Motrin)
Naproxen (Aleve, Anaprox, Naprosyn)

Fibromyalgia
Acetaminophen (Tylenol)
Amitriptyline (Elavil)
Carisoprodol (Soma)
Citalopram (Celexa)
Cyclobenzaprine (Flexeril)
Duloxetine (Cymbalta)
Fluoxetine (Prozac)
Gabapentin (Neurontin)
Milnacipran (Savella)
Paroxetine (Paxil)
Pregabalin (Lyrica)
Tramadol (Ultram)
Venlafaxine (Effexor)

Gastritis
Cimetidine (Tagamet)
Famotidine (Pepcid)
Nizatidine (Axid)
Ranitidine (Zantac)

Gastroesophageal reflux disease (GERD)
Cimetidine (Tagamet)
Dexlansoprazole (Kapidex)
Esomeprazole (Nexium)
Famotidine (Pepcid)
Lansoprazole (Prevacid)
Nizatidine (Axid)
Omeprazole (Prilosec)
Pantoprazole (Protonix)
Rabeprazole (Aciphex)
Ranitidine (Zantac)

Glaucoma
Acetazolamide (Diamox)
Apraclonidine (Iopidine)
Betaxolol (Betoptic)
Bimatoprost (Lumigan)
Brimonidine (Alphagan)
Brinzolamide (Azopt)
Carbachol
Dorzolamide (Trusopt)
Echothiophate iodide (Phospholine)
Latanoprost (Xalatan)
Levobunolol (Betagan)
Pilocarpine (Isopto Carpine)
Tafluprost (Zioptan)
Timolol (Timoptic)
Travoprost (Travatan)
Unoprostone (Rescula)

Gout
Allopurinol (Zyloprim)
Colchicine (Colcrys)
Febuxostat (Uloric)
Ibuprofen (Motrin)
Indomethacin (Indocin)
Naproxen (Naprosyn)
Pegloticase (Krystexxa)
Piroxicam (Feldene)
Probenecid (Benemid)
Sulindac (Clinoril)

Heart failure (HF)
Bisoprolol (Zebeta)
Bumetanide (Bumex)
Candesartan (Atacand)
Captopril (Capoten)
Carvedilol (Coreg)
Digoxin (Lanoxin)
Dobutamine (Dobutrex)
Dopamine (Intropin)
Enalapril (Vasotec)
Eplerenone (Inspra)
Fosinopril (Monopril)
Furosemide (Lasix)
Hydralazine (Apresoline)
Isosorbide (Isordil)
Lisinopril (Prinivil, Zestril)
Losartan (Cozaar)
Metoprolol (Lopressor)
Milrinone (Primacor)
Nitroglycerin
Quinapril (Accupril)
Ramipril (Altace)
Spironolactone (Aldactone)

Torsemide (Demadex)
Valsartan (Diovan)

Hepatitis B
Adefovir (Hepsera)
Entecavir (Baraclude)
Lamivudine (Epivir)
Peginterferon alpha-2a (Pegasys)
Telbivudine (Tyzeka)
Tenofovir (Viread)

Hepatitis C
Boceprevir (Victrelis)
Ledipasvir/Sofosbuvir (Harvoni)
Peginterferon alfa-2a (Pegasys)
Peginterferon alfa-2b (Pegintron)
Ribavirin (Copegus, Rebetol, Ribasphere)
Simeprevir (Olysio)
Sofosbuvir (Sovaldi)

Human immunodeficiency virus (HIV)
Abacavir (Ziagen)
Atazanavir (Reyataz)
Cobicistat (Tybost)
Darunavir (Prezista)
Delavirdine (Rescriptor)
Didanosine (Videx)
Dolutegravir (Tivicay)
Efavirenz (Sustiva)
Elvitegravir (Vitekta)
Emtricitabine (Emtriva)
Enfuvirtide (Fuzeon)
Etravirine (Intelence)
Fosamprenavir (Lexiva)
Indinavir (Crixivan)
Lamivudine (Epivir)
Lopinavir/ritonavir (Kaletra)
Maraviroc (Selzentry)
Nelfinavir (Viracept)
Nevirapine (Viramune)
Raltegravir (Isentress)
Rilpivirine (Edurant)
Ritonavir (Norvir)
Saquinavir (Invirase)
Stavudine (Zerit)
Tenofovir (Viread)
Tesamorelin (Egrifta)
Tipranavir (Aptivus)
Zidovudine (AZT, Retrovir)

Hypercholesterolemia
Atorvastatin (Lipitor)
Cholestyramine (Questran)
Colesevelam (Welchol)
Colestipol (Colestid)
Ezetimibe (Zetia)
Fenofibrate (Antara, Lofibra, Tricor)
Fenofibric Acid (Trilipix)
Fish oil (Lovaza)
Fluvastatin (Lescol)
Gemfibrozil (Lopid)
Lomitapide (Juxapid)
Lovastatin (Altoprev, Mevacor)
Mipomersen (Kynamro)
Niacin (Niaspan, Slo-Niacin)
Pitavastatin (Livalo)
Pravastatin (Pravachol)
Rosuvastatin (Crestor)
Simvastatin (Zocor)

Hyperphosphatemia
Aluminum salts
Calcium salts
Ferric Citrate (Auryxia)
Lanthanum (Fosrenol)
Sevelamer (Renagel)

Hypertension
Aliskiren (Tekturna)
Amlodipine (Norvasc)
Atenolol (Tenormin)
Azilsartan (Edarbi)
Benazepril (Lotensin)
Bisoprolol (Zebeta)
Candesartan (Atacand)
Captopril (Capoten)
Clonidine (Catapres)
Diltiazem (Cardizem, Dilacor)
Doxazosin (Cardura)
Enalapril (Vasotec)
Eplerenone (Inspra)
Eprosartan (Teveten)
Felodipine (Plendil)
Fosinopril (Monopril)
Hydralazine (Apresoline)
Hydrochlorothiazide (HydroDIURIL)
Indapamide (Lozol)
Irbesartan (Avapro)
Isradipine (DynaCirc)
Labetalol (Normodyne, Trandate)
Lisinopril (Prinivil, Zestril)
Losartan (Cozaar)
Methyldopa (Aldomet)
Metolazone (Diulo, Zaroxolyn)
Metoprolol (Lopressor)
Minoxidil (Loniten)

Moexipril (Univasc)
Nadolol (Corgard)
Nebivolol (Bystolic)
Nicardipine (Cardene)
Nifedipine (Adalat, Procardia)
Nitroglycerin
Nitroprusside (Nipride)
Olmesartan (Benicar)
Perindopril (Aceon)
Pindolol (Visken)
Prazosin (Minipress)
Propranolol (Inderal)
Quinapril (Accupril)
Ramipril (Altace)
Spironolactone (Aldactone)
Telmisartan (Micardis)
Terazosin (Hytrin)
Trandolapril (Mavik)
Valsartan (Diovan)
Verapamil (Calan, Isoptin)

Hypertriglyceridemia

Atorvastatin (Lipitor)
Colesevelam (Welchol)
Fenofibrate (Tricor)
Fluvastatin (Lescol)
Gemfibrozil (Lopid)
Icosapent (Vascepa)
Lovastatin (Mevacor)
Niacin (Niaspan)
Omega-3 acid ethyl esters (Lovaza)
Pravastatin (Pravachol)
Rosuvastatin (Crestor)
Simvastatin (Zocor)

Hyperuricemia

Allopurinol (Zyloprim)
Febuxostat (Uloric)
Pegloticase (Krystexxa)
Probenecid (Benemid)

Hypotension

Dobutamine (Dobutrex)
Dopamine (Intropin)
Ephedrine
Epinephrine
Norepinephrine (Levophed)
Phenylephrine (Neo-Synephrine)

Hypothyroidism

Levothyroxine (Levoxyl, Synthroid)
Liothyronine (Cytomel)
Thyroid

Idiopathic thrombocytopenic purpura (ITP)

Cyclophosphamide (Cytoxan)
Dexamethasone (Decadron)
Hydrocortisone (Solu-Cortef)
Immune globulin intravenous
Methylprednisolone (Solu-Medrol)
Prednisone
Rh_0(D) immune globulin (RhoGam)
Rituximab (Rituxan)

Insomnia

Diphenhydramine (Benadryl)
Estazolam (ProSom)
Eszopiclone (Lunesta)
Flurazepam (Dalmane)
Ramelteon (Rozerem)
Suvorexant (Belsomra)
Temazepam (Restoril)
Zaleplon (Sonata)
Zolpidem (Ambien, Edluar)

Inflammatory bowel disease (Crohn's disease, ulcerative colitis)

Adalimumab (Humira)
Azathioprine (Imuran)
Balsalazide (Colazal, Giazo)
Budesonide (Entocort EC, Uceris)
Certolizumab (Cimzia)
Cyclosporine (Sandimmune)
Golimumab (Simponi)
Hydrocortisone (Colocort, Cortifoam)
Infliximab (Remicade)
Mercaptopurine (Purinethol)
Mesalamine (Apriso, Asacol HD, Delzicol, Lialda, Pentasa)
Methotrexate (Otrexup, Rasuvo)
Olsalazine (Dipentum)
Prednisone
Sulfasalazine (Azulfidine)
Tacrolimus (Prograf)
Vedolizumab (Entyvio)

Migraine headaches

Almotriptan (Axert)
Amitriptyline (Elavil, Endep)
Diclofenac (Cambia)
Dihydroergotamine
Eletriptan (Relpax)
Ergotamine (Ergomar)
Frovatriptan (Frova)
Naratriptan (Amerge)
Propranolol (Inderal)

Rizatriptan (Maxalt)
Sumatriptan (Imitrex)
Zolmitriptan (Zomig)

Multiple sclerosis (MS)
Alemtuzumab (Lemtrada)
Dalfampridine (Ampyra)
Dimethyl fumarate (Tecfidera)
Fingolimod (Gilenya)
Glatiramer (Copaxone)
Interferon beta-1a (Avonex, Rebif)
Interferon beta-1b (Betaseron, Extavia)
Peginterferon beta-la (Plegridy)
Mitoxantrone (Novantrone)
Natalizumab (Tysabri)
Teriflunomide (Aubagio)

Myelodysplastic syndrome
Azacitidine (Vidaza)
Clofarabine (Clolar)
Decitabine (Dacogen)
Lenalidomide (Revlimid)

Myocardial infarction (MI)
Alteplase (Activase)
Aspirin
Atenolol (Tenormin)
Captopril (Capoten)
Clopidogrel (Plavix)
Dalteparin (Fragmin)
Diltiazem (Cardizem, Dilacor)
Enalapril (Vasotec)
Enoxaparin (Lovenox)
Heparin
Lidocaine
Lisinopril (Prinivil, Zestril)
Metoprolol (Lopressor)
Morphine
Nitroglycerin
Propranolol (Inderal)
Quinapril (Accupril)
Ramipril (Altace)
Reteplase (Retavase)
Streptokinase
Timolol (Blocadren)
Warfarin (Coumadin)

Nausea
Aprepitant (Emend)
Chlorpromazine (Thorazine)
Dexamethasone (Decadron)
Dimenhydrinate (Dramamine)
Dolasetron (Anzemet)
Dronabinol (Marinol)
Droperidol (Inapsine)
Fosaprepitant (Emend)
Granisetron (Kytril)
Hydroxyzine (Vistaril)
Lorazepam (Ativan)
Meclizine (Antivert)
Metoclopramide (Reglan)
Nabilone (Cesamet)
Ondansetron (Zofran)
Palonosetron (Aloxi)
Prochlorperazine (Compazine)
Promethazine (Phenergan)

Obesity
Benzphetamine (Didrex)
Bupropion (Wellbutrin)
Bupropion/naltrexone (Contrave)
Diethylpropion (Tenuate)
Exenatide (Bydureon, Byetta)
Lorcaserin (Belviq)
Methamphetamine (Desoxyn)
Orlistat (Alli, Xenical)
Phendimetrazine (Bontril)
Phentermine (Ionamin)
Phentermine and topiramate (Qsymia)

Obsessive-compulsive disorder (OCD)
Citalopram (Celexa)
Clomipramine (Anafranil)
Escitalopram (Lexapro)
Fluoxetine (Prozac)
Fluvoxamine (Luvox)
Paroxetine (Paxil)
Sertraline (Zoloft)

Organ transplant, rejection prophylaxis
Azathioprine (Imuran)
Basiliximab (Simulect)
Belatacept (Nulojix)
Cyclophosphamide (Cytoxan, Neosar)
Cyclosporine (Sandimmune)
Daclizumab (Zenapax)
Everolimus (Zortress)
Mycophenolate (CellCept)
Sirolimus (Rapamune)
Tacrolimus (Prograf)

Osteoarthritis
Acetaminophen (Tylenol)
Celecoxib (Celebrex)
Diclofenac (Cataflam, Pennsaid, Voltaren)
Duloxetine (Cymbalta)

Etodolac (Lodine)
Flurbiprofen (Ansaid)
Ibuprofen (Motrin)
Ketoprofen (Orudis)
Meloxicam (Mobic)
Nabumetone (Relafen)
Naproxen (Naprosyn)
Sulindac (Clinoril)
Tramadol (Ultram)

Osteoporosis
Alendronate (Fosamax)
Calcitonin (Miacalcin)
Calcium salts
Conjugated estrogens/bazedoxifene (Duavee)
Denosumab (Prolia)
Ibandronate (Boniva)
Raloxifene (Evista)
Risedronate (Actonel)
Teriparatide (Forteo)
Vitamin D
Zoledronic acid (Reclast)

Paget's disease
Alendronate (Fosamax)
Calcitonin (Miacalcin)
Etidronate (Didronel)
Pamidronate (Aredia)
Risedronate (Actonel)
Tiludronate (Skelid)
Zoledronic acid (Reclast)

Pain, mild to moderate
Acetaminophen (Tylenol)
Aspirin
Celecoxib (Celebrex)
Codeine
Diclofenac (Cataflam, Voltaren, Zipsor)
Diflunisal (Dolobid)
Etodolac (Lodine)
Flurbiprofen (Ansaid)
Ibuprofen (Advil, Caldolor, Motrin)
Ketorolac (Toradol)
Naproxen (Anaprox, Naprosyn)
Salsalate (Disalcid)
Tramadol (Ultram)

Pain, moderate to severe
Butorphanol (Stadol)
Fentanyl (Onsolis, Sublimaze)
Hydromorphone (Dilaudid)
Meperidine (Demerol)
Methadone (Dolophine)
Morphine (MS Contin)
Morphine/naltrexone (Embeda)
Nalbuphine (Nubain)
Oxycodone (OxyFast, Roxicodone)
Oxymorphone (Opana)
Ziconotide (Prialt)

Panic attack disorder
Alprazolam (Xanax)
Clonazepam (Klonopin)
Paroxetine (Paxil)
Sertraline (Zoloft)
Venlafaxine (Effexor)

Parkinsonism
Apomorphine (Apokyn)
Carbidopa/levodopa (Sinemet, Sinemet CR)
Entacapone (Comtan)
Pramipexole (Mirapex)
Rasagiline (Azilect)
Ropinirole (Requip)
Rotigotine (Neupro)
Selegiline (Eldepryl, Zelapar)
Tolcapone (Tasmar)

Peptic ulcer disease
Cimetidine (Tagamet)
Dexlansoprazole (Dexilant)
Esomeprazole (Nexium)
Famotidine (Pepcid)
Lansoprazole (Prevacid)
Misoprostol (Cytotec)
Nizatidine (Axid)
Omeprazole (Prilosec)
Pantoprazole (Protonix)
Rabeprazole (Aciphex)
Ranitidine (Zantac)
Sucralfate (Carafate)

Pneumonia
Amoxicillin (Amoxil)
Amoxicillin/clavulanate (Augmentin)
Ampicillin (Polycillin)
Azithromycin (Zithromax)
Cefaclor (Ceclor)
Cefpodoxime (Vantin)
Ceftriaxone (Rocephin)
Cefuroxime (Kefurox, Zinacef)
Clarithromycin (Biaxin)
Co-trimoxazole (Bactrim, Septra)
Erythromycin
Gentamicin (Garamycin)
Levofloxacin (Levaquin)

Linezolid (Zyvox)
Moxifloxacin (Avelox)
Piperacillin/tazobactam (Zosyn)
Tobramycin (Nebcin)
Vancomycin (Vancocin)

Pneumonia, *Pneumocystis jiroveci*
Atovaquone (Mepron)
Clindamycin (Cleocin)
Co-trimoxazole (Bactrim, Septra)
Pentamidine (Pentam)
Trimethoprim (Proloprim)

Post-traumatic stress disorder
Amitriptyline (Elavil)
Aripiprazole (Abilify)
Citalopram (Celexa)
Escitalopram (Lexapro)
Fluoxetine (Prozac)
Imipramine (Tofranil)
Lamotrigine (Lamictal)
Olanzapine (Zyprexa)
Paroxetine (Paxil)
Phenelzine (Nardil)
Prazosin (Minipress)
Propranolol (Inderal)
Quetiapine (Seroquel)
Risperidone (Risperdal)
Sertraline (Zoloft)
Topiramate (Topamax)
Valproic acid (Depakote)
Venlafaxine (Effexor)
Ziprasidone (Geodon)

Pruritus
Amcinonide (Cyclocort)
Brompheniramine (Dimetane)
Cetirizine (Zyrtec)
Chlorpheniramine (Dimetane)
Clemastine (Tavist)
Clobetasol (Temovate)
Cyproheptadine (Periactin)
Desloratadine (Clarinex)
Desonide (Tridesilon)
Desoximetasone (Topicort)
Diphenhydramine (Benadryl)
Fluocinolone (Synalar)
Fluocinonide (Lidex)
Halobetasol (Ultravate)
Hydrocortisone (Cort-Dome, Hytone)
Hydroxyzine (Atarax, Vistaril)
Prednisolone (Prelone)
Prednisone (Deltasone)
Promethazine (Phenergan)

Psychosis
Aripiprazole (Abilify)
Asenapine (Saphris)
Chlorpromazine (Thorazine)
Clozapine (Clozaril)
Fluphenazine (Prolixin)
Haloperidol (Haldol)
Iloperidone (Fanapt)
Loxapine (Adasuve)
Lurasidone (Latuda)
Olanzapine (Zyprexa)
Quetiapine (Seroquel, Seroquel XR)
Risperidone (Risperdal)
Thioridazine (Mellaril)
Thiothixene (Navane)
Ziprasidone (Geodon)

Pulmonary arterial hypertension
Ambrisentan (Letairis)
Bosentan (Tracleer)
Epoprostenol (Flolan)
Iloprost (Ventavis)
Macitentan (Opsumit)
Riociguat (Adempas)
Sildenafil (Revatio)
Tadalafil (Adcirca)
Treprostinil (Remodulin, Tyvaso)

Respiratory distress syndrome (RDS)
Beractant (Survanta)
Calfactant (Infasurf)
Poractant alfa (Curosurf)

Restless legs syndrome
Cabergoline (Dostinex)
Carbidopa/levodopa (Sinemet)
Clonazepam (Klonopin)
Gabapentin (Horizant, Neurontin)
Levodopa
Oxycodone (Roxicodone)
Pramipexole (Mirapex)
Ropinirole (Requip)
Rotigotine (Neupro)
Tramadol (Ultram)
Zaleplon (Sonata)
Zolpidem (Ambien)

Schizophrenia
Aripiprazole (Abilify)
Asenapine (Saphris)
Chlorpromazine (Thorazine)
Clozapine (Clozaril)
Fluphenazine (Prolixin)

Haloperidol (Haldol)
Iloperidone (Fanapt)
Lurasidone (Latuda)
Olanzapine (Zyprexa)
Paliperidone (Invega, Invega Sustenna)
Quetiapine (Seroquel, Seroquel XR)
Risperidone (Risperdal)
Thioridazine (Mellaril)
Thiothixene (Navane)
Ziprasidone (Geodon)

Smoking cessation
Bupropion (Zyban)
Clonidine (Catapres)
Nicotine (Nicoderm, Nicotrol)
Nortriptyline (Pamelor)
Varenicline (Chantix)

Thrombosis
Apixaban (Eliquis)
Dalteparin (Fragmin)
Enoxaparin (Lovenox)
Fondaparinux (Arixtra)
Heparin
Tinzaparin (Innohep)
Warfarin (Coumadin)

Thyroid disorders
Levothyroxine (Levoxyl, Synthroid)
Liothyronine (Cytomel)
Thyroid

Transient ischemic attack (TIA)
Aspirin
Clopidogrel (Plavix)
Prasugrel (Effient)
Ticlopidine (Ticlid)
Warfarin (Coumadin)

Tremor
Atenolol (Tenormin)
Chlordiazepoxide (Librium)
Diazepam (Valium)
Lorazepam (Ativan)
Metoprolol (Lopressor)
Nadolol (Corgard)
Propranolol (Inderal)

Tuberculosis (TB)
Bedaquiline (Sirturo)
Cycloserine (Seromycin)
Ethambutol (Myambutol)
Isoniazid (INH)
Pyrazinamide
Rifabutin (Mycobutin)
Rifampin (Rifadin)
Rifapentine (Priftin)

Urticaria
Cetirizine (Zyrtec)
Cimetidine (Tagamet)
Clemastine (Tavist)
Cyproheptadine (Periactin)
Diphenhydramine (Benadryl)
Hydroxyzine (Atarax, Vistaril)
Loratadine (Claritin)
Promethazine (Phenergan)
Ranitidine (Zantac)

Vertigo
Dimenhydrinate (Dramamine)
Diphenhydramine (Benadryl)
Meclizine (Antivert)
Scopolamine (Trans-Derm Scop)

Vomiting
Aprepitant (Emend)
Chlorpromazine (Thorazine)
Dexamethasone (Decadron)
Dimenhydrinate (Dramamine)
Dolasetron (Anzemet)
Dronabinol (Marinol)
Droperidol (Inapsine)
Fosaprepitant (Emend)
Granisetron (Kytril)
Hydroxyzine (Vistaril)
Lorazepam (Ativan)
Meclizine (Antivert)
Metoclopramide (Reglan)
Nabilone (Cesamet)
Ondansetron (Zofran)
Palonosetron (Aloxi)
Prochlorperazine (Compazine)
Promethazine (Phenergan)
Scopolamine (Trans-Derm Scop)
Trimethobenzamide (Tigan)

Zollinger-Ellison syndrome
Aluminum salts
Cimetidine (Tagamet)
Esomeprazole (Nexium)
Famotidine (Pepcid)
Lansoprazole (Prevacid)
Omeprazole (Prilosec)
Pantoprazole (Protonix)
Rabeprazole (Aciphex)
Ranitidine (Zantac)

DRUG CLASSIFICATION CONTENTS

Allergic Rhinitis Nasal Preparations

USES

Relieve symptoms associated with allergic rhinitis. These symptoms include rhinorrhea, nasal congestion, pruritus, sneezing, postnasal drip, nasal pain.

Allergic rhinitis or hay fever is an inflammation of the nasal airways occurring when an allergen (e.g., pollen) is inhaled. This triggers antibody production. The antibodies bind to mast cells, which contain histamine. Histamine is released, causing symptoms of allergic rhinitis.

ACTION

Intranasal corticosteroids: Depress migration of polymorphonuclear leucocytes and fibroblasts, reverse capillary permeability, and stabilize nasal membranes to prevent/control inflammation.

Intranasal antihistamines: Reduce histamine-mediated symptoms of allergic rhinitis, including pruritus, sneezing, rhinorrhea, watery eyes.

Intranasal mast cell stabilizers: Inhibit the mast cell release of histamine and other inflammatory mediators.

Intranasal anticholinergics: Block acetylcholine in the nasal mucosa. Effective in treating rhinorrhea associated with allergic rhinitis.

Intranasal decongestants: Vasoconstrict the respiratory mucosa, provide short-term relief of nasal congestion.

CORTICOSTEROIDS

Generic (Brand)	Adult Dose	Pediatric Dose	Side Effects
Beclomethasone (Beconase AQ) (Qnasi)	Beconase AQ: 1–2 sprays in each nostril 2 times/day Qnasi: 2 sprays in each nostril once daily	Beconase AQ: 5–11 yrs: 1–2 sprays in each nostril 2 times/day	Altered taste and smell, epistaxis, burning, stinging, headache, nasal septum perforation
Budesonide (Rhinocort Aqua)	1 spray in each nostril daily	6–11 yrs: 1 spray in each nostril daily	Bronchospasm, cough, epistaxis, nasal/throat irritation
Ciclesonide (Omnaris, Zetonna)	Omnaris: 2 sprays in each nostril daily Zetonna: 1 spray in each nostril daily	Omnaris: 2–11 yrs: 1–2 sprays in each nostril daily	Fever, headache, nausea, cough, epistaxis, nasal septum disorder

Flunisolide (Nasalide)	2 sprays in each nostril 2 or 3 times/day (maximum: 8 sprays in each nostril daily)	6–14 yrs: 2 sprays in each nostril 2 times/day or 1 spray in each nostril 3 times/day (maximum: 4 sprays in each nostril daily)	Nasal burning/stinging, nasal dryness/irritation
Fluticasone (Flonase)	2 sprays in each nostril daily or 1 spray in each nostril 2 times/day	4–17 yrs: 1–2 sprays in each nostril daily	Dizziness, fever, headache, nausea, cough, epistaxis
Fluticasone/Azelastine (Dymista)	1 spray in each nostril 2 times/day	Not indicated in children younger than 12 yrs	Same as fluticasone and azelastine
Fluticasone (Veramyst)	1–2 sprays in each nostril daily	2–11 yrs: 1–2 sprays in each nostril once daily	Same as fluticasone
Mometasone (Nasonex)	2 sprays in each nostril daily	2–11 yrs: 1 spray in each nostril daily	Headache, nasopharyngitis, sinusitis
Triamcinolone (Nasacort AQ)	1–2 sprays in each nostril daily	2–5 yrs: 1 spray in each nostril once daily 6–11 yrs: 1–2 sprays in each nostril daily	Bronchitis, chest congestion, cough, epistaxis, pharyngitis, sinusitis

ANTIHISTAMINES

Generic (Brand)	Adult Dose	Pediatric Dose	Side Effects
Azelastine (Astelin) Astepro 0.15%	Astelin: 1–2 sprays in each nostril 2 times/day Astepro 0.15%: 1–2 sprays in each nostril two times/day or 2 sprays each nostril once daily	Astelin: 5–11 yrs: 1 spray in each nostril 2 times/day	Sedation, epistaxis, nasal irritation
Azelastine/Fluticasone (Dymista)	1 spray in each nostril 2 times/day	Not approved for children younger than 12 yrs	Same as azelastine and fluticasone
Olopatadine (Patanase)	2 sprays in each nostril 2 times/day	6–11 yrs: 1 spray in each nostril 2 times/day	Same as azelastine

MAST CELL STABILIZERS

Generic (Brand)	Adult Dose	Pediatric Dose	Side Effects
Cromolyn (Nasalcrom)	1 spray in each nostril 3–6 times/day	2–11 yrs: 1 spray in each nostril 3–6 times/day	Nasal irritation, unpleasant taste

ANTICHOLINERGICS

Generic (Brand)	Adult Dose	Pediatric Dose	Side Effects
Ipratropium (Atrovent) 0.03%	2 sprays in each nostril 2–3 times/day	6–11 yrs: 2 sprays in each nostril 2–3 times/day	Nasal irritation, epistaxis, dizziness, headache, blurry vision
Ipratropium (Atrovent) 0.06%	2 sprays in each nostril 4 times/day	5–11 yrs: 2 sprays in each nostril 4 times/day	Same as ipratropium 0.03%

DECONGESTANTS

Generic (Brand)	Adult Dose	Pediatric Dose	Side Effects
Oxymetazoline (Afrin)	2–3 drops or sprays 2 times/day	2–3 drops or sprays 2 times/day	Insomnia, tachycardia, nervousness, nausea, vomiting, transient burning, headache, rebound congestion if used longer than 72 hrs
Phenylephrine (Neo-Synephrine)	2–3 drops or 1–2 sprays q4h as needed (0.25% or 0.5%)	6–11 yrs: 2–3 drops (0.25%) q4h as needed 1–5 yrs: 2–3 drops (0.125%) q4h as needed	Restlessness, nervousness, headache, rebound nasal congestion, burning, stinging, dryness

Anesthetics: General

USES

Intravenous (IV) anesthetic agents are used to induce general anesthesia. The general anesthetic state consists of unconsciousness, amnesia, analgesia, immobility, and attenuation of autonomic responses to noxious stimuli.

Volatile inhalation agents produce all the components of the anesthetic state but are administered through the lungs via an anesthesia machine. Agents for use include desflurane, sevoflurane, isoflurane, enflurane, and halothane.

General anesthetics are medications producing unconsciousness and a lack of response to all painful stimuli.

ACTION

IV anesthetic agents: Most agents produce CNS depression by action on the gamma-aminobutyric acid (GABA) receptor complex. GABA is the primary inhibitory neurotransmitter in the CNS. Ketamine produces dissociation between the thalamus and the limbic system.

Volatile inhalation agents: The action of these agents is not fully understood, but they may disrupt neuronal transmission throughout the CNS. These agents may either block excitatory or enhance inhibitory transmission through axons or synapses.

ANESTHETICS: GENERAL

Name	Availability	Uses	Dosage Range	Side Effects
Etomidate (Amidate)	**I:** 2 mg/ml	IV induction	0.2–0.6 mg/kg	Myoclonus, pain on injection, nausea, vomiting, respiratory depression
Ketamine (Ketalar)	**I:** 10 mg/ml, 50 mg/ml, 100 mg/ml	Analgesia, sedation, IV induction	1–4.5 mg/kg	Delirium, euphoria, nausea, vomiting
Methohexital (Brevital)	**Powder for injection:** 500 mg	IV induction, sedation	50–120 mg	Cardiovascular depression, myoclonus, nausea, vomiting, respiratory depression

Continued

ANESTHETICS: GENERAL—cont'd

Name	Availability	Uses	Dosage Range	Side Effects
Midazolam (Versed)	**I:** 1 mg/ml, 5 mg/ml	Anxiolytic, amnesic, sedation	1–5 mg titrated slowly	Respiratory depression
Propofol (Diprivan)	**I:** 10 mg/ml	Sedation IV induction Maintenance	0.5 mg/kg 2–2.5 mg/kg 100–200 mcg/kg/min	Cardiovascular depression, delirium, euphoria, pain on injection, respiratory depression

I, Injection.

Anesthetics: Local

USES

Local anesthetics suppress pain by blocking impulses along axons. Suppression of pain does not cause generalized depression of the entire nervous system. Local anesthetics may be given topically and by injection (local infiltration, peripheral nerve block [axillary], IV regional [Bier block], epidural, and spinal).

ACTION

Most local anesthetics fall into one of two groups: esters or amides. Both provide anesthesia and analgesia by reversibly binding to and blocking sodium (Na) channels. This slows the rate of depolarization of the nerve action potential; thus, propagation of the electrical impulses needed for nerve conduction is prevented.

ANESTHETICS: LOCAL

Name	Uses	Onset (min)	Duration (hrs)	Side Effects
Esters				
Chloroprocaine (Nesacaine)	Local infiltrate, nerve block, spinal	6–12	0.5–1	Seizures, bradycardia, cardiac arrest, hypotension, arrhythmias, anxiety, dizziness, restlessness, erythema, pruritus, urticaria, blurred vision, allergic reaction
Procaine (Novocaine)	Local infiltrate, nerve block, spinal	2–5	0.5–1.5	Burning sensation/pain at injection site, tissue irritation, CNS stimulation followed by CNS depression, chills
Amides				
Bupivacaine (Marcaine, Sensorcaine)	Local infiltrate, nerve block, epidural, spinal	5	2–9	Cardiac arrest, hypotension, bradycardia, palpitations, seizures, restlessness, anxiety, dizziness, nausea, vomiting, blurred vision, weakness, tinnitus, apnea
Lidocaine	Local infiltrate, nerve block, spinal, epidural, topical, IV regional	Less than 2	0.5–1	Bradycardia, hypotension, arrhythmias, agitation, anxiety, dizziness, seizures, pruritus, rash, nausea, vomiting, altered taste, visual changes, tinnitus, respiratory depression, allergic reaction
Mepivacaine (Carbocaine, Polocaine)	Local infiltrate, nerve block, epidural	3–20	2–2.5	Bradycardia, syncope, arrhythmias, anxiety, seizures, dizziness, restlessness, chills, pruritus, urticaria, nausea, vomiting, incontinence, blurred vision, tinnitus, allergic reaction
Ropivacaine (Naropin)	Local infiltrate, nerve block, epidural, spinal	1–15	3–15	Hypotension, bradycardia, headache, pruritus, nausea, vomiting, dizziness, anxiety, tinnitus, dyspnea, cardiac arrest, arrhythmias, seizures, syncope, chills

Note: Most side effects are manifestations of excessive plasma concentrations.

Anesthetics: Local Topical

ANESTHETICS: LOCAL TOPICAL

Name	Indications	Peak Effect (min)	Duration (min)
Amides			
Dibucaine (Nupercainal)	Skin	Less than 5	15–45
Lidocaine	Skin, mucous membranes	2–5	15–45
Esters			
Benzocaine	Skin, mucous membranes	Less than 5	15–45
Cocaine	Mucous membranes	2–5	30–60
Tetracaine (Pontocaine)	Skin, mucous membranes	3–8	30–60

Angiotensin-Converting Enzyme (ACE) Inhibitors

USES	ACTION	
Treatment of hypertension (HTN), adjunctive therapy for heart failure (HF).	*Antihypertensive:* Exact mechanism unknown. May be related to competitive inhibition of angiotensin I converting enzyme (ACE) activity causing decreased conversion of angiotensin I to angiotensin II, a potent vasoconstrictor. Reduces peripheral arterial resistance.	*HF:* Decreases peripheral vascular resistance (afterload), pulmonary capillary wedge pressure (preload); improves cardiac output, exercise tolerance.

ACE INHIBITORS

Name	Availability	Uses	Dosage Range (per day)	Side Effects
Benazepril (Lotensin)	**T:** 5 mg, 10 mg, 20 mg, 40 mg	HTN	**HTN:** 5–80 mg in 1 or 2 doses	Headaches, dizziness, fatigue, cough
Captopril (Capoten)	**T:** 12.5 mg, 25 mg, 50 mg, 100 mg	HTN HF	**HTN:** 12.5–150 mg in 2–3 doses **HF:** 12.5–450 mg	Insomnia, headaches, dizziness, fatigue, GI complaints, cough, rash
Enalapril (Vasotec)	**T:** 2.5 mg, 5 mg, 10 mg, 20 mg **IV:** 1.25 mg/ml	HTN HF	**HTN:** 2.5–40 mg in 1 or 2 doses (**IV:** 1.25 mg q6h) **HF:** 5–20 mg	Chest pain, hypotension, headaches, fatigue, dizziness
Fosinopril (Monopril)	**T:** 10 mg, 20 mg, 40 mg	HTN HF	**HTN:** 10–80 mg in 1 or 2 doses **HF:** 20–40 mg	Hypotension, nausea, vomiting, cough
Lisinopril (Prinivil, Zestril)	**T:** 2.5 mg, 5 mg, 10 mg, 20 mg, 40 mg	HTN HF	**HTN:** 5–40 mg **HF:** 5–20 mg	Chest pain, hypotension, headaches, dizziness, fatigue, diarrhea
Moexipril (Univasc)	**T:** 7.5 mg, 15 mg	HTN	**HTN:** 7.5–30 mg in 1 or 2 doses	Dizziness, fatigue, diarrhea, cough
Perindopril (Aceon)	**T:** 2 mg, 4 mg, 6 mg	HTN	**HTN:** 4–8 mg in 1 or 2 doses	Hypotension, dizziness, fatigue, syncope, cough
Quinapril (Accupril)	**T:** 5 mg, 10 mg, 20 mg, 40 mg	HTN HF	**HTN:** 10–80 mg in 1 or 2 doses **HF:** 10–40 mg	Chest pain, hypotension, headaches, dizziness, fatigue, diarrhea, nausea, vomiting, cough
Ramipril (Altace)	**C:** 1.25 mg, 2.5 mg, 5 mg, 10 mg	HTN HF	**HTN:** 2.5–20 mg in 1 or 2 doses **HF:** 1.25–10 mg	Hypotension, headaches, dizziness, cough

Continued

ACE INHIBITORS—cont'd

Name	Availability	Uses	Dosage Range (per day)	Side Effects
Trandolapril (Mavik)	**T:** 1 mg, 2 mg, 4 mg	HTN HF	**HTN:** 1–8 mg in 1 or 2 doses **HF:** 1–4 mg	Dizziness, dyspepsia, cough, asthenia (loss of strength, energy), syncope, myalgia

C, Capsules; ***HF,*** heart failure; ***HTN,*** hypertension; ***T,*** tablets.

Angiotensin II Receptor Antagonists

USES	ACTION
Treatment of hypertension (HTN) alone or in combination with other antihypertensives. Treatment of heart failure (HF).	Angiotensin II receptor antagonists (AIIRA) block vasoconstrictor and aldosterone-secreting effects on angiotensin II by selectively blocking the binding of angiotensin II to AT_1 receptors in vascular smooth muscle and the adrenal gland, causing vasodilation and a decrease in aldosterone effects.

ANGIOTENSIN II RECEPTOR ANTAGONISTS

Name	Availability	Uses	Dosage Range (per day)	Side Effects
Azilsartan (Edarbi)	**T:** 40 mg, 80 mg	HTN	40–80 mg once daily	Diarrhea, hypotension, muscle spasms, weakness
Candesartan (Atacand)	**T:** 4 mg, 8 mg, 16 mg, 32 mg	HTN HF	8–32 mg in 1–2 divided doses 4–32 mg once daily	Headaches, upper respiratory tract infection, pain, dizziness
Eprosartan (Teveten)	**T:** 400 mg, 600 mg	HTN	400–800 mg in 1–2 divided doses	Headaches, upper respiratory tract infection, myalgia

Irbesartan (Avapro)	**T:** 75 mg, 150 mg, 300 mg	HTN Nephropathy	150–300 mg once daily 300 mg once daily	Headaches, upper respiratory tract infection
Losartan (Cozaar)	**T:** 25 mg, 50 mg, 100 mg	HTN Nephropathy	25–100 mg in 1–2 divided doses 100 mg once daily	Dizziness, headaches, upper respiratory tract infection, diarrhea, fatigue, cough
Olmesartan (Benicar)	**T:** 5 mg, 20 mg, 40 mg	HTN	20–40 mg once daily	Headaches, upper respiratory tract infection, flu-like symptoms, dizziness, bronchitis, rhinitis, back pain, pharyngitis, sinusitis, diarrhea, peripheral edema
Telmisartan (Micardis)	**T:** 40 mg, 80 mg	HTN CV risk reduction	20–80 mg once daily 80 mg once daily	Upper respiratory tract infection, dizziness, back pain, sinusitis, diarrhea
Valsartan (Diovan)	**T:** 80 mg, 160 mg	HTN HF Post MI	80–320 mg once daily 40–160 mg 2 times/day 20–160 mg 2 times/day	Dizziness, headaches, upper respiratory tract infection, diarrhea, fatigue

CV, Cardiovascular; ***HF,*** heart failure; ***HTN,*** hypertension; ***MI,*** myocardial infarction; ***T,*** tablets.

Antacids

USES

Relief of symptoms associated with hyperacidity (e.g., heartburn, acid indigestion, sour stomach), hyperacidity associated with gastric/duodenal ulcers, treatment of pathologic gastric hypersecretion associated with Zollinger-Ellison syndrome, symptomatic treatment of gastroesophageal reflux disease (GERD), prevention and treatment of upper GI stress-induced ulceration and bleeding (esp. in intensive care unit [ICU]).

Aluminum hydroxide in conjunction with a low-phosphate diet to reduce elevated phosphate in pts with renal insufficiency. Calcium for calcium deficiency, magnesium for magnesium deficiency.

ACTION

Antacids act primarily in the stomach to neutralize gastric acid (increase pH). Antacids do not have a direct effect on acid output. The ability to increase pH depends on the dose, dosage form used, presence or absence of food in the stomach, and acid-neutralizing capacity (ANC). ANC is the number of mEq of hydrochloric acid that can be neutralized by a particular weight or volume of antacid.

Antacids reduce elevated phosphate by binding with phosphate in the intestine to form an insoluble complex, which is then eliminated.

ANTACIDS

Antacid	Brand Names	Availability	Dosage Range	Side Effects
Aluminum				
Hydroxide	Amphojel, Alu-Tab, Dialume	**T:** 300 mg, 500 mg, 600 mg **C:** 500 mg	500–1,500 mg 3–6 times/day	Chalky taste, mild constipation, abdominal cramps *Long-term use:* Neurotoxicity in dialysis pts, hypercalcemia, osteoporosis *Large doses:* Fecal impaction, peripheral edema

Calcium				
Carbonate	Tums, Caltrate 600, Oyst-Cal 500	**T (chewable):** 500 mg, 750 mg, 1,000 mg **T:** 1,250 mg	500–1,500 mg as needed (**Maximum:** 7,000 mg in 24 hrs)	Chalky taste *Large doses:* Fecal impaction, peripheral edema, metabolic alkalosis *Long-term use:* Difficult/painful urination
Citrate	Calcitrate	**C:** 225 mg **T:** 200 mg	500–2,000 mg	Constipation, nausea, vomiting
Magnesium				
Hydroxide	Milk of Magnesia	**T (chewable):** 311 mg **L:** 400 mg/5 ml, 800 mg/5 ml	**T:** 622–1,244 mg up to 4 times/day **L:** 2.5–7.5 ml up to 4 times/day	Chalky taste, diarrhea, laxative effect, electrolyte imbalance (dizziness, irregular heartbeat, fatigue)
Oxide	Mag-Ox 400	**T:** 400 mg, 420 mg, 500 mg	400–800 mg/day	Same as above

C, Capsules; ***L,*** liquid; ***T,*** tablets.

Antianxiety Agents

USES

Treatment of anxiety including generalized anxiety disorder (GAD), panic disorder, obsessive-compulsive disorder (OCD), social anxiety disorder (SAD), posttraumatic stress disorder (PTSD), and acute stress disorder. In addition, some benzodiazepines are used as hypnotics, anticonvulsants to prevent delirium tremors during alcohol withdrawal, and as adjunctive therapy for relaxation of skeletal muscle spasms. Midazolam, a short-acting benzodiazepine, is used for preop sedation and relief of anxiety for short diagnostic/endoscopic procedures (see individual monograph for midazolam).

ACTION

Benzodiazepines are the largest and most frequently prescribed group of antianxiety agents. The exact mechanism is unknown, but they may increase the inhibiting effect of gamma-aminobutyric acid (GABA), which inhibits nerve impulse transmission by binding to specific benzodiazepine receptors in various areas of the central nervous system (CNS).

◄**ALERT**► Refer to individual entries of nonbenzodiazepine drugs for more information on uses and actions.

ANTIANXIETY AGENTS

Name	Availability	Uses	Dosage Range (per day)	Side Effects
Benzodiazepine				
Alprazolam (Xanax)	**T:** 0.25 mg, 0.5 mg, 1 mg, 2 mg **S:** 0.5 mg/5 ml, 1 mg/ml **ER:** 0.5 mg, 1 mg, 2 mg, 3 mg **ODT:** 0.25 mg, 0.5 mg, 1 mg, 2 mg	Anxiety, panic disorder	0.75–10 mg	Drowsiness, weakness, fatigue, ataxia, slurred speech, confusion, lack of coordination, impaired memory, paradoxical agitation, dizziness, nausea
Chlordiazepoxide (Librium)	**C:** 5 mg, 10 mg, 25 mg **T:** 10 mg, 25 mg **I:** 100 mg	Anxiety, alcohol withdrawal	5–100 mg	Drowsiness, fatigue, ataxia, memory impairment

Clorazepate (Tranxene)	**C:** 3.75 mg, 7.5 mg, 15 mg **SD:** 11.25 mg, 22.5 mg	Anxiety, alcohol withdrawal, anticonvulsant	7.5–90 mg	Hypotension, drowsiness, fatigue, ataxia, memory impairment, headache, nausea
Diazepam (Valium)	**T:** 2.5 mg, 5 mg, 10 mg **S:** 5 mg/5 ml, 5 mg/ml **I:** 5 mg/ml	Anxiety, alcohol withdrawal, anticonvulsant, muscle relaxant	2–40 mg	Hypotension, ataxia, drowsiness, fatigue, vertigo
Lorazepam (Ativan)	**T:** 0.5 mg, 1 mg, 2 mg **S:** 2 mg/ml **I:** 2 mg/ml, 4 mg/ml	Anxiety	0.5–10 mg	Sedation, respiratory depression, ataxia, dizziness, headache
Nonbenzodiazepine				
Buspirone (BuSpar)	**T:** 5 mg, 10 mg, 15 mg, 30 mg	Anxiety	7.5–60 mg	Dizziness, light-headedness, headaches, nausea, restlessness
Hydroxyzine (Atarax, Vistaril)	**T:** 10 mg, 25 mg, 50 mg, 100 mg	Anxiety, rhinitis, pruritus, urticaria, nausea or vomiting	100–400 mg	Drowsiness; dry mouth, nose, and throat
Paroxetine (Paxil)	**S:** 10 mg/5 ml **T:** 10 mg, 20 mg, 30 mg, 40 mg **T (CR):** 12.5 mg, 25 mg, 37.5 mg	Anxiety, depression, obsessive-compulsive disorder, panic disorder	10–50 mg	Drowsiness, dry mouth, nose, and throat; dizziness; diarrhea; diaphoresis; constipation; vomiting; tremors
Trazodone (Desyrel)	**T:** 50 mg, 100 mg, 150 mg, 300 mg	Anxiety, depression	100–400 mg	Drowsiness, dizziness, headaches, dry mouth, nausea, vomiting, unpleasant taste
Venlafaxine (Effexor)	**C (ER):** 37.5 mg, 75 mg, 150 mg **T (ER):** 37.5 mg, 75 mg, 150 mg **T:** 25 mg, 37.5 mg, 50 mg, 75 mg, 150 mg	Anxiety, depression	37.5–225 mg	Drowsiness, nausea, headaches, dry mouth

C, Capsules; ***CR,*** controlled-release; ***ER,*** extended-release; ***I,*** injection; ***ODT,*** orally disintegrating tablet; ***S,*** solution; ***SD,*** single dose; ***T,*** tablets.

Antiarrhythmics

USES

Prevention and treatment of cardiac arrhythmias, such as premature ventricular contractions, ventricular tachycardia, premature atrial contractions, paroxysmal atrial tachycardia, atrial fibrillation and flutter.

ACTION

The antiarrhythmics are divided into four classes based on their effects on certain ion channels and/or receptors located on the myocardial cell membrane. Class I is further divided into three subclasses (IA, IB, IC) based on electrophysiologic effects.

Class I: Blocks cardiac sodium channels and slows conduction velocity, prolonging refractory period and decreasing automaticity of sodium-dependent tissue.

Class IA: Blocks sodium and potassium channels.

Class IB: Shortens the repolarization phase.

Class IC: No effect on repolarization phase, but slows conduction velocity.

Class II: Slows sinus and atrioventricular (AV) nodal conduction.

Class III: Blocks cardiac potassium channels, prolonging the repolarization phase of electrical cells.

Class IV: Inhibits the influx of calcium through its channels, causing slower conduction through the sinus and AV nodes.

ANTIARRHYTHMICS

Name	Availability	Uses	Dosage Range	Side Effects
Class IA				
Disopyramide (Norpace, Norpace CR)	**C:** 100 mg, 150 mg **C (ER):** 100 mg, 150 mg	AF, WPW, PSVT, PVCs, VT	400–800 mg/day	Dry mouth, blurred vision, urinary retention, HF, proarrhythmia, heart block, nausea, vomiting, diarrhea, hypoglycemia, nervousness
Procainamide (Procan-SR, Pronestyl)	**T:** 250 mg, 375 mg, 500 mg **C:** 250 mg, 375 mg, 500 mg **T (SR):** 250 mg, 500 mg, 750 mg, 1,000 mg **I:** 100 mg/ml, 500 mg/ml	AF, WPW, PVCs, VT	**A (PO):** 250–500 mg q3h; **(ER):** 250–750 mg q6h	Hypotension, fever, agranulocytosis, SLE, headaches, proarrhythmia, confusion, disorientation, GI symptoms, hypotension

Quinidine (Quinaglute, Quinidex)	**T:** 200 mg, 300 mg **T (ER):** 300 mg, 324 mg **I:** 80 mg/ml	AF, WPW, PVCs, VT	**A (PO):** 200–600 mg q2–4h; **(ER):** 300–600 mg q8h	Diarrhea, hypotension, nausea, vomiting, cinchonism, fever, bitter taste, heart block, thrombocytopenia, proarrhythmia
Class IB				
Lidocaine (Xylocaine)	**I:** 300 mg for IM **IV Infusion:** 2 mg/ml, 4 mg/ml	PVCs, VT, VF	**IV:** 50–100 mg bolus, then 1–4 mg/min infusion	Drowsiness, agitation, muscle twitching, seizures, paresthesia, proarrhythmia, slurred speech, tinnitus, cardiac depression, bradycardia, asystole
Mexiletine (Mexitil)	**C:** 150 mg, 200 mg, 250 mg	PVCs, VT, VF	**A:** 600–1,200 mg/day	Drowsiness, agitation, muscle twitching, seizures, paresthesia, proarrhythmia, nausea, vomiting, blood dyscrasias, hepatitis, fever
Tocainide (Tonocard)	**T:** 400 mg, 600 mg	PVCs, VT, VF	**A:** 1,200–1,800 mg/day	Drowsiness, agitation, muscle twitching, seizures, paresthesia, proarrhythmia, nausea, vomiting, diarrhea, agranulocytosis
Class IC				
Flecainide (Tambocor)	**T:** 50 mg, 100 mg, 150 mg	AF, PSVT, life-threatening ventricular arrhythmias	**A:** 200–400 mg/day	Dizziness, tremors, bradycardia, heart block, heart failure, GI upset, neutropenia, flushing, blurred vision, metallic taste, proarrhythmia
Propafenone (Rythmol)	**T:** 150 mg, 225 mg, 300 mg	PAF, WPW, life-threatening ventricular arrhythmias	**A:** 450–900 mg/day	Dizziness, blurred vision, altered taste, nausea, exacerbation of asthma, proarrhythmia, bradycardia, heart block, heart failure, GI upset, bronchospasm, hepatotoxicity

Continued

ANTIARRHYTHMICS—cont'd

Name	Availability	Uses	Dosage Range	Side Effects
Class II (Beta-Blockers)				
Acebutolol (Sectral)	**C:** 200 mg, 400 mg	Ventricular arrhythmias	**A:** 600–1,200 mg/day	Bradycardia, hypotension, depression, nightmares, fatigue, sexual dysfunction, SLE, arthritis, myalgia
Esmolol (Brevibloc)	**I:** 10 mg/ml, 20 mg/ml	Supraventricular tachycardia	**A:** 50–200 mcg/kg/min	Hypotension, heart block, heart failure, bronchospasm
Propranolol (Inderal)	**T:** 10 mg, 20 mg	Tachyarrhythmias	**A:** 10–30 mg 3–4 times/day	Bradycardia, hypotension, depression, nightmares, fatigue, sexual dysfunction, heart block, bronchospasm
Class III				
Amiodarone (Cordarone, Pacerone)	**T:** 200 mg, 400 mg **I:** 50 mg/ml	AF, PAF, PSVT, life-threatening ventricular arrhythmias	**A (PO):** 800–1,600 mg/day for 1–3 wks, then 600–800 mg/day **(IV):** 150 mg bolus, then IV infusion	Blurred vision, photophobia, constipation, ataxia, proarrhythmia, pulmonary fibrosis, bradycardia, heart block, hyperthyroidism or hypothyroidism, peripheral neuropathy, GI upset, blue-gray skin, optic neuritis, hypotension
Dofetilide (Tikosyn)	**C:** 125 mcg, 250 mcg, 500 mcg	AF, A flutter	**A:** Individualized	Torsades de pointes, hypotension
Dronedarone (Multaq)	**T:** 400 mg	AF, A flutter	**A (PO):** 400 mg 2 times/day	Diarrhea, nausea, abdominal pain, vomiting, asthenia (loss of strength, energy)
Ibutilide (Corvert)	**I:** 0.1 mg/ml	AF, A flutter	**A (greater than 60 kg):** 1 mg over 10 min; **(less than 60 kg):** 0.01 mg/kg over 10 min	Torsades de pointes

Sotalol (Betapace)	**T:** 80 mg, 120 mg, 160 mg, 240 mg	AF, PAF, PSVT, life-threatening ventricular arrhythmias	**A:** 160–640 mg/day	Fatigue, dizziness, dyspnea, bradycardia, proarrhythmia, heart block, hypotension, bronchospasm
Class IV (Calcium Channel Blockers)				
Diltiazem (Cardizem)	**I:** 25 mg/ml vials **Infusion:** 1 mg/ml	AF, A flutter, PSVT	**A (IV):** 20–25 mg bolus, then infusion of 5–15 mg/hr	Hypotension, bradycardia, dizziness, headaches, heart block, asystole, heart failure
Verapamil (Calan, Isoptin)	**I:** 5 mg/2 ml	AF, A flutter, PSVT	**A (IV):** 5–10 mg	Hypotension, bradycardia, dizziness, headaches, constipation, heart block, heart failure, asystole, fatigue, edema, nausea

A, Adults; ***AF,*** atrial fibrillation; ***A flutter,*** atrial flutter; ***C,*** capsules; ***HF,*** heart failure; ***ER,*** extended-release; ***I,*** injection; ***PAF,*** paroxysmal atrial fibrillation; ***PSVT,*** paroxysmal supraventricular tachycardia; ***PVCs,*** premature ventricular contractions; ***SLE,*** systemic lupus erythematosus; ***SR,*** sustained-release; ***T,*** tablets; ***VT,*** ventricular tachycardia; ***WPW,*** Wolff-Parkinson-White syndrome.

Antibiotics

USES

Treatment of wide range of gram-positive or gram-negative bacterial infections, suppression of intestinal flora before surgery, control of acne, prophylactically to prevent rheumatic fever, prophylactically in high-risk situations (e.g., some surgical procedures or medical conditions) to prevent bacterial infection.

ACTION

Antibiotics are natural or synthetic compounds that have the ability to kill or suppress the growth of microorganisms.

One means of classifying antibiotics is by their anti-microbial spectrum. Narrow-spectrum agents are effective against few microorganisms (e.g., aminoglycosides are effective against gram-negative aerobes), whereas broad-spectrum agents are effective against a wide variety of microorganisms (e.g., fluoroquinolones are effective against gram-positive cocci and gram-negative bacilli).

Antimicrobial agents may also be classified based on their mechanism of action.

- Agents that inhibit cell wall synthesis or activate enzymes that disrupt the cell wall, causing a weakening in the cell, cell lysis, and death. Include penicillins, cephalosporins, vancomycin, imidazole antifungal agents.
- Agents that act directly on the cell wall, affecting permeability of cell membranes, causing leakage of intracellular substances. Include antifungal agents amphotericin and nystatin, polymyxin, colistin.
- Agents that bind to ribosomal subunits, altering protein synthesis and eventually causing cell death. Include aminoglycosides.
- Agents that affect bacterial ribosome function, altering protein synthesis and causing slow microbial growth. Do not cause cell death. Include chloramphenicol, clindamycin, erythromycin, tetracyclines.
- Agents that inhibit nucleic acid metabolism by binding to nucleic acid or interacting with enzymes necessary for nucleic acid synthesis. Inhibit DNA or RNA synthesis. Include rifampin, metronidazole, fluoroquinolones (e.g., ciprofloxacin).
- Agents that inhibit specific metabolic steps necessary for microbial growth, causing a decrease in essential cell components or synthesis of nonfunctional analogues of normal metabolites. Include trimethoprim, sulfonamides.
- Agents that inhibit viral DNA synthesis by binding to viral enzymes necessary for DNA synthesis, preventing viral replication. Include acyclovir, vidarabine.

SELECTION OF ANTIMICROBIAL AGENTS

The goal of therapy is to achieve antimicrobial action at the site of infection sufficient to inhibit the growth of the microorganism. The agent selected should be the most active against the most likely infecting organism, least likely to cause toxicity or allergic reaction. Factors to consider in selection of an antimicrobial agent include the following:

- Sensitivity pattern of the infecting microorganism
- Location and severity of infection (may determine route of administration)
- Pt's ability to eliminate the drug (status of renal and hepatic function)
- Pt's defense mechanisms (includes both cellular and humoral immunity)
- Pt's age, pregnancy status, genetic factors, allergies, CNS disorder, preexisting medical problems

CATEGORIZATION OF ORGANISMS BY GRAM STAINING

Gram-Positive Cocci	Gram-Negative Cocci	Gram-Positive Bacilli	Gram-Negative Bacilli
Aerobic *Staphylococcus aureus* *Staphylococcus epidermidis* *Streptococcus pneumoniae* *Streptococcus pyogenes* *Viridans streptococci* *Enterococcus faecalis* *Enterococcus faecium* **Anaerobic** *Peptostreptococcus* spp. *Peptococcus* spp.	**Aerobic** *Neisseria gonorrhoeae* *Neisseria meningitidis* *Moraxella catarrhalis*	**Aerobic** *Listeria monocytogenes* *Bacillus anthracis* *Corynebacterium diphtheriae* **Anaerobic** *Clostridium difficile* *Clostridium perfringens* *Clostridium tetani* *Actinomyces* spp.	**Aerobic** *Escherichia coli* *Klebsiella pneumoniae* *Proteus mirabilis* *Serratia marcescens* *Acinetobacter* spp. *Pseudomonas aeruginosa* *Enterobacter* spp. *Haemophilus influenzae* *Legionella pneumophila* **Anaerobic** *Bacteroides fragilis* *Fusobacterium* spp.

Antibiotic: Aminoglycosides

USES

Treatment of serious infections when other less-toxic agents are not effective, are contraindicated, or require adjunctive therapy (e.g., with penicillins or cephalosporins). Used primarily in the treatment of infections caused by gram-negative microorganisms, such as those caused by *Proteus, Klebsiella, Pseudomonas, Escherichia coli, Serratia,* and *Enterobacter*. Inactive against most gram-positive microorganisms. Not well absorbed systemically from GI tract (must be administered parenterally for systemic infections). Oral agents are given to suppress intestinal bacteria.

ACTION

Bactericidal. Transported across bacterial cell membrane; irreversibly bind to specific receptor proteins of bacterial ribosomes. Interfere with protein synthesis, preventing cell reproduction and eventually causing cell death.

ANTIBIOTIC: AMINOGLYCOSIDES

Name	Availability	Dosage Range	Side Effects
Amikacin (Amikin)	**I:** 50 mg/ml, 250 mg/ml	**A:** 7.5 mg/kg q12h or 15–20 mg/kg once daily **C:** 7.5 mg/kg q12h	Nephrotoxicity, neurotoxicity, ototoxicity (both auditory and vestibular), hypersensitivity (skin itching, redness, rash, swelling)
Gentamicin (Garamycin)	**I:** 10 mg/ml, 40 mg/ml	**A:** 5–7 mg/kg once daily or 1–2.5 mg/kg q8h **C:** 1–2.5 mg/kg q8h	Same as amikacin
Neomycin	**T:** 500 mg	**A:** 1 g for 3 doses as preop	Nausea, vomiting, diarrhea
Tobramycin (Nebcin)	**I:** 10 mg/ml, 40 mg/ml	**A:** 5–7 mg/kg once daily or 1–2.5 mg/kg q8h **C:** 1–2.5 mg/kg q8h	Same as amikacin

A, Adults; ***C*** *(dosage),* children; ***I,*** injection; ***T,*** tablets.

Antibiotic: Cephalosporins

USES

Broad-spectrum antibiotics, which, like penicillins, may be used in a number of diseases, including respiratory diseases, skin and soft tissue infection, bone/joint infections, genitourinary infections, prophylactically in some surgical procedures.

First-generation cephalosporins have activity against gram-positive organisms (e.g., streptococci and most staphylococci) and activity against most gram-negative organisms, including *Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Salmonella,* and *Shigella.*

ACTION

Second-generation cephalosporins have same effectiveness as first-generation and increased activity against gram-negative organisms, including *Haemophilus influenzae, Neisseria, Enterobacter,* and several anaerobic organisms.

Third-generation cephalosporins are less active against gram-positive organisms but more active against the Enterobacteriaceae with some activity against *Pseudomonas aeruginosa, Serratia* spp., and *Acinetobacter* spp.

Fourth-generation cephalosporins have good activity against gram-positive organisms (e.g., *Staphylococcus aureus*) and gram-negative organisms (e.g., *Pseudomonas aeruginosa, E. coli, Klebsiella,* and *Proteus*).

Fifth-generation cephalosporins have good activity against gram-positive organisms (e.g., *Staphylococcus aureus, Streptococcus spp.*) and gram-negative organisms (e.g., *E. coli, Klebsiella* spp.).

Cephalosporins inhibit cell wall synthesis or activate enzymes that disrupt the cell wall, causing cell lysis and cell death. May be bacteriostatic or bactericidal. Most effective against rapidly dividing cells.

ANTIBIOTIC: CEPHALOSPORINS

Name	Availability	Dosage Range	Side Effects
First-Generation			
Cefadroxil (Duricef)	**C:** 500 mg **T:** 1 g **S:** 125 mg/5 ml, 250 mg/5 ml, 500 mg/5 ml	**A:** 500 mg–1 g q12h **C:** 15 mg/kg q12h	Abdominal cramps/pain, fever, nausea, vomiting, diarrhea, headaches, oral/vaginal candidiasis

Continued

ANTIBIOTIC: CEPHALOSPORINS—cont'd

Name	Availability	Dosage Range	Side Effects
Cefazolin (Ancef)	**I:** 500 mg, 1 g, 2 g	**A:** 500 mg–2 g q6–8h **C:** 25–100 mg/kg/day divided q6–8h	Fever, rash, diarrhea, nausea, pain at injection site
Cephalexin (Keflex, Keftab)	**C:** 250 mg, 500 mg **T:** 250 mg, 500 mg, 1 g	**A:** 250 mg–1 g q6–12h **C:** 25–100 mg/kg/day divided q6–8h	Headache, abdominal pain, diarrhea, nausea, dyspepsia
Second-Generation			
Cefaclor (Ceclor)	**C:** 250 mg, 500 mg **T (ER):** 500 mg **S:** 125 mg/5 ml, 187 mg/5 ml, 250 mg/5 ml, 375 mg/5 ml	**A:** 250–500 mg q8h **C:** 20–40 mg/kg/day q8–12h	Rash, diarrhea, increased transaminases May have serum sickness–like reaction
Cefotetan	**I:** 1 g, 2 g	**A:** 500 mg–3 g q12h **C:** 20–50 mg/kg q12h	Diarrhea, increased AST, ALT, hypersensitivity reactions
Cefoxitin (Mefoxin)	**I:** 1 g, 2 g	**A:** 1–2 g q6–8h **C:** 80–160 mg/kg/day divided q6h	Diarrhea
Cefprozil (Cefzil)	**T:** 250 mg, 500 mg **S:** 125 mg/5 ml, 250 mg/5 ml	**A:** 500 mg q12–24h **C:** 7.5–15 mg/kg q12h	Dizziness, abdominal pain, diarrhea, nausea, increased AST, ALT
Cefuroxime (Ceftin, Kefurox, Zinacef)	**T:** 125 mg, 250 mg, 500 mg **S:** 125 mg/5 ml, 250 mg/5 ml **I:** 750 mg, 1.5 g	**A (PO):** 125–500 mg q12h **(IM/IV):** 750 mg–1.5 g q8–12h **C (PO):** 10–15 mg/kg q12h **(IM/IV):** 50–150 mg/kg/day divided q8h	Diarrhea, nausea, vomiting, thrombophlebitis, increased AST, ALT

Third-Generation			
Cefdinir (Omnicef)	**C:** 300 mg **S:** 125 mg/5 ml	**A:** 300 mg q12h or 600 mg once daily **C:** 7 mg/kg q12h or 14 mg/kg once daily	Headache, hyperglycemia, abdominal pain, diarrhea, nausea
Cefditoren (Spectracef)	**T:** 200 mg	**A:** 200–400 mg q12h **C: (>11 yrs):** 200–400 mg q12h	Diarrhea, nausea
Cefotaxime (Claforan)	**I:** 500 mg, 1 g, 2 g	**A:** 1–2 g q4–12h **C:** 50–200 mg/kg/day divided q4–6h	Rash, diarrhea, nausea, pain at injection site
Cefpodoxime (Vantin)	**T:** 100 mg, 200 mg **S:** 50 mg/5 ml, 100 mg/5 ml	**A:** 100–400 mg q12h **C:** 5 mg/kg q12h	Rash, diarrhea, nausea
Ceftazidime (Fortaz, Tazicef, Tazidime)	**I:** 500 mg, 1 g, 2 g	**A:** 500 mg–2 g q8–12h **C:** 30–100 mg/kg q8h	Diarrhea, pain at injection site
Ceftibuten (Cedax)	**C:** 400 mg **S:** 90 mg/5 ml, 180 mg/5 ml	**A:** 400 mg once daily **C:** 4.5 mg/kg bid or 9 mg/kg once daily	Headache, nausea, diarrhea
Ceftriaxone (Rocephin)	**I:** 250 mg, 500 mg, 1 g, 2 g	**A:** 1–2 g q12–24h **C:** 50–100 mg/kg/day divided q12–24h	Rash, diarrhea, eosinophilia, increased AST, ALT
Fourth-Generation			
Cefepime (Maxipime)	**I:** 500 mg, 1 g, 2 g	**A:** 1–2 g q8–12h **C:** 50 mg/kg q8–12h	Rash, diarrhea, nausea; increased AST, ALT
Fifth-Generation			
Ceftaroline (Teflaro)	**I:** 400 mg, 600 mg	**A:** 600 mg q12h	Headache, insomnia, rash, pruritus, diarrhea, nausea

A, Adults; ***C,*** capsules; ***C (dosage),*** children; ***ER,*** extended-release; ***I,*** injection; ***S,*** suspension; ***T,*** tablets.

Antibiotic: Fluoroquinolones

USES	ACTION
Fluoroquinolones act against a wide range of gram-negative and gram-positive organisms. They are used primarily in the treatment of lower respiratory infections, skin/skin structure infections, urinary tract infections, and sexually transmitted diseases.	Bactericidal. Inhibit DNA gyrase in susceptible microorganisms, interfering with bacterial DNA replication and repair.

ANTIBIOTIC: FLUOROQUINOLONES

Name	Availability	Dosage Range	Side Effects
Ciprofloxacin (Cipro)	**T:** 100 mg, 250 mg, 500 mg, 750 mg **S:** 250 mg/5 ml, 500 mg/5 ml **I:** 200 mg, 400 mg	**A (PO):** 250–750 mg q12h; **(IV):** 200–400 mg q12h	Dizziness, headaches, anxiety, drowsiness, insomnia, abdominal pain, nausea, diarrhea, vomiting, phlebitis (parenteral)
Gemifloxacin (Factive)	**T:** 320 mg	**A:** 320 mg once daily	Headache, dizziness, rash, diarrhea, nausea
Levofloxacin (Levaquin)	**T:** 250 mg, 500 mg, 750 mg **I:** 250 mg, 500 mg, 750 mg **OS:** 250 mg/10 ml	**A (PO/IV):** 250–750 mg/day as single dose	Headache, insomnia, dizziness, rash, nausea, diarrhea, constipation
Moxifloxacin (Avelox)	**T:** 400 mg **I:** 400 mg	**A:** 400 mg/day	Headache, dizziness, insomnia, nausea, diarrhea
Norfloxacin (Noroxin)	**T:** 400 mg	**A:** 400 mg q12h	Same as ciprofloxacin
Ofloxacin	**T:** 200 mg, 300 mg, 400 mg	**A:** 200–400 mg q12h	Dizziness, headache, insomnia, abdominal cramps, diarrhea, nausea

A, Adults; ***I,*** injection; ***OS,*** oral solution; ***PO,*** oral; ***S,*** suspension; ***T,*** tablets.

Antibiotic: Macrolides

USES	ACTION
Macrolides act primarily against most gram-positive microorganisms and some gram-negative cocci. Azithromycin and clarithromycin appear to be more potent than erythromycin. Macrolides are used in the treatment of pharyngitis/tonsillitis, sinusitis, chronic bronchitis, pneumonia, uncomplicated skin/skin structure infections.	Bacteriostatic or bactericidal. Reversibly binds to the P site of the 50S ribosomal subunit of susceptible organisms, inhibiting RNA-dependent protein synthesis.

ANTIBIOTIC: MACROLIDES

Name	Availability	Dosage Range	Side Effects
Azithromycin (Zithromax)	**T:** 250 mg, 600 mg **S:** 100 mg/5 ml, 200 mg/5 ml, 1-g packet **I:** 500 mg	**A (PO):** 500 mg once, then 250 mg once daily **(IV):** 500 mg/day **C (PO/IV):** 5–10 mg/kg once daily	**PO:** Nausea, diarrhea, vomiting, abdominal pain **IV:** Pain, redness, swelling at injection site
Clarithromycin (Biaxin)	**T:** 250 mg, 500 mg **T (XL):** 500 mg **S:** 125 mg/5 ml	**A:** 250–500 mg q12h **C:** 7.5 mg/kg q12h	Headaches, loss of taste, nausea, vomiting, diarrhea, abdominal pain/discomfort
Erythromycin (EES, Eryc, EryPed, Ery-Tab, Erythrocin, PCE)	**T:** 200 mg, 250 mg, 333 mg, 400 mg, 500 mg **C**: 250 mg **S:** 100 mg/2.5 ml, 125 mg/5 ml, 200 mg/5 ml, 250 mg/5 ml, 400 mg/5 ml	**A (PO):** 250–500 mg q6h **(IV):** 500 mg–1 g q6h **C (PO):** 7.5 mg/kg q6h **(IV):** 15–50 mg/kg/day in divided doses q6h	**PO:** Nausea, vomiting, diarrhea, abdominal pain **IV:** Inflammation, phlebitis at injection site

A, Adults; ***C,*** capsules; ***C (dosage),*** children; ***I,*** injection; ***S,*** suspension; ***T,*** tablets; ***XL,*** long-acting.

Antibiotic: Penicillins

USES

Penicillins (also referred to as beta-lactam antibiotics) may be used to treat a large number of infections, including pneumonia and other respiratory diseases, urinary tract infections, septicemia, meningitis, intra-abdominal infections, gonorrhea and syphilis, bone/joint infection.

Penicillins are classified based on an antimicrobial spectrum:

Natural penicillins are very active against gram-positive cocci but ineffective against most strains of *Staphylococcus aureus* (inactivated by enzyme penicillinase).

Penicillinase-resistant penicillins are effective against penicillinase-producing *Staphylococcus aureus* but are less effective against gram-positive cocci than the natural penicillins.

Broad-spectrum penicillins are effective against gram-positive cocci and some gram-negative bacteria (e.g., *Haemophilus influenzae, Escherichia coli, Proteus mirabilis, Salmonella,* and *Shigella*).

Extended-spectrum penicillins are effective against gram-negative organisms, including *Pseudomonas aeruginosa, Enterobacter, Proteus* spp., *Klebsiella, Serratia* spp., and *Acinetobacter* spp.

ACTION

Penicillins inhibit cell wall synthesis or activate enzymes, which disrupt the bacterial cell wall, causing cell lysis and cell death. May be bacteriostatic or bactericidal. Most effective against bacteria undergoing active growth and division.

ANTIBIOTIC: PENICILLINS

Name	Availability	Dosage Range	Side Effects
Natural			
Penicillin G benzathine (Bicillin, Bicillin LA)	**I:** 600,000 units, 1.2 million units, 2.4 million units	**A:** 1.2–2.4 million units as single dose **C:** 25,000–50,000 units/kg as single dose	Mild diarrhea, nausea, vomiting, headaches, sore mouth/tongue, vaginal itching/discharge, allergic reaction (including anaphylaxis, skin rash, urticaria, pruritus)

Penicillin G potassium (Pfizerpen)	**I:** 1, 2, 3, 5 million-unit vials	**A:** 2–4 million units q4h **C:** 100,000–250,000 units/kg/day divided q4–6h	Rash, injection site reaction, phlebitis
Penicillin V potassium (Apo-Pen-VK)	**T:** 250 mg, 500 mg **S:** 125 mg/5 ml, 250 mg/5 ml	**A:** 250–500 mg q6–8h **C:** 25–50 mg/kg/day in divided doses q6–8h	Diarrhea, nausea, vomiting
Penicillinase-Resistant			
Dicloxacillin (Dynapen, Pathocil)	**C:** 125 mg, 250 mg, 500 mg **S:** 62.5 mg/5 ml	**A:** 125–500 mg q6h **C:** 25–50 mg/kg/day divided q6h	Abdominal pain, diarrhea, nausea
Nafcillin (Unipen)	**I:** 500 mg, 1 g, 2 g	**A (IV):** 500 mg–2 g q4–6h **C (IV):** 50–150 mg/kg/day in divided doses q4–6h	Inflammation, pain, phlebitis Increased risk of interstitial nephritis
Oxacillin (Bactocill)	**C:** 250 mg, 500 mg **S:** 250 mg/5 ml **I:** 250 mg, 500 mg, 1 g, 2 g	**A (IV):** 1–2 g q4–6h **C (IV):** 25–50 mg/kg q6h	Diarrhea, nausea, vomiting Increased risk of hepatotoxicity, interstitial nephritis
Broad-Spectrum			
Amoxicillin (Amoxil, Trimox)	**T:** 125 mg, 250 mg, 500 mg, 875 mg **C:** 250 mg, 500 mg **S:** 50 mg/ml, 125 mg/5 ml, 250 mg/5 ml	**A:** 250–500 mg q8h or 500–875 g q12h **C:** 20–90 mg/kg/day divided q8–12h	Diarrhea, colitis, nausea
Amoxicillin/clavulanate (Augmentin)	**T:** 250 mg, 500 mg, 875 mg **T (chewable):** 125 mg, 200 mg, 250 mg, 400 mg **S:** 125 mg/5 ml, 200 mg/5 ml, 250 mg/5 ml, 400 mg/5 ml	**A:** 875 mg q12h or 250–500 mg q8h **C:** 25–90 mg/kg/day divided q12h	Diarrhea, rash, nausea, vomiting

Continued

ANTIBIOTIC: PENICILLINS—cont'd

Name	Availability	Dosage Range	Side Effects
Ampicillin (Principen)	**C:** 250 mg, 500 mg **S:** 125 mg/5 ml, 250 mg/5 ml **I:** 125 mg, 250 mg, 500 mg, 1 g, 2 g	**A (PO):** 250–500 mg q6h **(IV):** 500 mg–2 g q6h **C (PO):** 12.5–50 mg/kg q6h **(IV):** 25–50 mg/kg q6h	Nausea, vomiting, diarrhea
Ampicillin/sulbactam (Unasyn)	**I:** 1.5 g, 3 g	**A:** 1.5–3 g q6h **C:** 25–50 mg/kg q6h	Local pain at injection site, rash, diarrhea
Extended-Spectrum			
Piperacillin/tazobactam (Zosyn)	**I:** 2.25 g, 3.375 g, 4.5 g	**A:** 3.375 g q6h or 4.5 g q6–8h **C:** 240–300 mg/kg/day divided q8h	Diarrhea, insomnia, headache, fever, rash
Ticarcillin/clavulanate (Timentin)	**I:** 3.1 g	**A:** 3.1 g q4–6h **C:** 200–300 mg/kg/day divided q4–6h	Colitis, nausea, vomiting, diarrhea

A, Adults; ***C,*** capsules; ***C** (dosage),* children; ***I,*** injection; ***PO,*** oral; ***S,*** suspension; ***T,*** tablets.

Anticoagulants/Antiplatelets/Thrombolytics

USES	ACTION
Treatment and prevention of venous thromboembolism, acute MI, acute cerebral embolism; reduce risk of acute MI; reduction of total mortality in pts with unstable angina; prevent occlusion of saphenous grafts following open heart surgery; prevent embolism in select pts with atrial fibrillation, prosthetic heart valves, valvular heart disease, cardiomyopathy. Heparin also used for acute/chronic consumption coagulopathies (disseminated intravascular coagulation).	*Anticoagulants:* Inhibit blood coagulation by preventing the formation of new clots and extension of existing ones *but do not dissolve formed clots.* Anticoagulants are subdivided into three classes. *Heparin* (including low molecular weight heparin): Indirectly interferes with blood coagulation by blocking the conversion of prothrombin to thrombin and fibrinogen to fibrin. *Coumarin:* Acts indirectly to prevent synthesis in the liver of vitamin K–dependent clotting factors. *Direct Thrombin Inhibitors:* Inhibit thrombin from converting fibrinogen to fibrin.
	Antiplatelets: Interfere with platelet aggregation. Effects are irreversible for life of platelet. Medications in this group act by different mechanisms. Aspirin irreversibly inhibits cyclo-oxygenase and formation of thromboxane A_2. Clopidogrel, dipyridamole, prasugrel, and ticlopidine have similar effects as aspirin and are known as adenosine diphosphate (ADP) inhibitors. Abciximab, eptifibatide, and tirofiban block binding of fibrinogen to the glycoprotein IIb/IIIa receptor on platelet surface (known as platelet glycoprotein IIb/IIIa receptor antagonists).
	Thrombolytics: Act directly or indirectly on fibrinolytic system to dissolve clots (converting plasminogen to plasmin, an enzyme that digests fibrin clot).

ANTICOAGULANTS/ANTIPLATELETS/THROMBOLYTICS

Name	Availability	Uses	Side Effects
Anticoagulants			
Direct Thrombin Inhibitors			
Argatroban	**I:** 100 mg/ml	Prevent/treat VTE in pts with HIT or at risk for HIT undergoing PCI	Bleeding, hypotension, hematuria
Bivalirudin (Angiomax)	**I:** 250-mg vials	Pts with unstable angina undergoing PTCA	Bleeding, hypotension, pain, headache, nausea, back pain
Dabigatran (Pradaxa)	**C:** 75 mg, 150 mg	Reduce risk for stroke/embolism with nonvalvular atrial fibrillation	Bleeding, gastritis, dyspepsia
Desirudin (Iprivask)	**I:** 15 mg	Hip surgery	Bleeding
Heparin, Low Molecular Weight Heparins			
Dalteparin (Fragmin)	**I:** 2,500 units, 5,000 units, 7,500 units, 10,000 units	Hip surgery, abdominal surgery, unstable angina or non–Q-wave MI	Bleeding, hematoma, increased ALT, AST, pain at injection site, bruising
Enoxaparin (Lovenox)	**I:** 30 mg, 40 mg, 60 mg, 80 mg, 100 mg, 120 mg, 150 mg	Hip surgery, knee surgery, abdominal surgery, unstable angina or non–Q-wave MI, acute illness	Bleeding, thrombocytopenia, hematoma, increased ALT, AST, nausea, bruising
Heparin	**I:** 1,000 units/ml, 2,500 units/ml, 5,000 units/ml, 7,500 units/ml, 10,000 units/ml, 20,000 units/ml	Prevent/treat VTE	Bleeding, thrombocytopenia, skin rash, itching, burning
Tinzaparin (Innohep)	**I:** 20,000 units/ml vials	Treatment of VTE (with warfarin)	Bleeding, thrombocytopenia, increased ALT, injection site hematoma
Factor Xa Inhibitor			
Apixaban (Eliquis)	**T:** 2.5 mg, 5 mg	Reduce risk of stroke/embolism in nonvalvular atrial fibrillation	Bleeding, nausea, anemia

Fondaparinux (Arixtra)	**I:** 2.5 mg	Hip surgery, knee surgery, DVT	Bleeding, thrombocytopenia, hematoma, fever, nausea, anemia
Rivaroxaban (Xarelto)	**T:** 10 mg	Prevent DVT post knee, hip replacement Prevent thromboembolism in atrial fibrillation	Bleeding
Coumarin			
Warfarin (Coumadin)	**PO:** 1 mg, 2 mg, 2.5 mg, 3 mg, 4 mg, 5 mg, 6 mg, 7.5 mg, 10 mg **I:** 5 mg	Prevent/treat VTE in pts; prevent systemic embolism in pts with heart valve replacement, valve heart disease, MI, atrial fibrillation	Bleeding, skin necrosis, anorexia, nausea, vomiting, diarrhea, rash, abdominal cramps, purple toe syndrome, drug interactions (see individual monograph)
Antiplatelets			
Abciximab (ReoPro)	**I:** 2 mg/ml	Adjunct to PCI to prevent acute cardiac ischemic complications (with heparin and aspirin)	Bleeding, hypotension, nausea, vomiting, back pain, allergic reactions, thrombocytopenia
Aspirin	**PO:** 81 mg, 165 mg, 325 mg, 500 mg, 650 mg	TIA Prevention of reinfarction and thromboembolism post MI	Tinnitus, dizziness, hypersensitivity, dyspepsia, minor bleeding, GI ulceration
Clopidogrel (Plavix)	**PO:** 75 mg	Reduce risk of stroke, MI, or vascular death in pts with recent MI, noncardioembolic stroke, peripheral artery disease. Reduce CV death, MI, stroke, reinfarction in pts with non-STEMI/STEMI	Bleeding, rash, pruritus, bruising, epistaxis
Dipyridamole (Persantine)	**PO:** 25 mg, 50 mg, 75 mg	Prevent postop thromboembolic complications following cardiac valve replacement	Dizziness, GI distress

Continued

ANTICOAGULANTS/ANTIPLATELETS/THROMBOLYTICS—cont'd

Name	Availability	Uses	Side Effects
Eptifibatide (Integrilin)	**I:** 0.75 mg/ml, 2 mg/ml	Treatment of acute coronary syndrome	Bleeding, hypotension
Prasugrel (Effient)	**PO:** 5 mg, 10 mg	Reduce thrombotic cardiovascular events in pts with ACS to be managed with PCI (including stenting)	Bleeding, hypotension
Ticagrelor (Brilinta)	**PO:** 90 mg	Reduce thrombotic cardiovascular events in pts with ACS	Bleeding, dyspnea
Ticlopidine (Ticlid)	**PO:** 250 mg	Reduce risk stroke in pts with CVA precursors, TIA Prevention of stent thrombosis	Neutropenia, agranulocytosis, thrombocytopenia, aplastic anemia, increased serum cholesterol/triglycerides, rash, diarrhea, nausea, vomiting, GI pain
Tirofiban (Aggrastat)	**I:** 50 mcg/ml, 250 mcg/ml	Treatment of acute coronary syndrome	Bleeding, thrombocytopenia, bradycardia, pelvic pain
Thrombolytics			
Alteplase (Activase)	**I:** 50 mg, 100 mg	Acute MI, acute ischemic stroke, pulmonary embolism	Bleeding, epistaxis
Reteplase (Retavase)	**I:** 10.4 units	Acute MI	Bleeding, injection site bleeding, anemia
Tenecteplase (TNKase)	**I:** 50 mg	Acute MI	Bleeding, hematuria

ACS, Acute coronary syndrome; ***DTV,*** deep vein thrombosis; ***HIT,*** heparin-induced thrombocytopenia; ***I,*** injection; ***MI,*** myocardial infarction; ***PCI,*** percutaneous coronary intervention; ***PO,*** oral; ***PTCA,*** percutaneous transluminal coronary angioplasty; ***STEMI,*** ST segment elevation MI; ***T,*** tablet; ***TIA,*** transient ischemic attack; ***VTE,*** venous thromboembolism.

Anticonvulsants

USES

Anticonvulsants are used to treat seizures. Seizures can be divided into two broad categories: partial seizures and generalized seizures. *Partial seizures* begin focally in the cerebral cortex, undergoing limited spread. Simple partial seizures do not involve loss of consciousness but may evolve secondarily into generalized seizures. Complex partial seizures involve impairment of consciousness.

Generalized seizures may be convulsive or nonconvulsive and usually produce immediate loss of consciousness.

ACTION

Anticonvulsants can prevent or reduce excessive discharge of neurons with seizure foci or decrease the spread of excitation from seizure foci to normal neurons. The exact mechanism is unknown but may be due to (1) suppressing sodium influx, (2) suppressing calcium influx, or (3) increasing the action of gamma-aminobutyric acid (GABA), which inhibits neurotransmitters throughout the brain.

ANTICONVULSANTS

Name	Availability	Uses	Dosage Range	Side Effects
Carbamazepine (Carbatrol, Tegretol, Tegretol XR)	**S:** 100 mg/5 ml **T (chewable):** 100 mg **T:** 200 mg **T (ER):** 100 mg, 200 mg, 400 mg **C (ER):** 200 mg, 300 mg	Complex partial, tonic-clonic, mixed seizures; trigeminal neuralgia	**A:** 800–1,600 mg/day in 2–3 doses **C:** 400–800 mg/day in 3–4 doses	Dizziness, diplopia, leukopenia, drowsiness, blurred vision, headache, ataxia, nausea, vomiting, hyponatremia
Clonazepam (Klonopin)	**T:** 0.5 mg, 1 mg, 2 mg	Petit mal, akinetic, myoclonic, absence seizures	**A:** 1.5–8 mg/day in 2–3 doses	CNS depression, sedation, ataxia, confusion, depression, behavior disorders, respiratory depression
Ezogabine (Potiga)	**T:** 50 mg, 200 mg, 300 mg, 400 mg	Partial onset seizures	**A:** 600–1,200 mg/day in 3 doses	Dizziness, somnolence, fatigue, confusion, vertigo, tremor, diplopia, blurred vision, balance disorder

Continued

ANTICONVULSANTS—cont'd

Name	Availability	Uses	Dosage Range	Side Effects
Fosphenytoin (Cerebyx)	**I:** 50 mg PE/ml	Status epilepticus, seizures occurring during neurosurgery	**A:** 15–20 mg PE/kg bolus, then 4–6 mg PE/kg/day maintenance	Burning, itching, paresthesia, nystagmus, ataxia
Gabapentin (Neurontin)	**C:** 100 mg, 300 mg, 400 mg	Partial seizures with and without secondary generalization	**A:** 1,800–3,600 mg/day in 3 doses	CNS depression, fatigue, drowsiness, dizziness, ataxia, nystagmus, blurred vision, confusion
Lacosamide (Vimpat)	**T:** 50 mg, 100 mg, 150 mg, 200 mg **S:** 10 mg/ml **I:** 10 mg/ml	Adjunctive therapy, partial seizures	**A:** 200–400 mg/day in 2 doses	Diplopia, headache, dizziness, nausea
Lamotrigine (Lamictal)	**T:** 25 mg, 100 mg, 150 mg, 200 mg **T (ER):** 25 mg, 50 mg, 100 mg, 200 mg **T (ODT):** 25 mg, 50 mg, 100 mg, 200 mg	Partial seizures, primary generalized tonic-clonic seizures, generalized seizures of Lennox-Gastaut syndrome	**A:** 100–600 mg/day in 2 doses	Dizziness, ataxia, drowsiness, diplopia, nausea, rash, headache, vomiting, insomnia, incoordination
Levetiracetam (Keppra)	**T:** 250 mg, 500 mg, 750 mg, 2,000 mg **S:** 100 mg/ml	Adjunctive therapy, partial seizures, primary tonic-clonic seizures, myoclonic seizures	**A:** 1,000–3,000 mg/day in 2 doses	Dizziness, drowsiness, weakness, irritability, hallucinations, psychosis
Oxcarbazepine (Trileptal)	**T:** 150 mg, 300 mg, 600 mg	Partial seizures	**A:** 1,200–2,400 mg/day in 2 doses	Drowsiness, dizziness, headaches, diplopia, ataxia, nausea, vomiting
Phenobarbital	**T:** 30 mg, 60 mg, 100 mg **I:** 65 mg, 130 mg	Tonic-clonic, partial seizures; status epilepticus	**A (PO):** 100–300 mg/day; **(IM/IV):** 200–600 mg **C (PO):** 3–5 mg/kg/day; **(IM/IV):** 100–400 mg	CNS depression, sedation, paradoxical excitement and hyperactivity, rash

Phenytoin (Dilantin)	**C:** 100 mg **T (chewable):** 50 mg **S:** 125 mg/5 ml **I:** 50 mg/ml	Tonic-clonic, psychomotor seizures	**A (PO):** 300–600 mg/day in 1–3 doses; **IV:** 150–250 mg **C (PO):** 4–8 mg/kg/day in 1–3 doses; **(IV):** 10–15 mg/kg	Nystagmus, ataxia, hypertrichosis, gingival hyperplasia, rash, osteomalacia, lymphadenopathy
Pregabalin (Lyrica)	**C:** 25 mg, 50 mg, 75 mg, 100 mg, 150 mg, 200 mg, 225 mg, 300 mg	Adjunctive therapy, partial seizures	**A:** 150–600 mg/day in 2 or 3 doses	Confusion, drowsiness, dizziness, ataxia, weight gain, dry mouth, blurred vision, peripheral edema
Primidone (Mysoline)	**T:** 50 mg, 250 mg **S:** 250 mg/5 ml	Complex partial, akinetic, tonic-clonic seizures	**A:** 750–1250 mg/day in 3–4 doses **C:** 10–25 mg/kg/day	CNS depression, sedation, paradoxical excitement and hyperactivity, rash, dizziness, ataxia
Tiagabine (Gabitril)	**T:** 4 mg, 12 mg, 16 mg, 20 mg	Partial seizures	**A:** Initially, 4 mg up to 56 mg/day in 2–4 doses **C:** Initially, 4 mg up to 32 mg/day in 2–4 doses	Dizziness, asthenia (loss of strength, energy), nervousness, anxiety, tremors, abdominal pain
Topiramate (Topamax)	**T:** 25 mg, 100 mg, 200 mg	Partial seizures	**A:** 200–400 mg/day in 2 doses **C:** 1–9 mg/kg/day in 2 divided doses	Drowsiness, dizziness, headache, ataxia, confusion, weight loss, diplopia
Valproic acid (Depakene, Depakote)	**C:** 250 mg **S:** 250 mg/5 ml **Sprinkles:** 125 mg **T:** 125 mg, 250 mg, 500 mg **T (ER):** 500 mg **I:** 100 mg/ml	Complex partial, absence seizures	**A, C:** 15–60 mg/kg/day in 2–3 doses	Nausea, vomiting, tremors, thrombocytopenia, hair loss, hepatic dysfunction, weight gain, decreased platelet function

Continued

ANTICONVULSANTS—cont'd

Name	Availability	Uses	Dosage Range	Side Effects
Vigabatrin (Sabril)	**T:** 500 mg **PS:** 500 mg	Infantile spasms, refractory complex partial seizures	**A:** 3 g/day in 2 divided doses **C:** 40–100 mg/kg/day in 2 divided doses	Vision changes, eye pain, abdominal pain, agitation, confusion, mood/mental changes, abnormal coordination
Zonisamide (Zonegran)	**C:** 100 mg	Partial seizures	**A:** 100–400 mg/day in 1 or 2 doses	Drowsiness, dizziness, anorexia, diarrhea, weight loss, agitation, irritability, rash, nausea

A, Adults; ***C,*** capsules; ***C** (dosage),* children; ***ER,*** extended-release; ***I,*** injection; ***ODT,*** orally disintegrating tablets; ***PE,*** phenytoin equivalent; ***PO,*** oral; ***PS,*** powder sachet; ***S,*** suspension; ***T,*** tablets.

Antidepressants

USES

Used primarily for the treatment of depression. Depression can be a chronic or recurrent mental disorder presenting with symptoms such as depressed mood, loss of interest or pleasure, guilt feelings, disturbed sleep/appetite, low energy, and difficulty in thinking. Depression can also lead to suicide.

ACTION

Antidepressants include tricyclics, monoamine oxidase inhibitors (MAOIs), selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), and other antidepressants. Depression may be due to reduced functioning of monoamine neurotransmitters (e.g., norepinephrine, serotonin [5-HT], dopamine) in the CNS (decreased amount and/or decreased effects at the receptor sites). Antidepressants block metabolism, increase amount/effects of monoamine neurotransmitters, and act at receptor sites (change responsiveness/sensitivities of both presynaptic and postsynaptic receptor sites).

ANTIDEPRESSANTS

Name	Availability	Uses	Dosage Range (per day)	Side Effects
Tricyclics				
Amitriptyline (Elavil)	**T:** 10 mg, 25 mg, 50 mg, 75 mg, 100 mg, 150 mg	Depression, neuropathic pain	50–150 mg	Drowsiness, blurred vision, constipation, confusion, postural hypotension, cardiac conduction defects, weight gain, seizures, dry mouth
Clomipramine (Anafranil)	**C:** 25 mg, 50 mg, 75 mg	OCD	25–250 mg	Dizziness, somnolence, drowsiness, headache, xerostomia, constipation, nausea
Desipramine (Norpramin)	**T:** 10 mg, 25 mg, 50 mg, 75 mg, 100 mg, 150 mg	Depression, neuropathic pain	50–150 mg	Dizziness, drowsiness, fatigue, headache, anorexia, diarrhea, nausea
Imipramine (Tofranil)	**T:** 10 mg, 25 mg, 50 mg **C:** 75 mg, 100 mg, 125 mg, 150 mg	Depression, enuresis, neuropathic pain, panic disorder, ADHD	25–100 mg	Dizziness, fatigue, headache, vomiting, xerostomia
Nortriptyline (Aventyl, Pamelor)	**C:** 10 mg, 25 mg, 50 mg, 75 mg **S:** 10 mg/5 ml	Depression, neuropathic pain, smoking cessation	75–150 mg	Dizziness, fatigue, headache, anorexia, xerostomia
Monoamine Oxidase Inhibitors				
Phenelzine (Nardil)	**T:** 15 mg	Depression	45–60 mg	Sedation, hypertensive crisis, weight gain, orthostatic hypotension

Continued

ANTIDEPRESSANTS—cont'd

Name	Availability	Uses	Dosage Range (per day)	Side Effects
Tranylcypromine (Parnate)	**T:** 10 mg	Depression	10–60 mg	Same as phenelzine
Selective Serotonin Reuptake Inhibitors				
Citalopram (Celexa)	**T:** 20 mg, 40 mg **S:** 10 mg/5 ml	Depression, OCD, panic disorder	20–40 mg	Insomnia or sedation, nausea, agitation, headaches
Escitalopram (Lexapro)	**T:** 5 mg, 10 mg, 20 mg	Depression, GAD	10–20 mg	Insomnia or sedation, nausea, agitation, headaches
Fluoxetine (Prozac)	**C:** 10 mg, 20 mg, 40 mg **T:** 10 mg **S:** 20 mg/5 ml	Depression, OCD, bulimia, panic disorder, anorexia, bipolar disorder, premenstrual syndrome	10–80 mg	Akathisia, sexual dysfunction, skin rash, urticaria, pruritus, decreased appetite, asthenia (loss of strength, energy), diarrhea, drowsiness, headaches, diaphoresis, insomnia, nausea, tremors
Fluvoxamine (Luvox, Luvox CR)	**T:** 25 mg, 50 mg, 100 mg **C (SR):** 100 mg, 150 mg	OCD, SAD	100–300 mg	Sexual dysfunction, fatigue, constipation, dizziness, drowsiness, headaches, insomnia, nausea, vomiting
Paroxetine (Paxil)	**T:** 10 mg, 20 mg, 30 mg, 40 mg **S:** 10 mg/5 ml	Depression, OCD, panic attack, SAD	20–50 mg	Asthenia (loss of strength, energy), constipation, diarrhea, diaphoresis, insomnia, nausea, sexual dysfunction, tremors, vomiting, urinary frequency or retention
Sertraline (Zoloft)	**T:** 25 mg, 50 mg, 100 mg **S:** 20 mg/ml	Depression, OCD, panic attack	50–200 mg	Sexual dysfunction, dizziness, drowsiness, anorexia, diarrhea, nausea, dry mouth, abdominal cramps, decreased weight, headaches, increased diaphoresis, tremors, insomnia

Serotonin-Norepinephrine Reuptake Inhibitors

Desvenlafaxine (Pristiq)	**T:** 50 mg, 100 mg	Depression	50–100 mg	Nausea, dizziness, insomnia, hyperhidrosis, constipation, drowsiness, decreased appetite, anxiety, male sexual function disorders
Duloxetine (Cymbalta)	**C:** 20 mg, 30 mg, 60 mg	Depression, fibromyalgia, neuropathic pain	40–60 mg	Nausea, dry mouth, constipation, decreased appetite, fatigue, diaphoresis
Venlafaxine (Effexor)	**T:** 25 mg, 37.5 mg, 50 mg, 75 mg, 100 mg **T (ER):** 37.5 mg, 75 mg, 150 mg	Depression, anxiety	75–375 mg	Increased blood pressure, agitation, sedation, insomnia, nausea

Other

Bupropion (Wellbutrin)	**T:** 75 mg, 100 mg **SR:** 100 mg, 150 mg	Depression, smoking cessation, ADHD, bipolar disorder	150–450 mg	Insomnia, irritability, seizures
Mirtazapine (Remeron)	**T:** 15 mg, 30 mg, 45 mg	Depression	15–45 mg	Sedation, dry mouth, weight gain, agranulocytosis, hepatic toxicity
Trazodone (Desyrel)	**T:** 50 mg, 100 mg, 150 mg, 300 mg	Depression	50–600 mg	Sedation, orthostatic hypotension, priapism
Vilazodone (Viibyrd)	**T:** 10 mg, 20 mg, 40 mg	Depression	10–40 mg	Diarrhea, nausea, dizziness, dry mouth, insomnia, vomiting, decreased libido

ADHD, Attention-deficit hyperactivity disorder; ***C,*** capsules; ***ER,*** extended-release; ***GAD,*** generalized anxiety disorder; ***OC,*** oral concentrate; ***OCD,*** obsessive-compulsive disorder; ***S,*** suspension; ***SAD,*** social anxiety disorder; ***SR,*** sustained-release; ***T,*** tablets.

Antidiabetics

USES

Insulin: Treatment of insulin-dependent diabetes (type 1) and non–insulin-dependent diabetes (type 2). Also used in acute situations such as ketoacidosis, severe infections, major surgery in otherwise non–insulin-dependent diabetics. Administered to pts receiving parenteral nutrition. Drug of choice during pregnancy. All insulins, including long-acting insulins, can cause hypoglycemia and weight gain.

Alpha-glucosidase inhibitors: Adjunct to diet and exercise for management of type 2 diabetes mellitus.

Biguanides: Adjunct to diet and exercise for management of type 2 diabetes mellitus.

Dipeptidyl peptidase 4 inhibitors (DPP-4): Adjunct to diet and exercise for management of type 2 diabetes mellitus.

Meglitinide: Adjunct to diet and exercise for management of type 2 diabetes mellitus.

Sulfonylureas: Adjunct to diet and exercise for management of type 2 diabetes mellitus.

Thiazolidinediones: Adjunct to diet and exercise for management of type 2 diabetes mellitus.

ACTION

Insulin: A hormone synthesized and secreted by beta cells of Langerhans' islet in the pancreas. Controls storage and utilization of glucose, amino acids, and fatty acids by activated transport systems/enzymes. Inhibits breakdown of glycogen, fat, protein. Insulin lowers blood glucose by inhibiting glycogenolysis and gluconeogenesis in liver; stimulates glucose uptake by muscle, adipose tissue. Activity of insulin is initiated by binding to cell surface receptors.

Alpha-glucosidase inhibitors: Work locally in small intestine, slowing carbohydrate breakdown and glucose absorption.

Biguanides: Inhibit hepatic gluconeogenesis, glycogenolysis; enhance insulin sensitivity in muscle and fat.

DPP-4: Inhibit degradation of endogenous incretins, which increases insulin secretion, decreases glucagon secretion.

Meglitinide: Stimulates pancreatic insulin secretion.

Sulfonylureas: Stimulate release of insulin from beta cells of the pancreas.

Thiazolidinediones: Enhance insulin sensitivity in muscle and fat.

ANTIDIABETICS

INSULIN

Type	Onset	Peak	Duration	Comments
Rapid-Acting				
Apidra, glulisine	10–15 min	1–1.5 hrs	3–5 hrs	Stable at room temp for 28 days Can mix with NPH
Humalog, lispro	15–30 min	0.5–2.5 hrs	6–8 hrs	Stable at room temp for 28 days Can mix with NPH
Novolog, aspart	10–20 min	1–3 hrs	3–5 hrs	Stable at room temp for 28 days Can mix with NPH
Short-Acting				
Humulin R, Novolin R, regular	30–60 min	1–5 hrs	6–10 hrs	Stable at room temp for 28 days Can mix with NPH
Intermediate-Acting				
Humulin N, Novolin N, NPH	1–2 hrs	6–14 hrs	16–24 hrs	Stable at room temp for 28 days Can mix with aspart, lispro, glulisine
Long-Acting				
Lantus, glargine	1.1 hrs	No significant peak	24 hrs	Do NOT mix with other insulins Stable at room temp for 28 days
Levemir, detemir	0.8–2 hrs	No significant peak	12–24 hrs (dose dependent)	Do NOT mix with other insulins Stable at room temp for 42 days

Continued

ANTIDIABETICS—cont'd

Oral Agents

Name	Availability	Dosage Range	Side Effects
Sulfonylureas			
Glimepiride (Amaryl)	**T:** 1 mg, 2 mg, 4 mg	1–8 mg/day	Hypoglycemia, dizziness, headache, nausea, flu-like syndrome
Glipizide (Glucotrol)	**T:** 5 mg, 10 mg **T (XL):** 5 mg	**T:** 2.5–40 mg/day **XL:** 5–20 mg/day	Dizziness, nervousness, anxiety, diarrhea, tremor
Glyburide (DiaBeta, Micronase)	**T:** 1.25 mg, 2.5 mg, 5 mg **PT:** 1.5 mg, 3 mg	**T:** 1.25–20 mg/day **PT:** 1.5–12 mg/day	Dizziness, headache, nausea
Alpha-Glucosidase Inhibitors			
Acarbose (Precose)	**T:** 25 mg, 50 mg, 100 mg	75–300 mg/day	Flatulence, diarrhea, abdominal pain, increased risk of hypoglycemia when used with insulin or sulfonylureas
Miglitol (Glyset)	**T:** 25 mg, 50 mg, 100 mg	75–300 mg/day	Flatulence, diarrhea, abdominal pain, rash
Dipeptidyl Peptidase Inhibitors			
Alogliptin (Nesina)	**T:** 6.25 mg, 12.5 mg, 25 mg	6.25–25 mg/day	Nasopharyngitis, cough, headache, upper respiratory tract infections
Linagliptin (Tradjenta)	**T:** 5 mg	5 mg/day	Arthralgia, back pain, headache
Saxagliptin (Onglyza)	**T:** 2.5 mg, 5 mg	2.5–5 mg/day	Upper respiratory tract infection, urinary tract infection, headache
Sitagliptin (Januvia)	**T:** 25 mg, 50 mg, 100 mg	25–100 mg/day	Nasopharyngitis, upper respiratory infection, headaches, modest weight gain, increased incidence of hypoglycemia when added to a sulfonylurea

Biguanides			
Metformin (Glucophage)	**T:** 500 mg, 850 mg **XR:** 500 mg	**T:** 0.5–2.5 g/day **XR:** 1,500–2,000 mg/day	Nausea, vomiting, diarrhea, loss of appetite, metallic taste, lactic acidosis (rare but potentially fatal complication)
Glucagon-Like Peptide-1 (GLP-1)			
Albiglutide (Tanzeum)	**I:** 30 mg, 50 mg	30–50 mg once weekly	Diarrhea, nausea, upper respiratory tract infection, injection site reaction
Exenatide (Byetta)	**I:** 5 mcg, 10 mcg	5–10 mcg 2 times/day	Diarrhea, dizziness, dyspnea, headaches, nausea, vomiting
Exenatide extended-release (Bydureon)	**I:** 2 mg	2 mg once weekly	Diarrhea, nausea, headache
Liraglutide (Victoza)	**I:** 0.6 mg, 1.2 mg, 1.8 mg (6 mg/ml)	0.6–1.8 mg/day	Headache, nausea, diarrhea
Meglitinides			
Nateglinide (Starlix)	**T:** 60 mg, 120 mg	60–120 mg 3 times/day	Hypoglycemia, upper respiratory infection, dizziness, back pain, flu-like syndrome
Repaglinide (Prandin)	**T:** 0.5 mg, 1 mg, 2 mg	0.5–1 mg with each meal (**Maximum:** 16 mg/day)	Headache, hypoglycemia, upper respiratory infection
Thiazolidinediones			
Pioglitazone (Actos)	**T:** 15 mg, 30 mg, 45 mg	15–45 mg/day	Mild to moderate peripheral edema, weight gain, increased risk of HF, associated with reduced bone mineral density and increased incidence of fractures
Rosiglitazone (Avandia)	**T:** 2 mg, 4 mg, 8 mg	4–8 mg/day	Increased cholesterol, wgt gain, back pain, upper respiratory tract infection

Continued

ANTIDIABETICS—cont'd

Name	Availability	Dosage Range	Side Effects
Miscellaneous			
Bromocriptine (Cycloset)	**T:** 0.8 mg	1.6–4.8 mg/day	Nausea, fatigue, dizziness, vomiting
Canagliflozin (Invokana)	**T:** 100 mg, 300 mg	100–300 mg/day	Increased urination, genital yeast infections, urticaria, rash, pruritus
Colesevelam (Welchol)	**T:** 625 mg **S:** 1.875 g, 3.75 g packet	3.75 g/day	Constipation, dyspepsia, nausea
Dapagliflozin (Farxiga)	**T:** 5 mg, 10 mg	5–10 mg/day	Genital yeast infections, nasopharyngitis, urinary tract infections
Empagliflozin (Jardiance)	**T:** 10 mg, 25 mg	10–25 mg/day	Female genital mycotic infections, urinary tract infections
Pramlintide (Symlin)	**I:** 0.6 mg/ml	15–60 mcg immediately prior to meals	Abdominal pain, anorexia, headaches, nausea, vomiting, severe hypoglycemia may occur when used in combination with insulin (reduction in dosages of short-acting, including premixed, insulins recommended)

HF, Heart failure; ***I,*** injection; ***PT,*** prestab; ***S:*** suspension; ***T,*** tablets; ***XL,*** extended-release; ***XR,*** extended-release.

Antidiarrheals

USES	ACTION	
Acute diarrhea, chronic diarrhea of inflammatory bowel disease, reduction of fluid from ileostomies.	*Systemic agents:* Act as smooth muscle receptors (enteric) disrupting peristaltic movements, decreasing GI motility, increasing transit time of intestinal contents.	*Local agents:* Adsorb toxic substances and fluids to large surface areas of particles in the preparation. Some of these agents coat and protect irritated intestinal walls. May have local anti-inflammatory action.

ANTIDIARRHEALS

Name	Availability	Type	Dosage Range
Bismuth (Pepto-Bismol)	**T:** 262 mg **C:** 262 mg **L:** 130 mg/15 ml, 262 mg/15 ml, 524 mg/15 ml	Local	**A:** 2 **T** or 30 ml **C (9–12 yrs):** 1 **T** or 15 ml **C (6–8 yrs):** 2/3 **T** or 10 ml **C (3–5 yrs):** 1/3 **T** or 5 ml
Diphenoxylate with atropine (Lomotil)	**T:** 2.5 mg **L:** 2.5 mg/5 ml	Systemic	**A:** 5 mg 4 times/day **C:** 0.3–0.4 mg/kg/day in 4 divided doses **(L)**
Loperamide (Imodium)	**C:** 2 mg **T:** 2 mg **L:** 1 mg/5 ml, 1 mg/ml	Systemic	**A:** Initially, 4 mg (**Maximum:** 16 mg/day) **C (9–12 yrs):** 2 mg 3 times/day **C (6–8 yrs):** 2 mg 2 times/day **C (2–5 yrs):** 1 mg 3 times/day **(L)**

A, Adults; ***C,*** capsules; ***C** (dosage),* children; ***L,*** liquid; ***S,*** suspension; ***T,*** tablets.

Antifungals: Systemic Mycoses

Systemic mycoses are subdivided into opportunistic infections (candidiasis, aspergillosis, cryptococcosis, and mucormycosis) that are seen primarily in debilitated or immunocompromised hosts and nonopportunistic infections (blastomycosis, histoplasmosis, and coccidioidomycosis) that occur in any host. Treatment can be difficult because these infections often resist treatment and may require prolonged therapy.

ANTIFUNGALS: SYSTEMIC MYCOSES

Name	Indications	Side Effects
Amphotericin B	Potentially life-threatening fungal infections, including aspergillosis, blastomycosis, coccidioidomycosis, cryptococcosis, histoplasmosis, systemic candidiasis	Fever, chills, headache, nausea, vomiting, nephrotoxicity, hypokalemia, hypomagnesemia, hypotension, dyspnea, arrhythmias, abdominal pain, diarrhea, increased hepatic function tests
Amphotericin B lipid complex (Abelcet)	Invasive fungal infections	Chills, fever, hypotension, headache, nausea, vomiting
Amphotericin B liposomal (AmBisome)	Empiric therapy for presumed fungal infections in febrile neutropenic pts, treatment of cryptococcal meningitis in HIV-infected pts, treatment of *Aspergillus, Candida, Cryptococcus* infections, treatment of visceral leishmaniasis	Peripheral edema, tachycardia, hypotension, chills, insomnia, headache
Amphotericin colloidal dispersion (Amphotec)	Invasive *Aspergillus*	Hypotension, tachycardia, chills, fever, vomiting
Anidulafungin (Eraxis)	Candidemia, esophageal candidiasis	Diarrhea, hypokalemia, increased hepatic function tests, headache
Caspofungin (Cancidas)	Candidemia, invasive aspergillosis, empiric therapy for presumed fungal infections in febrile neutropenic pts	Headache, nausea, vomiting, diarrhea, increased hepatic function tests
Fluconazole (Diflucan)	Treatment of vaginal candidiasis; oropharyngeal, esophageal candidiasis; and cryptococcal meningitis. Prophylaxis to decrease incidence of candidiasis in pts undergoing bone marrow transplant receiving cytotoxic chemotherapy and/or radiation	Nausea, vomiting, abdominal pain, diarrhea, dysgeusia, increased hepatic function tests, liver necrosis, hepatitis, cholestasis, headache, rash, pruritus, eosinophilia, alopecia
Itraconazole (Sporanox)	Blastomycosis, histoplasmosis, aspergillosis, onychomycosis, empiric therapy of febrile neutropenic pts with suspected fungal infections, treatment of oropharyngeal and esophageal candidiasis	Congestive heart failure, peripheral edema, nausea, vomiting, abdominal pain, diarrhea, increased hepatic function tests, liver necrosis, hepatitis, cholestasis, headache, rash, pruritus, eosinophilia

Ketoconazole (Nizoral)	Candidiasis, chronic mucocutaneous candidiasis, oral thrush, candiduria, blastomycosis, coccidioidomycosis	Nausea, vomiting, abdominal pain, diarrhea, gynecomastia, increased hepatic function tests, liver necrosis, hepatitis, cholestasis, headache, rash, pruritus, eosinophilia
Micafungin (Mycamine)	Esophageal candidiasis, *Candida* infections, prophylaxis in pts undergoing hematopoietin stem cell transplantation	Fever, chills, hypokalemia, hypomagnesemia, hypocalcemia, myelosuppression, thrombocytopenia, nausea, vomiting, abdominal pain, diarrhea, increased hepatic function tests, dizziness, headache, rash, pruritus, pain or inflammation at injection site, fever
Posaconazole (Noxafil)	Prevent invasive aspergillosis and *Candida* infections in pts 13 yrs and older who are immunocompromised, treatment of oropharyngeal candidiasis	Fever, headaches, nausea, vomiting, diarrhea, abdominal pain, hypokalemia, cough, dyspnea
Voriconazole (Vfend)	Invasive aspergillosis, candidemia, esophageal candidiasis, serious fungal infections	Visual disturbances, nausea, vomiting, abdominal pain, diarrhea, increased hepatic function tests, liver necrosis, hepatitis, cholestasis, headache, rash, pruritus, eosinophilia

Antifungals: Topical

USES

Treatment of tinea infections, cutaneous candidiasis (moniliasis) due to *Candida albicans.*

ACTION

Exact mechanism unknown. May deplete essential intracellular components by inhibiting transport of potassium, other ions into cells; alter membrane permeability, resulting in loss of potassium, other cellular components.

ANTIFUNGALS: TOPICAL

Name	Availability	Dosage Range	Side Effects
Butenafine (Mentax)	**C:** 1%	2 times/day	Burning, stinging, pruritus, contact dermatitis, erythema
Ciclopirox (Loprox)	**C:** 1% **L:** 1%	2 times/day	Irritation, pruritus, redness

Continued

ANTIFUNGALS: TOPICAL—cont'd

Name	Availability	Dosage Range	Side Effects
Clioquinol (Vioform)	**C:** 3% **O:** 3%	2–3 times/day	Irritation, stinging, swelling
Clotrimazole (Lotrimin, Mycelex)	**C:** 1% **L:** 1% **S:** 1%	2 times/day	Erythema, stinging, blistering, edema, pruritus
Efinaconazole (Jublia)	**S:** 10%	Once daily	Application site dermatitis/vesicles
Ketoconazole (Nizoral)	**C:** 2%	1–2 times/day	Irritation, pruritus, stinging
Miconazole (Micatin, Monistat)	**C:** 2% **P:** 2%	2 times/day	Irritation, burning, allergic contact dermatitis
Nystatin (Mycostatin, Nilstat)	**C:** 100,000 g **O:** 100,000 g **P:** 100,000 g	2–3 times/day	Irritation
Oxiconazole (Oxistat)	**C:** 1% **L:** 1%	1–2 times/day	Pruritus, burning, stinging, irritation, pain, tingling
Sertaconazole (Ertaczo)	**C:** 2%	2 times/day	Dry skin, burning, pruritus, erythema
Terbinafine (Lamisil)	**C:** 1% **G:** 10 mg	1–2 times/day	Irritation, burning, pruritus, dryness
Tolnaftate (Tinactin)	**C:** 1% **G:** 1% **S:** 1%	2 times/day	Mild irritation
Triacetin (Fungoid)	**C:** 1% **S:** 1%	3 times/day	Irritation
Undecylenic acid (Caldesene, Cruex, Desenex)	**C:** 8%, 20% **P:** 10%, 12%, 15%, 19%, 25% **O:** 25%	As needed	None significant

C, Cream; ***G,*** gel; ***L,*** lotion; ***O,*** ointment; ***P,*** powder; ***S,*** solution.

Antiglaucoma Agents

USES	ACTION
Reduction of elevated intraocular pressure (IOP) in pts with open-angle glaucoma and ocular hypertension.	Medications decrease IOP by two primary mechanisms: decreasing aqueous humor (AH) production or increasing AH outflow. • *Miotics (direct acting and indirect acting):* Constrict pupils, opening channels in the trabecular meshwork, reducing resistance to outflow of AH. • *Alpha$_2$ agonists:* Activate receptors in ciliary body, inhibiting aqueous secretion and increasing uveoscleral aqueous outflow. • *Beta blockers:* Reduce production of aqueous humor. • *Carbonic anhydrase inhibitors:* Decrease production of AH by inhibiting enzyme carbonic anhydrase. • *Prostaglandins:* Increase outflow of aqueous fluid through uveoscleral route.

ANTIGLAUCOMA AGENTS

Name	Availability	Dosage Range	Side Effects
Miotics			
Carbachol (Isopto-Carbachol)	**S:** 1.5%, 3%	1 drop qid	Brow ache, corneal toxicity, conjunctival inflammation, transient myopia, blurred vision, retinal detachment
Pilocarpine (Isopto Carpine Pilopine HS [Gel])	**G:** 4% **S:** 1%, 2%, 4%	**S:** 1 drop qid **G:** 1 drop HS	Same as carbachol
Alpha$_2$ Agonists			
Apraclonidine (Iopidine)	**S:** 0.5%, 1%	1 drop tid	Fatigue, somnolence, local allergic reaction, dry eyes, stinging

Continued

ANTIGLAUCOMA AGENTS—cont'd

Name	Availability	Dosage Range	Side Effects
Brimonidine (Alphagan HP)	**S:** 0.1%, 0.15%, 0.2%	1 drop tid	Same as apraclonidine
Prostaglandins			
Bimatoprost (Lumigan)	**S:** 0.01%	1 drop daily in evening	Conjunctival hyperemia; darkening of iris, eyelids; increase in length, thickness, and number of eyelashes; local irritation; itching; dryness; blurred vision
Latanoprost (Xalatan)	**S:** 0.005%	1 drop daily in evening	See bimatoprost
Tafluprost (Zioptan)	**S:** 0.0015%	1 drop daily in evening	See bimatoprost
Travoprost (Travatan)	**S:** 0.004%	1 drop daily in evening	See bimatoprost
Unoprostone (Rescula)	**S:** 0.15%	1 drop bid	See bimatoprost
Beta Blockers			
Betaxolol (Betoptic, Betoptic-S)	**Suspension (Betoptic-S):** 0.25% **S (Betoptic):** 0.5%	Betoptic-S: 1 drop 2 times/day Betoptic: 1–2 drops 2 times/day	Fatigue, dizziness, bradycardia, respiratory depression, mask symptoms of hypoglycemia, block effects of beta agonists in treatment of asthma
Levobunolol (Betagan)	**S:** 0.25%, 0.5%	1 drop 1–2 times/day	Same as betaxolol
Timolol (Betimol, Istalol, Timoptic, Timoptic XE)	**S:** 0.25%, 0.5% **G, Timoptic XE:** 0.25%, 0.5%	**S:** 1 drop 2 times/day (Istalol): 1 drop daily **G:** 1 drop daily	Same as betaxolol
Carbonic Anhydrase Inhibitors			
Brinzolamide (Azopt)	**Suspension:** 1%	1 drop 3 times/day	Bitter taste, stinging, redness, burning, conjunctivitis, dry eyes, blurred vision

Dorzolamide (Trusopt)	**S:** 2%	1 drop 3 times/day	Same as brinzolamide
Combinations			
Brimonidine/timolol (Combigan)	0.2%/0.5%	1 drop bid	See individual agents
Brinzolamide/ brimonidine (Simbrinza)	1%/0.2%	1 drop tid	See individual agents
Timolol/dorzolamide (Cosopt)	0.5%/2%	1 drop bid	See individual agents

C, Capsules; ***G,*** gel; ***O,*** ointment; ***S,*** solution; ***T,*** tablets.

Antihistamines

USES

Symptomatic relief of upper respiratory allergic disorders. Allergic reactions associated with other drugs respond to antihistamines, as do blood transfusion reactions. Used as a second-choice drug in treatment of angioneurotic edema. Effective in treatment of acute urticaria and other dermatologic conditions. May also be used for preop sedation, Parkinson's disease, and motion sickness.

ACTION

Antihistamines (H_1 antagonists) inhibit vasoconstrictor effects and vasodilator effects on endothelial cells of histamine. They block increased capillary permeability, formation of edema/wheal caused by histamine. Many antihistamines can bind to receptors in CNS, causing primarily depression (decreased alertness, slowed reaction times, drowsiness) but also stimulation (restlessness, nervousness, inability to sleep). Some may counter motion sickness.

ANTIHISTAMINES

Name	Availability	Dosage Range	Side Effects
Cetirizine (Zyrtec)	**T:** 5 mg, 10 mg **C:** 5 mg, 10 mg **T (chew):** 5 mg/10 mg **S:** 5 mg/5 ml	**A:** 5–10 mg/day **C (6–12 yrs):** 5–10 mg/day **C (2–5 yrs):** 2.5–5 mg/day	Headache, somnolence, fatigue, abdominal pain, dry mouth
Desloratadine (Clarinex)	**T:** 5 mg **ODT:** 2.5 mg, 5 mg **S:** 0.5 mg/ml	**A, C (12 yrs and older):** 5 mg/day **C (6–11 yrs):** 2.5 mg/day **C (1–5 yrs):** 1.25 mg/day **C (6–11 mos):** 1 mg/day	Dizziness, fatigue, headache, nausea
Dimenhydrinate (Dramamine)	**T:** 50 mg **T (chew):** 25 mg, 50 mg	**A:** 50–100 mg q4–6h **C:** 12.5–50 mg q6–8h	Dizziness, drowsiness, headache, nausea
Diphenhydramine (Benadryl)	**T:** 25 mg, 50 mg **C:** 25 mg, 50 mg **L:** 12.5 mg/5 ml	**A:** 25–50 mg q6–8h **C (6–11 yrs):** 12.5–25 mg q4–6h **C (2–5 yrs):** 6.25 mg q4–6h	Chills, confusion, dizziness, fatigue, headache, sedation, nausea
Fexofenadine (Allegra)	**T:** 30 mg, 60 mg, 180 mg **ODT:** 30 mg **S:** 30 mg/5 ml	**A:** 60 mg q12h or 180 mg/day **C (2–11 yrs):** 30 mg q12h, **(6–23 mos):** 15 mg bid	Headache, vomiting, fatigue, diarrhea
Hydroxyzine (Atarax)	**T:** 10 mg, 25 mg, 50 mg **C:** 25 mg, 50 mg, 100 mg **S:** 10 mg/5 ml	**A:** 25 mg q6–8h **C:** 2 mg/kg/day in divided doses q6–8h	Dizziness, drowsiness, fatigue, headache
Levocetirizine (Xyzal)	**T:** 5 mg **S:** 2.5 mg/ml	**A, C (12 yrs and older):** 5 mg once daily in evening **C (6–11 yrs):** 2.5 mg once daily in evening **(6 mos–5 yrs):** 1.25 mg once daily	Fatigue, fever, somnolence, vomiting

Loratadine (Claritin)	**ODT:** 10 mg **T (chew):** 5 mg **T:** 10 mg **S:** 1 mg/ml	**A:** 10 mg/day **C (6–12 yrs):** 10 mg/day **(2–5 yrs):** 5 mg/day	Fatigue, headache, malaise, somnolence, abdominal pain
Promethazine (Phenergan)	**T:** 12.5 mg, 25 mg, 50 mg **S:** 6.25 mg/5 ml	**A:** 25 mg at bedtime or 12.5 mg q8h **C:** 0.5 mg/kg at bedtime or 0.1 mg/kg q6–8h	Confusion, dizziness, drowsiness, fatigue, constipation, nausea, vomiting

A, Adults; ***C,*** capsules; ***C** (dosage),* children; ***L,*** liquid; ***ODT,*** orally disintegrating tablet; ***S,*** syrup; ***SR,*** sustained-release; ***T,*** tablets.

Antihyperlipidemics

USES	ACTION
Cholesterol management.	*Bile acid sequestrants:* Bind bile acids in the intestine; prevent active transport and reabsorption and enhance bile acid excretion. Depletion of hepatic bile acid results in the increased conversion of cholesterol to bile acids. *HMG-CoA reductase inhibitors (statins):* Inhibit HMG-CoA reductase, the last regulated step in the synthesis of cholesterol. Cholesterol synthesis in the liver is reduced. *Niacin (nicotinic acid):* Reduces hepatic synthesis of triglycerides and secretion of VLDL by inhibiting the mobilization of free fatty acids from peripheral tissues. *Fibric acid:* Increases the oxidation of fatty acids in the liver, resulting in reduced secretion of triglyceride-rich lipoproteins, and increases lipoprotein lipase activity and fatty acid uptake. *Cholesterol absorption inhibitor:* Acts in the gut wall to prevent cholesterol absorption through the intestinal villi. *Omega fatty acids:* Exact mechanism unknown. Mechanisms may include inhibition of acyl-CoA, decreased lipogenesis in liver, increased lipoprotein lipase activity.

ANTIHYPERLIPIDEMICS

Name	Primary Effect	Dosage	Comments/Side Effects
Bile Acid Sequestrants			
Cholestyramine (Prevalite, Questran)	Decreases LDL Increases HDL, TG	4 g 1–2 times/day 8 g once daily	May bind drugs given concurrently. Take at least 1 hr before or 4–6 hrs after cholestyramine. **Side Effects:** Constipation, heartburn, nausea, vomiting, stomach pain
Colesevelam (Welchol)	Decreases LDL Increases HDL, TG	6–7 625-mg tablets once daily or 2 divided doses with meals	Take with food. **Side Effects:** Constipation, dyspepsia, weakness, myalgia, pharyngitis
Colestipol (Colestid)	Decreases LDL Increases TG	10 g once daily or 5 g 2 times/day	Do not crush tablets. May bind drugs given concurrently. Take at least 1 hr before or 4–6 hrs after colestipol. **Side Effects:** Constipation, headache, dizziness, anxiety, vertigo, drowsiness, nausea, vomiting, diarrhea, flatulence
Cholesterol Absorption Inhibitor			
Ezetimibe (Zetia)	Decreases LDL Increases HDL Decreases TG	10 mg once daily	Administer at least 2 hrs before or 4 hrs after bile acid sequestrants. **Side Effects:** Dizziness, headache, fatigue, diarrhea, abdominal pain, arthralgia, sinusitis, pharyngitis
Fibric Acid			
Fenofibrate (Antara, Lofibra, Tricor, Triglide)	Decreases TG Decreases LDL Increases HDL	**Antara:** 43–130 mg/day **Lofibra:** 67–200 mg/day **Tricor:** 48–145 mg/day **Triglide:** 50–160 mg/day	May increase levels of ezetimibe. Concomitant use of statins may increase rhabdomyolysis, elevate CPK levels, and cause myoglobinuria. **Side Effects:** Abdominal pain, constipation, diarrhea, respiratory complaints, headache, fever, flu-like syndrome, asthenia (loss of strength, energy)

Fenofibric acid (Fibricor, Trilipix)	Decreases TG, LDL Increases HDL	45–135 mg/day	May give without regard to meals. Concomitant use of statins may increase rhabdomyolysis. **Side Effects:** Headache, upper respiratory tract infection, pain, nausea, dizziness, nasopharyngitis
Gemfibrozil (Lopid)	Decreases TG Increases HDL	600 mg 2 times/day	Give 30 min before breakfast and dinner. Concomitant use of statins may increase rhabdomyolysis, elevate CPK levels, and cause myoglobinuria. **Side Effects:** Fatigue, vertigo, headache, rash, eczema, diarrhea, abdominal pain, nausea, vomiting, constipation
Niacin			
Niacin, nicotinic acid (Niacor, Niaspan)	Decreases LDL, TG Increases HDL	**Regular-release (Niacor):** 1 g tid **Extended-release (Niaspan):** 1 g at bedtime	Diabetics may experience a dose-related elevation in glucose. **Side Effects:** Increased hepatic function tests, hyperglycemia, dyspepsia, itching, flushing, dizziness, insomnia
Statins			
Atorvastatin (Lipitor)	Decreases LDL, TG Increases HDL	10–80 mg/day	May interact with CYP3A4 inhibitors (e.g., amiodarone, diltiazem, cyclosporine, grapefruit juice) increasing risk of myopathy. **Side Effects:** Myalgia, myopathy, rhabdomyolysis, headache, chest pain, peripheral edema, dizziness, rash, abdominal pain, constipation, diarrhea, dyspepsia, nausea, flatulence, increased hepatic function tests, back pain, sinusitis
Fluvastatin (Lescol)	Decreases LDL, TG Increases HDL	20–80 mg/day	Primarily metabolized by CYP2C9 enzyme system. May increase levels of phenytoin, rifampin. May lower fluvastatin levels. **Side Effects:** Headache, fatigue, dyspepsia, diarrhea, nausea, abdominal pain, myalgia, myopathy, rhabdomyolysis

Continued

ANTIHYPERLIPIDEMICS—cont'd

Name	Primary Effect	Dosage	Comments/Side Effects
Lovastatin (Mevacor)	Decreases LDL, TG Increases HDL	20–80 mg/day	May interact with CYP3A4 inhibitors (e.g., amiodarone, diltiazem, cyclosporine, grapefruit products) increasing risk of myopathy. **Side Effects:** Increased CPK levels, headache, dizziness, rash, constipation, diarrhea, abdominal pain, dyspepsia, nausea, flatulence, myalgia, myopathy, rhabdomyolysis
Pitavastatin (Livalo)	Decreases LDL, TG Increases HDL	1–4 mg/day	Erythromycin, rifampin may increase concentration. **Side Effects:** Myalgia, back pain, diarrhea, constipation, pain in extremities
Pravastatin (Pravachol)	Decreases LDL, TG Increases HDL	20–80 mg/day	May be less likely to be involved in drug interactions. Cyclosporine may increase pravastatin levels. **Side Effects:** Chest pain, headache, dizziness, rash, nausea, vomiting, diarrhea, increased hepatic function tests, cough, flu-like symptoms, myalgia, myopathy, rhabdomyolysis
Rosuvastatin (Crestor)	Decreases LDL, TG Increases HDL	5–40 mg/day	May be less likely to be involved in drug interactions. Cyclosporine may increase rosuvastatin levels. **Side Effects:** Chest pain, peripheral edema, headache, rash, dizziness, vertigo, pharyngitis, diarrhea, nausea, constipation, abdominal pain, dyspepsia, sinusitis, flu-like symptoms, myalgia, myopathy, rhabdomyolysis

Simvastatin (Zocor)	Decreases LDL, TG Increases HDL	5–80 mg/day	May interact with CYP3A4 inhibitors (e.g., amiodarone, diltiazem, cyclosporine, grapefruit products) increasing risk of myopathy. **Side Effects:** Constipation, flatulence, dyspepsia, increased hepatic function tests, increased CPK, upper respiratory tract infection
Omega Fatty Acids			
Icosapent (Vascepa)	Decreases TG	2 g 2 times/day	**Side Effects:** Arthralgia
Lovaza	Decreases TG Increases LDL, HDL	2 g 2 times/day or 4 g once daily	Use with caution with fish or shellfish allergy. **Side Effects:** Eructation, dyspepsia, taste perversion

CPK, Creatine phosphokinase; ***G,*** granules; ***HDL,*** high-density lipoprotein; ***LDL,*** low-density lipoprotein; ***T,*** tablets; ***TG,*** triglycerides.

Antihypertensives

USES	ACTION
Treatment of mild to severe hypertension.	Many groups of medications are used in the treatment of hypertension. *ACE inhibitors:* Decrease conversion of angiotensin I to angiotensin II, a potent vasoconstrictor, reducing peripheral vascular resistance and B/P. *Alpha agonists (central action):* Stimulate alpha$_2$-adrenergic receptors in the cardiovascular centers of the CNS, reducing sympathetic outflow and producing an antihypertensive effect. *Alpha antagonists (peripheral action):* Block alpha$_1$-adrenergic receptors in arterioles and veins, inhibiting vasoconstriction and decreasing peripheral vascular resistance, causing a fall in B/P. *Angiotensin receptor blockers:* Block vasoconstrictor effects of angiotensin II by blocking the binding of angiotensin II to AT1 receptors in vascular smooth muscle, helping blood vessels to relax and reduce B/P. *Beta blockers:* Decrease B/P by inhibiting beta$_1$-adrenergic receptors, which lowers heart rate, heart workload, and the heart's output of blood. *Calcium channel blockers:* Reduce B/P by inhibiting flow of extracellular calcium across cell membranes of vascular tissue, relaxing arterial smooth muscle. *Diuretics:* Inhibit sodium (Na) reabsorption, increasing excretion of Na and water. Reduce plasma, extracellular fluid volume, and peripheral vascular resistance. *Renin inhibitors:* Directly inhibit renin, decreasing plasma renin activity (PRA), inhibiting conversion of angiotensinogen to angiotensin, producing antihypertensive effect. *Vasodilators:* Directly relaxe arteriolar smooth muscle, decreasing vascular resistance. Exact mechanism unknown.

ANTIHYPERTENSIVES

Name	Availability	Dosage Range	Side Effects
(ACE) Inhibitors			
Benazepril (Lotensin)	**T:** 5 mg, 10 mg, 20 mg, 40 mg	20–80 mg/day as single or 2 divided doses	Postural dizziness, headache, cough
Enalapril (Vasotec)	**T:** 2.5 mg, 5 mg, 10 mg, 20 mg	2.5–40 mg/day in 1–2 divided doses	Hypotension, chest pain, syncope, headache, dizziness, fatigue
Lisinopril (Prinivil, Zestril)	**T:** 2.5 mg, 5 mg, 10 mg, 20 mg, 30 mg, 40 mg	10–40 mg/day	Hypotension, headache, fatigue, dizziness, hyperkalemia, cough
Quinapril	**T:** 5 mg, 10 mg, 20 mg, 40 mg	10–40 mg/day	Hypotension, dizziness, fatigue, headache, myalgia, hyperkalemia
Ramipril (Altace)	**T or C:** 1.25 mg, 2.5 mg, 5 mg, 10 mg	2.5–20 mg/day	Cough, hypotension, angina, headache, dizziness, hyperkalemia
Alpha Agonists: Central Action			
Clonidine (Catapres)	**T:** 0.1 mg, 0.2 mg, 0.3 mg **P:** 0.1 mg/hr, 0.2 mg/hr, 0.3 mg/hr	**PO:** 0.1–0.8 mg/day **Topical:** 0.1–0.6 mg/wk	Sedation, dry mouth, constipation, sexual dysfunction, bradycardia, xerostomia, drowsiness, headache
Methyldopa (Aldomet)	**T:** 125 mg, 250 mg, 500 mg	**PO:** 250–1,000 mg/day in 2 divided doses	Nausea, vomiting, weight gain, impaired memory, depression, nasal congestion
Alpha Agonists: Peripheral Action			
Doxazosin (Cardura)	**T:** 1 mg, 2 mg, 4 mg, 8 mg	**PO:** 2–16 mg/day	Dizziness, vertigo, headaches
Prazosin (Minipress)	**C:** 1 mg, 2 mg, 5 mg	**PO:** 6–20 mg/day	Dizziness, light-headedness, headaches, drowsiness
Terazosin (Hytrin)	**C:** 1 mg, 2 mg, 5 mg, 10 mg	**PO:** 1–20 mg/day	Dizziness, headaches, asthenia (loss of strength, energy)
Angiotensin Receptor Blockers			
Azilsartan (Edarbi)	**T:** 40 mg, 80 mg	40–80 mg/day	Diarrhea, hypotension, nausea, cough

Continued

ANTIHYPERTENSIVES—cont'd

Name	Availability	Dosage Range	Side Effects
Candesartan (Atacand)	**T:** 4 mg, 8 mg, 16 mg, 32 mg	8–32 mg/day	Hypotension, dizziness, headache, hyperkalemia
Losartan (Cozaar)	**T:** 25 mg, 50 mg, 100 mg	25–100 mg/day	Chest pain, fatigue, hypoglycemia, weakness, cough, hypotension
Olmesartan (Benicar)	**T:** 5 mg, 20 mg, 40 mg	20–40 mg/day	Dizziness, headache, diarrhea, flu-like symptoms
Valsartan (Diovan)	**T:** 80 mg, 160 mg, 320 mg	80–320 mg/day	Dizziness, fatigue, increased BUN
Beta Blockers			
Atenolol (Tenormin)	**T:** 25 mg, 50 mg, 100 mg	25–100 mg/day	Fatigue, bradycardia, reduced exercise tolerance, increased triglycerides, bronchospasm, sexual dysfunction, masked hypoglycemia
Bisoprolol (Zebeta)	**T:** 5 mg, 10 mg	2.5–10 mg/day	Fatigue, insomnia, diarrhea, arthralgia, upper respiratory infections
Metoprolol (Lopressor)	**T:** 25 mg, 50 mg, 100 mg	50–100 mg/day	Hypotension, bradycardia, fatigue, 1st degree heart block, dizziness
Metoprolol XL (Toprol XL)	**T:** 25 mg, 50 mg, 100 mg, 200 mg	50–100 mg/day	Same as metoprolol
Calcium Channel Blockers			
Amlodipine (Norvasc)	**T:** 2.5 mg, 5 mg, 10 mg	2.5–10 mg/day	Headache, fatigue, peripheral edema, flushing, worsening heart failure
Diltiazem CD (Cardizem CD)	**C:** 120 mg, 180 mg, 240 mg, 300 mg	180–420 mg/day	Dizziness, headache, bradycardia, heart block, worsening heart failure, edema, constipation
Felodipine (Plendil)	**T:** 2.5 mg, 5 mg, 10 mg	2.5–20 mg/day	Headache, flushing, peripheral edema

Nifedipine XL (Adalat CC, Procardia XL)	**T:** 30 mg, 60 mg, 90 mg	90–120 mg/day	Flushing, peripheral edema, headache, dizziness, nausea
Verapamil SR (Calan SR)	**T:** 120 mg, 180 mg, 240 mg **T (Sustained-Release):** 120 mg, 180 mg	**T (Immediate-Release):** 80–320 mg/day **T (Sustained-Release):** 120–480 mg/day	Headache, gingival hyperplasia, constipation
Diuretics			
Chlorthalidone (Hygroton)	**T:** 25 mg, 50 mg	12.5–25 mg/day	Same as hydrochlorothiazide
Hydrochlorothiazide (Hydrodiuril)	**T:** 25 mg, 50 mg	12.5–50 mg/day	Hypokalemia, hyperuricemia, hypomagnesemia, hyperglycemia
Renin Inhibitor			
Aliskiren (Tekturna)	**T:** 150 mg, 300 mg	**PO:** 150–300 mg/day	Diarrhea, dyspepsia, headache, dizziness, fatigue, upper respiratory tract infection
Vasodilators			
Hydralazine (Apresoline)	**T:** 10 mg, 25 mg, 50 mg, 100 mg	**PO:** 40–300 mg/day	Anorexia, nausea, diarrhea, vomiting, headaches, palpitations
Minoxidil (Loniten)	**T:** 2.5 mg, 10 mg	**PO:** 10–40 mg/day	Rapid/irregular heartbeat, hypertrichosis, peripheral edema

C, Capsules; ***P,*** patch; ***T,*** tablets.

Antimigraine (Triptans)

USES	ACTION
Treatment of migraine headaches with or without aura in adults 18 yrs and older.	Triptans are selective agonists of the serotonin (5-HT) receptor in cranial arteries, which cause vasoconstriction and reduce inflammation associated with antidromic neuronal transmission correlating with relief of migraine headache.

TRIPTANS

Name	Availability	Dosage Range	Contraindications	Side Effects
Almotriptan (Axert)	**T:** 6.25 mg, 12.5 mg	6.25–12.5 mg; may repeat after 2 hrs	Ischemic heart disease, angina pectoris, arrhythmias, previous MI, uncontrolled hypertension, hemiplegic or basilar migraine, peripheral vascular disease	Drowsiness, dizziness, fatigue, hot flashes, chest pain/discomfort, paresthesia, nausea, vomiting
Eletriptan (Relpax)	**T:** 20 mg, 40 mg	**A:** 20–40 mg; may repeat after 2 hrs (**Maximum:** 60 mg/day)	Same as almotriptan	Asthenia (loss of strength, energy), nausea, dizziness, drowsiness
Frovatriptan (Frova)	**T:** 2.5 mg	2.5 mg; may repeat after 2 hrs; no more than 3 **T**/day	Same as almotriptan	Hot/cold sensations, dizziness, fatigue, headaches, chest pain, skeletal pain, dry mouth, dyspepsia, flushing
Naratriptan (Amerge)	**T:** 1 mg, 2.5 mg	1–2.5 mg; may repeat once after 4 hrs	Same as almotriptan plus severe renal/hepatic disease	Atypical sensations, pain, nausea, fatigue

Rizatriptan (Maxalt, Maxalt-MLT)	**T:** 5 mg, 10 mg **DT:** 5 mg, 10 mg	5 or 10 mg; may repeat after 2 hrs	Same as almotriptan	Atypical sensations, pain, nausea, dizziness, drowsiness, asthenia (loss of strength, energy), fatigue
Sumatriptan (Imitrex, Sumavel DosePro)	**T:** 25 mg, 50 mg, 100 mg **NS:** 5 mg, 20 mg **I:** 4 mg, 6 mg	**PO:** 25–100 mg; may repeat after 2 hrs **NS:** 5–20 mg; may repeat after 2 hrs **Subcutaneous:** 4–6 mg; may repeat after 1 hr	Same as almotriptan plus severe hepatic dysfunction	*Oral:* Atypical sensations, pain, malaise, fatigue *Injection:* Atypical sensations, flushing, chest pain/discomfort, injection site reaction, dizziness, vertigo *Nasal:* Discomfort, nausea, vomiting, altered taste
Zolmitriptan (Zomig, Zomig-ZMT)	**T:** 2.5 mg, 5 mg **DT:** 2.5 mg, 5 mg **NS:** 5 mg/0.1 ml	2.5–5 mg; may repeat after 2 hrs **NS:** 1 spray (5 mg) at onset of migrane headache	Same as almotriptan plus symptomatic Wolff-Parkinson-White syndrome	Atypical sensations, pain, nausea, dizziness, asthenia (loss of strength, energy), drowsiness

A, Adults; ***DT,*** disintegrating tablets; ***I,*** injection; ***NS,*** nasal spray; ***T,*** tablets.

Antipsychotics

USES

Primarily used in managing psychotic illness (esp. in pts with increased psychomotor activity). Also used to treat the manic phase of bipolar disorder, behavioral problems in children, nausea and vomiting, intractable hiccups, anxiety and agitation, as adjunct in treatment of tetanus, and to potentiate effects of narcotics.

ACTION

Effects of these agents occur at all levels of the CNS. Antipsychotic mechanism unknown but may antagonize dopamine action as a neurotransmitter in basal ganglia and limbic system. Antipsychotics may block postsynaptic dopamine receptors, inhibit dopamine release, increase dopamine turnover. These medications can be divided into the phenothiazines and nonphenothiazines (miscellaneous). In addition to their use in the symptomatic treatment of psychiatric illness, some have antiemetic, antinausea, antihistamine, anticholinergic, and/or sedative effects.

ANTIPSYCHOTICS

Name	Availability	Dosage	Relative Side Effect Profile			
			EPS	Anticholinergic	Sedation	Hypotension
Aripiprazole (Abilify)	**T:** 2 mg, 5 mg, 10 mg, 15 mg, 20 mg, 30 mg **DT:** 10 mg, 15 mg **I:** 9.75 mg **S:** 1 mg/ml	**PO:** 15–30 mg/day **I:** Up to 30 mg/day	Low	Very low	Very low	Low
Chlorpromazine (Thorazine)	**T:** 10 mg, 25 mg, 50 mg, 100 mg, 200 mg **SR:** 30 mg, 75 mg, 100 mg **OC:** 30 mg/ml, 100 mg/ml	30–800 mg/day in 1–4 divided doses	Moderate	Moderate	High	High
Clozapine (Clozaril, FazaClo)	**T:** 25 mg, 50 mg, 100 mg, 200 mg **DT:** 12.5 mg, 25 mg, 100 mg	75–900 mg/day	Very low	High	High	High
Fluphenazine (Prolixin)	**T:** 1 mg, 2.5 mg, 5 mg, 10 mg **I:** 25 mg/ml **OC:** 5 mg/ml	**PO:** 2–40 mg/day **I:** 12.5–75 mg q2–4wks	High	Low	Low	Low
Haloperidol (Haldol)	**T:** 0.5 mg, 1 mg, 2 mg, 5 mg, 10 mg, 20 mg **I:** 5 mg/ml **OC:** 2 mg/ml	0.5–5 mg 2–3 times/day	High	Low	Low	Low
Iloperidone (Fanapt)	**T:** 1 mg, 2 mg, 4 mg, 6 mg, 8 mg, 10 mg, 12 mg	6–12 mg 2 times/day	Low	Very low	Low	Low/moderate
Loxapine (Adasuve)	**C:** 5 mg, 10 mg, 25 mg, 50 mg **OC:** 25 mg/ml **I:** 50 mg/ml	60–100 mg/day in 2–4 divided doses	Moderate	Low	Moderate	Low

Olanzapine (Zyprexa)	**T:** 2.5 mg, 5 mg, 7.5 mg, 10 mg, 15 mg, 20 mg **DT:** 5 mg, 10 mg, 15 mg, 20 mg **I:** 10 mg	10–20 mg once daily	Low	Moderate	Moderate/ high	Moderate
Paliperidone (Invega)	**T:** 1.5 mg, 3 mg, 6 mg, 9 mg **I:** 39 mg, 78 mg, 117 mg, 234 mg	3–12 mg once daily **IM:** Initially, 234 mg once, then 156 mg 1 wk later, then 39–234 mg monthly	Low	Very low	Low/ moderate	Moderate
Quetiapine (Seroquel)	**T:** 25 mg, 50 mg, 100 mg, 200 mg, 300 mg, 400 mg **ER:** 50 mg, 150 mg, 200 mg, 300 mg, 400 mg	300–800 mg/day in 2–3 divided doses **ER:** 400–800 mg once daily	Very low	Moderate	Moderate/ high	Moderate
Risperidone (Risperdal)	**T:** 0.25 mg, 0.5 mg, 1 mg, 2 mg, 3 mg, 4 mg **OC:** 1 mg/ml **I:** 12.5 mg, 25 mg, 37.5 mg, 50 mg	4–8 mg/day in 1–2 divided doses **IM:** 25–50 mg q2wks	Low	Very low	Low/moder- ate	Moderate
Thioridazine (Mellaril)	**T:** 10 mg, 15 mg, 25 mg, 50 mg, 100 mg, 150 mg, 200 mg	150–800 mg/day in 2–4 divided doses	Low	High	High	Moderate/ high
Thiothixene (Navane)	**C:** 1 mg, 2 mg, 5 mg, 10 mg	10–60 mg/day in 2 divided doses	High	Low	Low	Low/moderate
Trifluoperazine (Stelazine)	**T:** 1 mg, 2 mg, 5 mg, 10 mg	2–20 mg/day in 2 divided doses	High	Low	Low	Low

Continued

Name	Availability	Dosage	Relative Side Effect Profile			
			EPS	Anticholinergic	Sedation	Hypotension
Ziprasidone (Geodon)	**C:** 20 mg, 40 mg, 60 mg, 80 mg **I:** 20 mg	20–100 mg 2 times/day **IM:** 10 mg q2h or 20 mg q4h (**Maximum:** 40 mg/day)	Low	Very low	Low to moderate	Low to moderate

C, Capsules; ***DT,*** disintegrating tablets; ***EPS,*** extrapyramidal symptoms; ***ER,*** extended-release; ***I,*** injection; ***OC,*** oral concentrate; ***SR,*** sustained-release; ***T,*** tablets; ***TSL,*** sublingual tablets.

Antivirals

USES

Treatment of HIV infection. Treatment of cytomegalovirus (CMV) retinitis in pts with AIDS, acute herpes zoster (shingles), genital herpes (recurrent), mucosal and cutaneous herpes simplex virus (HSV), chickenpox, and influenza A viral illness.

ACTION

Effective antivirals must inhibit virus-specific nucleic acid/protein synthesis. Possible mechanisms of action of antivirals used for non-HIV infection may include interference with viral DNA synthesis and viral replication, inactivation of viral DNA polymerases, incorporation and termination of the growing viral DNA chain, prevention of release of viral nucleic acid into the host cell, or interference with viral penetration into cells.

ANTIVIRALS

Name	Availability	Uses	Side Effects
Abacavir (Ziagen)	**T:** 300 mg **OS:** 20 mg/ml	HIV infection	Nausea, vomiting, loss of appetite, diarrhea, headaches, fatigue, hypersensitivity reactions
Acyclovir (Zovirax)	**T:** 400 mg, 800 mg **C:** 200 mg **I:** 50 mg/ml	Mucosal/cutaneous HSV-1 and HSV-2, varicella-zoster (shingles), genital herpes, herpes simplex, encephalitis, chickenpox	Malaise, anorexia, nausea, vomiting, light-headedness
Adefovir (Hepsera)	**T:** 10 mg	Chronic hepatitis B	Asthenia (loss of strength, energy), headaches, abdominal pain, nausea, diarrhea, flatulence, dyspepsia
Amantadine (Symmetrel)	**T:** 100 mg **C:** 100 mg **S:** 50 mg/5 ml	Influenza A	Anxiety, dizziness, headaches, nausea, loss of appetite
Cidofovir (Vistide)	**I:** 75 mg/ml	CMV retinitis	Decreased urination, fever, chills, diarrhea, nausea, vomiting, headaches, loss of appetite
Darunavir (Prezista)	**T:** 75 mg, 150 mg, 400 mg, 600 mg, 800 mg	HIV infection	Diarrhea, nausea, vomiting, headaches, skin rash, constipation
Delavirdine (Rescriptor)	**T:** 100 mg, 200 mg	HIV infection	Diarrhea, fatigue, rash, headaches, nausea
Didanosine (Videx)	**C:** 125 mg, 200 mg, 250 mg, 400 mg **Powder for suspension:** 2 g, 4 g	HIV infection	Peripheral neuropathy, anxiety, headaches, rash, nausea, diarrhea, dry mouth
Efavirenz (Sustiva)	**C:** 50 mg, 200 mg **T:** 600 mg	HIV infection	Diarrhea, dizziness, headaches, insomnia, nausea, vomiting, drowsiness
Etravirine (Intelence)	**T:** 25 mg, 100 mg, 200 mg	HIV infection	Rash, nausea, abdominal pain, vomiting

Continued

ANTIVIRALS—cont'd

Name	Availability	Uses	Side Effects
Famciclovir (Famvir)	**T:** 125 mg, 250 mg, 500 mg	Herpes zoster, genital herpes, herpes labialis, mucosal/cutaneous herpes simplex	Headaches, nausea
Foscarnet (Foscavir)	**I:** 24 mg/ml	CMV retinitis, HSV infections	Decreased urination, abdominal pain, nausea, vomiting, dizziness, fatigue, headaches
Ganciclovir (Cytovene)	**I:** 500 mg	CMV retinitis, CMV disease	Sore throat, fever, unusual bleeding/bruising
Indinavir (Crixivan)	**C:** 200 mg, 400 mg	HIV infection	Blood in urine, weakness, nausea, vomiting, diarrhea, headaches, insomnia, altered taste
Lamivudine (Epivir)	**T:** 100 mg, 150 mg, 300 mg **OS:** 5 mg/ml, 10 mg/ml	HIV infection, chronic hepatitis B	Nausea, vomiting, abdominal pain, paresthesia
Lopinavir/ritonavir (Kaletra)	**T:** 100 mg/25 mg, 200 mg/50 mg **OS:** 80 mg/20 mg per ml	HIV infection	Diarrhea, nausea
Maraviroc (Selzentry)	**T:** 150 mg, 300 mg	HIV infection	Cough, pyrexia, upper respiratory tract infection, rash, musculoskeletal symptoms, abdominal pain, dizziness
Nelfinavir (Viracept)	**T:** 250 mg, 625 mg	HIV infection	Diarrhea
Oseltamivir (Tamiflu)	**C:** 30 mg, 45 mg, 75 mg **S:** 6 mg/ml	Influenza A or B	Diarrhea, nausea, vomiting
Raltegravir (Isentress)	**T:** 400 mg **T (chew):** 25 mg, 100 mg	HIV infection	Nausea, headache, diarrhea, pyrexia
Ribavirin (Virazole)	**Aerosol:** 6 g **OS:** 40 mg/ml **T:** 200 mg, 400 mg, 600 mg	Lowers respiratory infections in infants, children due to respiratory syncytial virus (RSV), chronic hepatitis C	Anemia

Ritonavir (Norvir)	**C:** 100 mg **T:** 100 mg **OS:** 80 mg/ml	HIV infection	Weakness, diarrhea, nausea, decreased appetite, vomiting, altered taste
Saquinavir (Invirase)	**C:** 200 mg **T:** 500 mg	HIV infection	Weakness, diarrhea, nausea, oral ulcers, abdominal pain
Stavudine (Zerit)	**C:** 15 mg, 20 mg, 30 mg, 40 mg **OS:** 1 mg/ml	HIV infection	Paresthesia, decreased appetite, chills, fever, rash
Tenofovir (Viread)	**T:** 150 mg, 200 mg, 250 mg, 300 mg **Powder (oral):** 40 mg/g	HIV infection	Diarrhea, nausea, pharyngitis, headaches
Valacyclovir (Valtrex)	**T:** 500 mg, 1 g	Herpes zoster, genital herpes, herpes labialis, chickenpox	Headaches, nausea
Valganciclovir (Valcyte)	**T:** 450 mg, **OS:** 50 mg/ml	CMV retinitis	Anemia, abdominal pain, diarrhea, headaches, nausea, vomiting, paresthesia
Zanamivir (Relenza)	**Inhalation:** 5 mg	Influenza A and B	Cough, diarrhea, dizziness, headaches, nausea, vomiting
Zidovudine (Retrovir)	**C:** 100 mg **S:** 50 mg/5 ml **I:** 10 mg/ml	HIV infection	Fatigue, fever, chills, headaches, nausea, muscle pain

C, Capsules; ***I,*** injection; ***OS,*** oral solution; ***S,*** syrup; ***T,*** tablets.

Beta-Adrenergic Blockers

USES

Management of hypertension, angina pectoris, arrhythmias, hypertrophic subaortic stenosis, migraine headaches, MI (prevention), glaucoma.

ACTION

Beta-adrenergic blockers competitively block $beta_1$-adrenergic receptors, located primarily in myocardium, and $beta_2$-adrenergic receptors, located primarily in bronchial and vascular smooth muscle. By occupying beta-receptor sites, these agents prevent naturally occurring or administered epinephrine/norepinephrine from exerting their effects. The results are basically opposite to those of sympathetic stimulation.

Effects of $beta_1$ blockade include slowing heart rate, decreasing cardiac output and contractility; effects of $beta_2$ blockade include bronchoconstriction, increased airway resistance in pts with asthma or COPD. Beta blockers can affect cardiac rhythm/automaticity (decrease sinus rate, SA/AV conduction; increase refractory period in AV node); decrease systolic and diastolic B/P; exact mechanism unknown but may block peripheral receptors, decrease sympathetic outflow from CNS, or decrease renin release from kidney. All beta blockers mask tachycardia that occurs with hypoglycemia. When applied to the eye, reduce intraocular pressure and aqueous production.

BETA-ADRENERGIC BLOCKERS

Name	Availability	Indication	Dosage Range
Acebutolol (Sectral)	**C:** 200 mg, 400 mg	HTN, arrhythmias	**HTN:** 400–1,200 mg/day in 1–2 divided doses **Arrhythmia:** 300–600 mg bid
Atenolol (Tenormin)	**T:** 25 mg, 50 mg, 100 mg	HTN, angina, MI	**Angina:** 50–100 mg once daily **HTN:** 50–100 mg once daily **MI:** 50 mg bid or 100 mg once daily
Bisoprolol (Zebeta)	**T:** 5 mg, 10 mg	HTN	2.5–20 mg once daily

Carvedilol (Coreg)	**T:** 3.125 mg, 6.25 mg, 12.5 mg, 25 mg **C (SR):** 10 mg, 20 mg, 40 mg, 80 mg	HF, LVD after MI, HTN	**Immediate-Release HF:** 3.125–50 mg bid **LVD after MI:** 6.25–25 mg BID **HTN:** 6.25–25 mg BID **Extended-Release HF:** 10–80 mg once daily **LVD after MI:** 10–80 mg once daily **HTN:** 20–80 mg once daily
Labetalol (Trandate)	**T:** 100 mg, 200 mg, 300 mg **I:** 5 mg/ml	HTN	200–2,400 mg/day in 2–3 divided doses **I:** 20–80 mg at 10-min intervals (**Maximum:** 300 mg)
Metoprolol (Lopressor [IR], Toprol XL [SR])	**T (IR):** 50 mg, 100 mg **I:** 1 mg/ml **T (SR):** 25 mg, 50 mg	HTN, angina, HF, MI	**IR:** **Angina:** 100–400 mg bid **HTN:** 100–450 mg once daily or bid **Post-MI:** 100 mg bid **SR:** **Angina:** 100–400 mg once daily **HF:** 12.5–200 mg once daily **HTN:** 25–400 mg once daily
Nadolol (Corgard)	**T:** 20 mg, 40 mg, 80 mg	HTN, angina	40–320 mg once daily
Nebivolol (Bystolic)	**T:** 2.5 mg, 5 mg, 10 mg, 20 mg	HTN	5–40 mg once daily
Pindolol (Visken)	**T:** 5 mg, 10 mg	HTN	10–60 mg bid

Continued

BETA-ADRENERGIC BLOCKERS—cont'd

Name	Availability	Indication	Dosage Range
Propranolol (Inderal)	**T (IR):** 10 mg, 20 mg, 40 mg, 60 mg, 80 mg **C (SR):** 60 mg, 80 mg, 120 mg, 160 mg **S:** 4 mg/ml, 8 mg/ml **I:** 1 mg/ml	HTN, angina, MI, arrhythmias, migraine, essential tremor, hypertrophic subaortic stenosis	**IR:** **Angina:** 80–320 mg/day in 2–4 divided doses **Arrhythmias:** 10–30 mg bid or tid **HTN:** 40 mg bid up to 240 mg/day in 2–3 divided doses **Hypertrophic subaortic stenosis:** 20–40 mg 3–4 times/day **Post-MI:** 180–240 mg/day in 2–4 divided doses **Migraine:** 80–240 mg/day in divided doses **Tremor:** 80–120 mg/day in divided doses **SR:** **Angina:** 80–320 mg once daily **HTN:** 80–120 mg once daily **Migraine:** 80–240 mg once daily **Hypertrophic subaortic stenosis:** 80–160 mg once daily
Timolol (Blocadren)	**T:** 5 mg, 10 mg, 20 mg	HTN, post-MI, migraine prevention	**HTN:** 10–20 mg bid **Post-MI:** 10 mg bid **Migraine:** 10 mg bid or 20 mg once daily

C, Capsules; ***HF,*** heart failure; ***HTN,*** hypertension; ***I,*** injection; ***LVD,*** left ventricular dysfunction; ***S,*** solution; ***SR,*** sustained-release; ***T,*** tablets.

Bronchodilators

USES	ACTION	
Relief of bronchospasm occurring during anesthesia and in bronchial asthma, bronchitis, emphysema.	*Inhaled corticosteroids:* Exact mechanism unknown. May act as anti-inflammatories, decrease mucus secretion. *Beta$_2$-adrenergic agonists:* Stimulate beta receptors in lung, relax bronchial smooth muscle, increase vital capacity, decrease airway resistance. *Anticholinergics:* Inhibit cholinergic receptors on bronchial smooth muscle (block acetylcholine action).	*Leukotriene modifiers:* Decrease effect of leukotrienes, which increase migration of eosinophils, producing mucus/edema of airway wall, causing bronchoconstriction. *Methylxanthines:* Directly relax smooth muscle of bronchial airway, pulmonary blood vessels (relieve bronchospasm, increase vital capacity). Increase cyclic 3,5-adenosine monophosphate.

BRONCHODILATORS

Name	Availability	Dosage Range	Side Effects
Anticholinergics			
Aclidinium (Tudorza)	**Inhalation powder:** 400 mcg/actuation	**A:** 400 mcg 2 times/day	Headache, nasopharyngitis, cough
Ipratropium (Atrovent)	**NEB:** 0.02% (500 mcg) **MDI:** 18 mcg/actuation	**A (NEB):** 500 mcg q6–8h **A (MDI):** 2 puffs 4 times/day	Upper respiratory tract infection, bronchitis, sinusitis, headache, dyspnea
Tiotropium (Spiriva)	**Inhalation powder:** 18 mcg/capsule	**A:** Once/day (inhaled twice)	Xerostomia, upper respiratory tract infection, sinusitis, pharyngitis
Umeclidinium (Incruse Ellipta)	**Inhalation powder:** 62.5 mcg/blister	**A:** Once daily	Nasopharyngitis, upper respiratory tract infection, cough, arthralgia

Continued

BRONCHODILATORS—cont'd

Name	Availability	Dosage Range	Side Effects
Bronchodilators			
Albuterol (AccuNeb, ProAir HFA, Proventil HFA, Ventolin HFA)	**MDI:** 90 mcg/actuation **NEB:** 2.5 mg/3 ml, 2.5 mg/0.5 ml, ***(AccuNeb):*** 0.63–1.25 mg/3 ml	**MDI:** 2 inhalations q4–6h as needed **NEB:** 1.25–5 mg q4–6h as needed	Tachycardia, skeletal muscle tremors, muscle cramping, palpitations, insomnia, hypokalemia, increased serum glucose
Albuterol/ipratropium (Combivent, DuoNeb)	**MDI:** 90 mcg albuterol/ 18 mcg ipratropium/ actuation **NEB:** 2.5 mg albuterol/ 0.5 mg ipratropium/3 ml	**MDI:** 2 inhalations 4 times/day as needed **NEB:** 2.5 mg/0.5 mg 4 times/day as needed	Same as individual listing for albuterol and ipratropium
Arformoterol (Brovana)	**NEB:** 15 mcg/2 ml	**NEB:** 15 mcg 2 times/day	Same as formoterol
Formoterol (Foradil, Perforomist)	**DPI:** 12 mcg/capsule **NEB:** 20 mcg/2 ml	**DPI:** 12 mcg q12h **NEB:** 20 mcg q12h	Diarrhea, nausea, asthma exacerbation, bronchitis, infection
Formoterol/budesonide (Symbicort)	**MDI:** 80, 160 mcg/ 4.5 mcg/inhalation	**MDI:** 2 inhalations 2 times/day	Same as individual listing for formoterol and budesonide
Formoterol/mometasone (Dulera)	**MDI:** 5 mcg/100 mcg, 5 mcg/200 mcg	**MDI:** 2 inhalations 2 times/day	Same as individual listing for formoterol and beclomethasone
Indacaterol (Arcapta)	**DPI:** 75 mcg/capsule	**DPI:** 75–300 mcg once daily	Cough, oropharyngeal pain, nasopharyngitis, headache, nausea
Levalbuterol (Xopenex)	**MDI:** 45 mcg/actuation **NEB:** 0.31, 0.63, 1.25 mg/3 ml	**MDI:** 2 inhalations q4–6h as needed **NEB:** 0.63–1.25 mg q6–8h	Tremor, rhinitis, viral infection, headache, nervousness, asthma, pharyngitis, rash

Olodaterol (Striverdi)	**MDI:** 2.5 mcg/actuation	**MDI:** 2 inhalations once daily	Nasopharyngitis, rash, dizziness, cough, bronchitis, upper respiratory tract infections
Salmeterol (Serevent Diskus)	**DPI:** 50 mcg/blister	**DPI:** 50 mcg q12h	Headache, pain, throat irritation, nasal congestion, bronchitis, pharyngitis
Salmeterol/fluticasone (Advair Diskus, Advair HFA)	**DPI:** 100, 250, 500 mcg/50 mcg/blister **MDI:** 45, 115, 230 mcg/21 mcg/inhalation	**DPI:** 1 inhalation 2 times/day **MDI:** 2 inhalations 2 times/day	Same as individual listing for salmeterol and fluticasone
Inhaled Corticosteroids			
Beclomethasone (Qvar)	**MDI:** 40, 80 mcg/inhalation	**MDI:** 40–320 mcg 2 times/day	Cough, hoarseness, headache, pharyngitis
Budesonide (Pulmicort Flexhaler, Pulmicort Respules)	**DPI: (Flexhaler):** 90, 180 mcg/inhalation **DPI: (Turbuhaler):** 200 mcg/inhalation **NEB: (Respules):** 0.25, 0.5 mg/2 ml	**DPI: (Flexhaler):** 180–720 mcg 2 times/day **DPI: (Turbuhaler):** 400–2,400 mcg/day in 2–4 divided doses **NEB: (Respules):** 250–500 mcg 1–2 times/day or 1 mg once daily	Headache, nausea, respiratory infection, rhinitis
Ciclesonide (Alvesco HFA)	**HFA:** 80, 160 mcg/inhalation	**HFA:** 80–320 mcg 2 times/day	Headache, nasopharyngitis, upper respiratory infection, epistaxis, nasal congestion, sinusitis
Fluticasone (Flovent Diskus, Flovent HFA)	**DPI: (Flovent Diskus):** 50, 100, 250 mcg/blister **MDI: (Flovent HFA):** 44, 110, 220 mcg/inhalation	**DPI: (Flovent Diskus):** 100–1,000 mcg 2 times/day **MDI: (Flovent HFA):** 88–880 mcg 2 times/day	Headache, nasal congestion, pharyngitis, sinusitis, respiratory infections

Continued

BRONCHODILATORS—cont'd

Name	Availability	Dosage Range	Side Effects
Formoterol/budesonide (Symbicort)	**MDI:** 80, 160 mcg/4.5 mcg/ inhalation	**MDI:** 2 inhalations 2 times/day	Same as individual listing for formoterol and budesonide
Mometasone (Asmanex Twisthaler)	**DPI:** 110–220 mcg/inhalation	**DPI:** 220–880 mcg once daily in evening or 220 mcg bid	Same as beclomethasone
Salmeterol/fluticasone (Advair Diskus, Advair HFA)	**DPI:** 100, 250, 500 mcg/ 50 mcg/blister **MDI:** 45, 115, 230 mcg/ 21 mcg/inhalation	**DPI:** 1 inhalation 2 times/day **MDI:** 2 inhalations 2 times/day	Same as individual listing for salmeterol and fluticasone
Leukotriene Modifiers			
Montelukast (Singulair)	**T:** 4 mg, 5 mg, 10 mg	**A:** 10 mg/day **C (6–14 yrs):** 5 mg/day **C (2–5 yrs):** 4 mg/day	Dyspepsia, increased hepatic function tests, cough, nasal congestion, headache, dizziness, fatigue
Zafirlukast (Accolate)	**T:** 10 mg, 20 mg	**A, C (12 yrs and older):** 20 mg 2 times/day **C (5–11 yrs):** 10 mg 2 times/day	Headache, nausea, diarrhea, infection
PDE-4 Inhibitor			
Roflumilast (Daliresp)	**T:** 500 mcg	**A:** 500 mcg once daily	Headache, dizziness, insomnia

A, Adults; ***C** (dosage),* children; ***DPI,*** dry powder inhaler; ***HFA,*** hydrofluoroalkane; ***MDI,*** metered dose inhaler; ***NEB,*** nebulization; ***T,*** tablets.

Calcium Channel Blockers

USES

Treatment of essential hypertension, treatment of and prophylaxis of angina pectoris (including vasospastic, chronic stable, unstable), prevention/control of supraventricular tachyarrhythmias, prevention of neurologic damage due to subarachnoid hemorrhage.

ACTION

Calcium channel blockers inhibit the flow of extracellular Ca^{2+} ions across cell membranes of cardiac cells, vascular tissue. They relax arterial smooth muscle, depress the rate of sinus node pacemaker, slow AV conduction, decrease heart rate, produce negative inotropic effect (rarely seen clinically due to reflex response). Calcium channel blockers decrease coronary vascular resistance, increase coronary blood flow, reduce myocardial oxygen demand. Degree of action varies with individual agent.

CALCIUM CHANNEL BLOCKERS

Name	Availability	Dosage Range	Side Effects	Indications
Amlodipine (Norvasc)	**T:** 2.5 mg, 5 mg, 10 mg	**HTN:** 2.5–10 mg once daily **Angina:** 10 mg once daily	Abdominal pain, flushing, headaches, peripheral edema	HTN, angina
Diltiazem (Cardizem)	**T:** 30 mg, 60 mg, 90 mg **T (SR):** 120 mg, 180 mg, 240 mg **C (SR):** 60 mg, 90 mg, 120 mg, 180 mg, 240 mg, 300 mg, 360 mg **I:** 5 mg/ml	**HTN:** 120–540 mg/day **Angina:** 120–480 mg/day **I:** 20–25 mg IV bolus, then 5–15 mg/hr infusion	Dizziness, drowsiness, edema, headache	**PO:** HTN, angina **IV:** Arrhythmias
Felodipine (Plendil)	**T:** 2.5 mg, 5 mg, 10 mg	2.5–20 mg once daily	Peripheral edema, headaches	HTN

Continued

CALCIUM CHANNEL BLOCKERS—cont'd

Name	Availability	Dosage Range	Side Effects	Indications
Isradipine (DynaCirc)	**C:** 2.5 mg, 5 mg	2.5–10 mg/day in 2 divided doses	Headaches	HTN
Nicardipine (Cardene)	**C (IR):** 20 mg, 30 mg **C (ER):** 30 mg, 45 mg, 60 mg **I:** 2.5 mg/ml	**HTN (IR):** 20–40 mg tid or **(ER):** 30–60 mg bid **Angina (IR):** 20–40 mg tid	Flushing, peripheral edema, headache, dizziness	HTN, angina
Nifedipine (Adalat, Procardia)	**C (IR):** 10 mg, 20 mg **T (ER):** 30 mg, 60 mg, 90 mg	**HTN (ER):** 90–120 mg once daily **Angina (IR):** 10–20 mg tid or **(ER):** 120–180 mg once daily	Peripheral edema, dizziness, flushed face, headaches, nausea	HTN, angina
Nimodipine (Nimotop)	**C:** 30 mg	60 mg q4h for 21 days	Nausea, reduced B/P, headache, rash, diarrhea	Prevent neurologic damage following subarachnoid hemorrhage
Verapamil (Calan, Isoptin)	**T (IR):** 40 mg, 80 mg, 120 mg **T (SR):** 120 mg, 180 mg, 240 mg	**Angina (IR):** 80–160 mg tid or **(SR):** 180–480 mg once daily **HTN (IR):** 80–320 mg/day in 2 divided doses or **(SR):** 120–480 mg/day in 2 divided doses	Nausea, gingival hyperplasia, headache, fatigue, dizziness	HTN, angina

C, Capsules; ***CR,*** controlled-release; ***ER,*** extended-release; ***HTN,*** hypertension; ***I,*** injection; ***SR,*** sustained-release; ***T,*** tablets.

Chemotherapeutic Agents

USES

Treatment of a variety of cancers; may be palliative or curative. Treatment of choice in hematologic cancers. Often used as adjunctive therapy (e.g., with surgery or irradiation); most effective when tumor mass has been removed or reduced by radiation. Often used in combinations to increase therapeutic results, decrease toxic effects. Certain agents may be used in nonmalignant conditions: polycythemia vera, psoriasis, rheumatoid arthritis, or immunosuppression in organ transplantation (used only in select cases that are severe and unresponsive to other forms of therapy). Refer to individual monographs.

ACTION

Most antineoplastics can be divided into alkylating agents, antimetabolites, anthracyclines, plant alkaloids, and topoisomerase inhibitors. These agents affect cell division or DNA synthesis. Newer agents (monoclonal antibodies and tyrosine kinase inhibitors) directly target a molecular abnormality in certain types of cancer. Hormones modulate tumor cell behavior without directly attacking those cells. Some agents are classified as miscellaneous.

CHEMOTHERAPEUTIC AGENTS

Name	Availability	Category	Side Effects
Abiraterone (Zytiga)	**T:** 250 mg	Antiandrogen	Joint swelling, hypokalemia, edema, muscle discomfort, hot flashes, diarrhea, UTI, cough, hypertension, arrhythmia, dyspepsia, upper respiratory tract infection
Aldesleukin (Proleukin)	**I:** 22 million units	Biologic response modifier	Hypotension, sinus tachycardia, nausea, vomiting, diarrhea, renal impairment, anemia, rash, fatigue, agitation, pulmonary congestion, dyspnea, fever, chills, oliguria, weight gain, dizziness
Alemtuzumab (Campath)	**I:** 30 mg/3 ml	Monoclonal antibody	Rigors, fever, fatigue, hypotension, neutropenia, anemia, sepsis, dyspnea, bronchitis, pneumonia, urticaria

Continued

CHEMOTHERAPEUTIC AGENTS—cont'd

Name	Availability	Category	Side Effects
Anastrozole (Arimidex)	**T:** 1 mg	Aromatase inhibitor	Peripheral edema, chest pain, nausea, vomiting, diarrhea, constipation, abdominal pain, anorexia, pharyngitis, vaginal hemorrhage, anemia, leukopenia, rash, weight gain, diaphoresis, increased appetite, pain, headaches, dizziness, depression, paresthesia, hot flashes, increased cough, dry mouth, asthenia (loss of strength, energy), dyspnea, phlebitis
Arsenic trioxide (Trisenox)	**I:** 10 mg/ml	Miscellaneous	AV block, GI hemorrhage, hypertension, hypoglycemia, hypokalemia, hypomagnesemia, neutropenia, oliguria, prolonged QT interval, seizures, sepsis, thrombocytopenia
Asparaginase (Elspar)	**I:** 10,000 units	Miscellaneous	Anorexia, nausea, vomiting, hepatic toxicity, pancreatitis, nephrotoxicity, clotting factor abnormalities, malaise, confusion, lethargy, EEG changes, respiratory distress, fever, hyperglycemia, depression, stomatitis, allergic reactions, drowsiness
Axitinib (Inlyta)	**T:** 1 mg, 5 mg	Kinase inhibitor	Diarrhea, hypertension, fatigue, decreased appetite, nausea, dysphoria, vomiting, asthenia (loss of strength, energy), constipation
Azacitidine (Vidaza)	**I:** 100 mg	DNA methylation inhibitor	Edema, hypokalemia, weight loss, myalgia, cough, dyspnea, upper respiratory tract infection, back pain, pyrexia, weakness
BCG (TheraCys, Tice BCG)	**I:** 50 mg, 81 mg	Biologic response modulator	Nausea, vomiting, anorexia, diarrhea, dysuria, hematuria, cystitis, urinary urgency, anemia, malaise, fever, chills
Belinostat (Beleodaq)	**I:** 500 mg	Miscellaneous	Nausea, fatigue, pyrexia, anemia, vomiting
Bendamustine (Treanda)	**I:** 100 mg	Alkylating agent	Neutropenia, pyrexia, thrombocytopenia, nausea, anemia, leukopenia, vomiting
Bevacizumab (Avastin)	**I:** 25 mg/ml	Monoclonal antibody	Increased B/P, fatigue, blood clots, diarrhea, decreased WBCs, headaches, decreased appetite, stomatitis
Bexarotene (Targretin)	**C:** 75 mg **Gel:** 1%	Miscellaneous	Anemia, dermatitis, fever, hypercholesterolemia, infection, leukopenia, peripheral edema

Bicalutamide (Casodex)	**T:** 50 mg	Antiandrogen	Gynecomastia, hot flashes, breast pain, nausea, diarrhea, constipation, nocturia, impotence, pain, muscle pain, asthenia (loss of strength, energy), abdominal pain
Bleomycin (Blenoxane)	**I:** 15 units, 30 units	Antibiotic	Nausea, vomiting, anorexia, stomatitis, hyperpigmentation, alopecia, pruritus, hyperkeratosis, urticaria, pneumonitis progression to fibrosis, weight loss, rash
Bortezomib (Velcade)	**I:** 3.5 mg	Proteasome inhibitor	Anxiety, dizziness, headaches, insomnia, peripheral neuropathy, pruritus, rash, abdominal pain, decreased appetite, constipation, diarrhea, dyspepsia, nausea, vomiting, arthralgia, dyspnea, asthenia (loss of strength, energy), edema, pain
Bosutinib (Bosulif)	**T:** 100 mg, 500 mg	Kinase inhibitor	Nausea, diarrhea, thrombocytopenia, vomiting, abdominal pain, anemia, fever, fatigue
Brentuximab (Adcetris)	**I:** 50 mg	Miscellaneous	Neutropenia, peripheral sensory neuropathy, fatigue, nausea, anemia, upper respiratory tract infection, diarrhea, pyrexia, thrombocytopenia, cough, vomiting
Busulfan (Myleran)	**T:** 2 mg	Alkylating agent	Nausea, vomiting, hyperuricemia, myelosuppression, skin hyperpigmentation, alopecia, anorexia, weight loss, diarrhea, stomatitis
Cabazitaxel (Jevtana)	**I:** 60 mg/1.5 ml	Microtubule inhibitor	Neutropenia, anemia, leukopenia, thrombocytopenia, diarrhea, fatigue, nausea, vomiting, constipation, asthenia (loss of strength, energy), abdominal pain, hematuria, anorexia, peripheral neuropathy, dyspnea, alopecia
Capecitabine (Xeloda)	**T:** 150 mg, 300 mg	Antimetabolite	Nausea, vomiting, diarrhea, stomatitis, myelosuppression, palmar-plantar erythrodysesthesia syndrome, dermatitis, fatigue, anorexia
Carboplatin (Paraplatin)	**I:** 50 mg, 150 mg, 450 mg	Alkylating agent	Nausea, vomiting, nephrotoxicity, myelosuppression, alopecia, peripheral neuropathy, hypersensitivity, ototoxicity, asthenia (loss of strength, energy), diarrhea, constipation
Carfilzomib (Kyprolis)	**I:** 60 mg	Proteasome inhibitor	Anemia, fatigue, nausea, thrombocytopenia, dyspnea, diarrhea, pyrexia
Carmustine (BiCNU)	**I:** 100 mg	Alkylating agent	Anorexia, nausea, vomiting, myelosuppression, pulmonary fibrosis, pain at injection site, diarrhea, skin discoloration

Continued

CHEMOTHERAPEUTIC AGENTS—cont'd

Name	Availability	Category	Side Effects
Ceritinib (Zykadia)	**C:** 150 mg	Kinase inhibitor	Diarrhea, nausea, increased LFTs, vomiting, abdominal pain, fatigue, decreased appetite, constipation
Cetuximab (Erbitux)	**I:** 2 mg/ml	Monoclonal antibody	Dyspnea, hypotension, acne-like rash, dry skin, weakness, fatigue, fever, constipation, abdominal pain
Chlorambucil (Leukeran)	**T:** 2 mg	Alkylating agent	Myelosuppression, dermatitis, nausea, vomiting, hepatic toxicity, anorexia, diarrhea, abdominal discomfort, rash
Cisplatin (Platinol-AQ)	**I:** 50 mg, 100 mg	Alkylating agent	Nausea, vomiting, nephrotoxicity, myelosuppression, neuropathies, ototoxicity, anaphylactic-like reactions, hyperuricemia, hypomagnesemia, hypophosphatemia, hypokalemia, hypocalcemia, pain at injection site
Cladribine (Leustatin)	**I:** 1 mg/ml	Antimetabolite	Nausea, vomiting, diarrhea, myelosuppression, chills, fatigue, rash, fever, headaches, anorexia, diaphoresis
Crizotinib (Xalkori)	**C:** 200 mg, 250 mg	Tyrosine kinase inhibitor	Vision disorders, nausea, vomiting, diarrhea, edema, constipation
Cyclophosphamide (Cytoxan)	**I:** 100 mg, 200 mg, 500 mg, 1 g, 2 g **T:** 25 mg, 50 mg	Alkylating agent	Nausea, vomiting, hemorrhagic cystitis, myelosuppression, alopecia, interstitial pulmonary fibrosis, amenorrhea, azoospermia, diarrhea, darkening skin/fingernails, headaches, diaphoresis
Cytarabine (Ara-C, Cytosar)	**I:** 100 mg, 500 mg, 1 g, 2 g	Antimetabolite	Anorexia, nausea, vomiting, stomatitis, esophagitis, diarrhea, myelosuppression, alopecia, rash, fever, neuropathies, abdominal pain
Dacarbazine (DTIC)	**I:** 200 mg	Alkylating agent	Nausea, vomiting, anorexia, hepatic necrosis, myelosuppression, alopecia, rash, facial flushing, photosensitivity, flu-like symptoms, confusion, blurred vision
Dasatinib (Sprycel)	**T:** 20 mg, 50 mg, 70 mg	Tyrosine kinase inhibitor	Pyrexia, pleural effusion, febrile neutropenia, GI bleeding, pneumonia, thrombocytopenia, dyspnea, anemia, cardiac failure, diarrhea
Daunorubicin (Cerubidine)	**I:** 20 mg	Anthracycline	HF, nausea, vomiting, stomatitis, mucositis, diarrhea, hematuria, myelosuppression, alopecia, fever, chills, abdominal pain

Daunorubicin liposomal (DaunoXome)	**I:** 50 mg	Anthracycline	Nausea, diarrhea, abdominal pain, anorexia, vomiting, stomatitis, myelosuppression, rigors, back pain, headaches, neuropathy, depression, dyspnea, fatigue, fever, cough, allergic reactions, diaphoresis
Denileukin (Ontak)	**I:** 300 mcg/2 ml	Miscellaneous	Hypersensitivity reaction, back pain, dyspnea, rash, chest pain, tachycardia, asthenia (loss of strength, energy), flu-like symptoms, chills, nausea, vomiting, infection
Docetaxel (Taxotere)	**I:** 20 mg, 80 mg	Antimicrotubular	Hypotension, nausea, vomiting, diarrhea, mucositis, myelosuppression, rash, paresthesia, hypersensitivity, fluid retention, alopecia, asthenia (loss of strength, energy), stomatitis, fever
Doxorubicin (Adriamycin)	**I:** 10 mg, 20 mg, 50 mg, 75 mg, 150 mg, 200 mg	Anthracycline	Cardiotoxicity, including HF; arrhythmias, nausea, vomiting, stomatitis, esophagitis, GI ulceration, diarrhea, anorexia, hematuria, myelosuppression, alopecia, hyperpigmentation of nail beds and skin, local inflammation at injection site, rash, fever, chills, urticaria, lacrimation, conjunctivitis
Doxorubicin liposomal (Doxil)	**I:** 20 mg, 50 mg	Anthracycline	Neutropenia, palmar-plantar erythrodysesthesia syndrome, cardiomyopathy, HF
Enzalutamide (Xtandi)	**C:** 40 mg	Antiandrogen	Fatigue, weakness, back pain, diarrhea, tissue swelling, musculoskeletal pain, headache, upper respiratory tract infections, blood in urine, spinal cord compression
Epirubicin (Ellence)	**I:** 2 mg/ml	Anthracycline	Anemia, leukopenia, neutropenia, infection, mucositis
Erlotinib (Tarceva)	**T:** 25 mg, 100 mg, 150 mg	Tyrosine kinase inhibitor	Diarrhea, rash, nausea, vomiting
Estramustine (Emcyt)	**C:** 140 mg	Alkylating agent	Increased risk of thrombosis, gynecomastia, nausea, vomiting, diarrhea, thrombocytopenia, peripheral edema
Etoposide (VePesid)	**I:** 20 mg/ml **C:** 50 mg	Podophyllotoxin derivative	Nausea, vomiting, anorexia, myelosuppression, alopecia, diarrhea, drowsiness, peripheral neuropathies

Continued

CHEMOTHERAPEUTIC AGENTS—cont'd

Name	Availability	Category	Side Effects
Everolimus (Afinitor, Zortress)	**T (Afinitor):** 5 mg, 10 mg **T (Zortress):** 0.25 mg, 0.5 mg, 0.75 mg	mTOR kinase inhibitor	Stomatitis, infections, asthenia (loss of strength, energy), fatigue, cough, diarrhea
Exemestane (Aromasin)	**T:** 25 mg	Aromatase inactivator	Dyspnea, edema, hypertension, mental depression
Fludarabine (Fludara)	**I:** 50 mg	Antimetabolite	Nausea, diarrhea, stomatitis, bleeding, anemia, myelosuppression, skin rash, weakness, confusion, visual disturbances, peripheral neuropathy, coma, pneumonia, peripheral edema, anorexia
Fluorouracil (Adrucil, Efudex)	**I:** 50 mg/ml **Cream:** 1%, 5% **Solution:** 1%, 2%, 5%	Antimetabolite	Nausea, vomiting, stomatitis, GI ulceration, diarrhea, anorexia, myelosuppression, alopecia, skin hyperpigmentation, nail changes, headaches, drowsiness, blurred vision, fever
Flutamide (Eulexin)	**C:** 125 mg	Antiandrogen	Hot flashes, nausea, vomiting, diarrhea, hepatitis, impotence, decreased libido, rash, anorexia
Fulvestrant (Faslodex)	**I:** 125 mg/2.5 ml, 250 mg/5 ml syringes	Estrogen receptor antagonist	Asthenia (loss of strength, energy), pain, headaches, injection site pain, flu-like symptoms, fever, nausea, vomiting, constipation, anorexia, diarrhea, peripheral edema, dizziness, depression, anxiety, rash, increased cough, UTI
Gefitinib (Iressa)	**T:** 250 mg	Tyrosine kinase inhibitor	Diarrhea, rash, acne, nausea, dry skin, vomiting, pruritus, anorexia
Gemcitabine (Gemzar)	**I:** 200 mg, 1 g	Antimetabolite	Increased hepatic function tests, nausea, vomiting, diarrhea, stomatitis, hematuria, myelosuppression, rash, mild paresthesia, dyspnea, fever, edema, flu-like symptoms, constipation
Goserelin (Zoladex)	**I:** 3.6 mg, 10.8 mg	Hormone agonist	Hot flashes, sexual dysfunction, erectile dysfunction, gynecomastia, lethargy, pain, lower urinary tract symptoms, headaches, nausea, depression, diaphoresis

Hydroxyurea (Hydrea)	**C:** 500 mg	Antimetabolite	Anorexia, nausea, vomiting, stomatitis, diarrhea, constipation, myelosuppression, fever, chills, malaise
Ibritumomab (Zevalin)	Injection kit	Monoclonal antibody	Neutropenia, thrombocytopenia, anemia, infection, asthenia (loss of strength, energy), abdominal pain, fever, pain, headaches, nausea, peripheral edema, allergic reaction, GI hemorrhage, apnea
Idarubicin (Idamycin PFS)	**I:** 5 mg, 10 mg, 20 mg	Anthracycline	HF, arrhythmias, nausea, vomiting, stomatitis, myelosuppression, alopecia, rash, urticaria, hyperuricemia, abdominal pain, diarrhea, esophagitis, anorexia
Idelalisib (Zydelig)	**T:** 100 mg, 150 mg	Kinase inhibitor	Diarrhea, pyrexia, fatigue, nausea, cough, abdominal pain, pneumonia, increased ALT/AST
Ifosfamide (Ifex)	**I:** 1 g, 3 g	Alkylating agent	Nausea, vomiting, hemorrhagic cystitis, myelosuppression, alopecia, lethargy, drowsiness, confusion, hallucinations, hematuria
Imatinib (Gleevec)	**C:** 100 mg	Tyrosine kinase inhibitor	Nausea, fluid retention, hemorrhage, musculoskeletal pain, arthralgia, weight gain, pyrexia, abdominal pain, dyspnea, pneumonia
Interferon alfa-2b (Intron-A)	**I:** 3 million units, 5 million units, 10 million units, 18 million units, 25 million units, 50 million units	Miscellaneous	Mild hypotension, hypertension, tachycardia with high fever, nausea, diarrhea, altered taste, weight loss, thrombocytopenia, myelosuppression, rash, pruritus, myalgia, arthralgia associated with flu-like symptoms
Ipilimumab (Yervoy)	**I:** 5 mg/ml	Miscellaneous	Fatigue, diarrhea, pruritus, rash, colitis
Irinotecan (Camptosar)	**I:** 40 mg, 100 mg	Camptothecin	Diarrhea, nausea, vomiting, abdominal cramps, anorexia, stomatitis, increased AST, severe myelosuppression, alopecia, diaphoresis, rash, weight loss, dehydration, increased serum alkaline phosphatase, headaches, insomnia, dizziness, dyspnea, cough, asthenia (loss of strength, energy), rhinitis, fever, back pain, chills
Ixabepilone (Ixempra)	**I:** 15 mg, 45 mg	Antimicrotubular	Peripheral sensory neuropathy, fatigue, myalgia, alopecia, nausea, vomiting, stomatitis, diarrhea, anorexia, abdominal pain

Continued

CHEMOTHERAPEUTIC AGENTS—cont'd

Name	Availability	Category	Side Effects
Lapatinib (Tykerb)	**T:** 250 mg	Tyrosine kinase inhibitor	Diarrhea, palmar-plantar erythrodysesthesia, nausea, rash, vomiting, fatigue
Letrozole (Femara)	**T:** 2.5 mg	Aromatase inhibitor	Hypertension, nausea, vomiting, constipation, diarrhea, abdominal pain, anorexia, rash, pruritus, musculoskeletal pain, arthralgia, fatigue, headaches, dyspnea, coughing, hot flashes
Leuprolide (Lupron)	**I:** 3.75 mg, 5 mg, 7.5 mg, 11.25 mg, 15 mg, 22.5 mg, 30 mg	Hormone agonist	Hot flashes, gynecomastia, nausea, vomiting, constipation, anorexia, dizziness, headaches, insomnia, paresthesia, bone pain
Lomustine (CeeNU)	**C:** 10 mg, 40 mg, 100 mg	Alkylating agent	Anorexia, nausea, vomiting, stomatitis, hepatotoxicity, nephrotoxicity, myelosuppression, alopecia, confusion, slurred speech
Mechlorethamine (Mustargen)	**I:** 10 mg/ml	Alkylating agent	Severe nausea and vomiting, metallic taste, diarrhea, myelosuppression, alopecia, phlebitis, vertigo, tinnitus, hyperuricemia, infertility, azoospermia, anorexia, headaches, drowsiness, fever
Megestrol (Megace)	**T:** 20 mg, 40 mg **Suspension:** 40 mg/ml	Hormone	Deep vein thrombosis, Cushing-like syndrome, alopecia, carpal tunnel syndrome, weight gain, nausea
Melphalan (Alkeran)	**T:** 2 mg	Alkylating agent	Anorexia, nausea, vomiting, myelosuppression, diarrhea, stomatitis
Mercaptopurine (Purinethol)	**T:** 50 mg	Antimetabolite	Anorexia, nausea, vomiting, stomatitis, hepatic toxicity, myelosuppression, hyperuricemia, diarrhea, rash
Methotrexate (Rheumatrex)	**T:** 2.5 mg, 5 mg, 7.5 mg, 10 mg, 15 mg **I:** 5 mg, 50 mg, 100 mg, 200 mg, 250 mg	Antimetabolite	Nausea, vomiting, stomatitis, GI ulceration, diarrhea, hepatic toxicity, renal failure, cystitis, myelosuppression, alopecia, urticaria, acne, photosensitivity, interstitial pneumonitis, fever, malaise, chills, anorexia

Mitomycin (Mutamycin)	**I:** 20 mg, 40 mg	Antibiotic	Anorexia, nausea, vomiting, stomatitis, diarrhea, renal toxicity, myelosuppression, alopecia, pruritus, fever, hemolytic uremic syndrome, weakness
Mitotane (Lysodren)	**T:** 500 mg	Miscellaneous	Anorexia, nausea, vomiting, diarrhea, skin rashes, depression, lethargy, drowsiness, dizziness, adrenal insufficiency, blurred vision, impaired hearing
Mitoxantrone (Novantrone)	**I:** 20 mg, 25 mg, 30 mg	Anthracenedione	HF, tachycardia, EKG changes, chest pain, nausea, vomiting, stomatitis, mucositis, myelosuppression, rash, alopecia, urine discoloration (bluish green), phlebitis, diarrhea, cough, headaches, fever
Nelarabine (Arranon)	**I:** 5 mg/ml	Antimetabolite	Anemia, neutropenia, thrombocytopenia, nausea, vomiting, diarrhea, fatigue, fever, dyspnea, severe neurologic events (convulsions, peripheral neuropathy)
Nilotinib (Tasigna)	**C:** 200 mg	Tyrosine kinase inhibitor	Rash, pruritus, nausea, fatigue, headache, constipation, diarrhea, vomiting, thrombocytopenia, neutropenia
Nilutamide (Nilandron)	**T:** 50 mg	Antiandrogen	Hypertension, angina, hot flashes, nausea, anorexia, increased hepatic enzymes, dizziness, dyspnea, visual disturbances, impaired adaptation to dark, constipation, decreased libido
Oxaliplatin (Eloxatin)	**I:** 50 mg, 100 mg	Alkylating agent	Fatigue, neuropathy, abdominal pain, dyspnea, diarrhea, nausea, vomiting, anorexia, fever, edema, chest pain, anemia, thrombocytopenia, thromboembolism, altered hepatic function tests
Paclitaxel (Taxol)	**I:** 30 mg, 100 mg	Antimicrotubular	Hypertension, bradycardia, EKG changes, nausea, vomiting, diarrhea, mucositis, myelosuppression, alopecia, peripheral neuropathies, hypersensitivity reaction, arthralgia, myalgia
Panitumumab (Vectibix)	**I:** 20 mg/ml	Monoclonal antibody	Pulmonary fibrosis, severe dermatologic toxicity, infusion reactions, abdominal pain, nausea, vomiting, constipation, skin rash, fatigue
Pegaspargase (Oncaspar)	**I:** 750 international units/ml	Miscellaneous	Hypotension, anorexia, nausea, vomiting, hepatotoxicity, pancreatitis, depression of clotting factors, malaise, confusion, lethargy, EEG changes, respiratory distress, hypersensitivity reaction, fever, hyperglycemia, stomatitis
Pemetrexed (Alimta)	**I:** 500 mg	Antimetabolite	Anorexia, constipation, diarrhea, neuropathy, anemia, chest pain, dyspnea, rash, fatigue

Continued

CHEMOTHERAPEUTIC AGENTS—cont'd

Name	Availability	Category	Side Effects
Pentostatin (Nipent)	**I:** 10 mg	Antibiotic	Nausea, vomiting, hepatic disorders, elevated hepatic function tests, leukopenia, anemia, thrombocytopenia, rash, fever, upper respiratory infection, fatigue, hematuria, headaches, myalgia, arthralgia, diarrhea, anorexia
Pertuzumab (Perjeta)	**I:** 420 mg/14 ml	HERZ/neu receptor antagonist	Alopecia, diarrhea, nausea, neutropenia, rash, fatigue, peripheral neuropathy
Procarbazine (Matulane)	**C:** 50 mg	Alkylating agent	Nausea, vomiting, stomatitis, diarrhea, constipation, myelosuppression, pruritus, hyperpigmentation, alopecia, myalgia, paresthesia, confusion, lethargy, mental depression, fever, hepatic toxicity, arthralgia, respiratory disorders
Ramucirumab (Cyramza)	**I:** 100 mg, 500 mg	Miscellaneous	Diarrhea, hypertension
Rituximab (Rituxan)	**I:** 100 mg, 500 mg	Monoclonal antibody	Hypotension, arrhythmias, peripheral edema, nausea, vomiting, abdominal pain, leukopenia, thrombocytopenia, neutropenia, rash, pruritus, urticaria, angioedema, myalgia, headaches, dizziness, throat irritation, rhinitis, bronchospasm, hypersensitivity reaction
Sipuleucel-T (Provenge)	**I:** Minimum of 50 million autologous $CD54^+$ cells in lactated Ringer's	Miscellaneous	Chills, fatigue, fever, back pain, nausea, headache, joint ache
Sorafenib (Nexavar)	**T:** 200 mg	Tyrosine kinase inhibitor	Fatigue, alopecia, nausea, vomiting, anorexia, constipation, diarrhea, neuropathy, dyspnea, cough, asthenia (loss of strength, energy), pain
Sunitinib (Sutent)	**C:** 12.5 mg, 25 mg, 50 mg	Tyrosine kinase inhibitor	Hypotension, edema, fatigue, headache, fever, dizziness, rash, hyperpigmentation, diarrhea, nausea, dyspepsia, altered taste, vomiting, neutropenia, thrombocytopenia, increased ALT/AST

Tamoxifen (Nolvadex-D)	**T:** 10 mg, 20 mg	Estrogen receptor antagonist	Skin rash, nausea, vomiting, anorexia, menstrual irregularities, hot flashes, pruritus, vaginal discharge or bleeding, myelosuppression, headaches, tumor or bone pain, ophthalmic changes, weight gain, confusion
Temozolomide (Temodar)	**C:** 5 mg, 20 mg, 100 mg, 250 mg	Alkylating agent	Amnesia, fever, infection, leukopenia, neutropenia, peripheral edema, seizures, thrombocytopenia
Temsirolimus (Torisel)	**I:** 25 mg/ml	mTOR kinase inhibitor	Rash, asthenia (loss of strength, energy), mucositis, nausea, edema, anorexia, thrombocytopenia, leukopenia
Thioguanine (Tabloid)	**T:** 40 mg	Antimetabolite	Anorexia, stomatitis, myelosuppression, hyperuricemia, nausea, vomiting, diarrhea
Thiotepa (Thioplex)	**I:** 15 mg	Alkylating agent	Anorexia, nausea, vomiting, mucositis, myelosuppression, amenorrhea, reduced spermatogenesis, fever, hypersensitivity reactions, pain at injection site, headaches, dizziness, alopecia
Topotecan (Hycamtin)	**I:** 4 mg	Camptothecin	Nausea, vomiting, diarrhea, constipation, abdominal pain, stomatitis, anorexia, neutropenia, leukopenia, thrombocytopenia, anemia, alopecia, headaches, dyspnea, paresthesia
Toremifene (Fareston)	**T:** 60 mg	Estrogen receptor antagonist	Elevated hepatic function tests, nausea, vomiting, constipation, skin discoloration, dermatitis, dizziness, hot flashes, diaphoresis, vaginal discharge or bleeding, ocular changes, cataracts, anxiety
Trastuzumab (Herceptin)	**I:** 440 mg	Monoclonal antibody	HF, heart murmur (S_3 gallop), nausea, vomiting, diarrhea, abdominal pain, anorexia, rash, peripheral edema, back or bone pain, asthenia (loss of strength, energy), headaches, insomnia, dizziness, cough, dyspnea, rhinitis, pharyngitis
Tretinoin (Vesanoid)	**C:** 10 mg	Miscellaneous	Flushing, nausea, vomiting, diarrhea, constipation, dyspepsia, mucositis, leukocytosis, dry skin/mucous membranes, rash, pruritus, alopecia, dizziness, anxiety, insomnia, headaches, depression, confusion, intracranial hypertension, agitation, dyspnea, shivering, fever, visual changes, earaches, hearing loss, bone pain, myalgia, arthralgia

Continued

CHEMOTHERAPEUTIC AGENTS—cont'd

Name	Availability	Category	Side Effects
Valrubicin (Valstar)	**I:** 200 mg/5 ml	Anthracycline	Dysuria, hematuria, urinary frequency/incontinence/urgency
Vandetanib (Caprelsa)	**T:** 100 mg, 300 mg	Tyrosine kinase inhibitor	Diarrhea, rash, acne, nausea, hypertension, headache, fatigue, decreased appetite, abdominal pain
Vinblastine (Velban)	**I:** 10 mg	Vinca alkaloid	Nausea, vomiting, stomatitis, constipation, myelosuppression, alopecia, peripheral neuropathy, loss of deep tendon reflexes, paresthesia, diarrhea
Vincristine (Oncovin)	**I:** 1 mg, 2 mg, 3 mg	Vinca alkaloid	Nausea, vomiting, stomatitis, constipation, pharyngitis, polyuria, myelosuppression, alopecia, numbness, paresthesia, peripheral neuropathy, loss of deep tendon reflexes, headaches, abdominal pain
Vincristine liposomal (Marqibo)	**I:** 5 mg/31 ml	Vinca alkaloid	Constipation, nausea, pyrexia, fatigue, peripheral neuropathy, febrile neutropenia, diarrhea, anemia, reduced appetite, insomnia
Vinorelbine (Navelbine)	**I:** 10 mg, 50 mg	Vinca alkaloid	Elevated hepatic function tests, nausea, vomiting, constipation, ileus, anorexia, stomatitis, myelosuppression, alopecia, vein discoloration, venous pain, phlebitis, interstitial pulmonary changes, asthenia (loss of strength, energy), fatigue, diarrhea, peripheral neuropathy, loss of deep tendon reflexes
Vismodegib (Erivedge)	**C:** 150 mg	Hedgehog pathway inhibitor	Alopecia, muscle spasms, dysgensia, weight loss, fatigue, nausea, diarrhea, reduced appetite, vomiting, arthralgia
Vorinostat (Zolinza)	**C:** 100 mg	Histone deacetylase inhibitor	Diarrhea, fatigue, nausea, thrombocytopenia, anorexia, dysgeusia
ziv-aflibercept (Zaltrap)	**I:** 25 mg/ml	Miscellaneous	Leukopenia, neutropenia, diarrhea, proteinuria, increased ALT/AST, stomatitis, thrombocytopenia, hypertension, epistaxis, headache, abdominal pain

AV, Atrioventricular; ***C,*** capsules; ***EEG,*** electroencephalogram; ***I,*** injection; ***LFT,*** liver function test; ***T,*** tablets; ***UTI,*** urinary tract infection.

Contraception

ACTION	CLASSIFICATION	
Combination oral contraceptives decrease fertility primarily by inhibition of ovulation. In addition, they can promote thickening of the cervical mucus, thereby creating a physical barrier for the passage of sperm. Also, they can modify the endometrium, making it less favorable for nidation.	Oral contraceptives either contain both an estrogen and a progestin (combination oral contraceptives) or contain only a progestin (progestin-only oral contraceptives). The combination oral contraceptives have three subgroups: *Monophasic:* Daily estrogen and progestin dosage remains constant.	*Biphasic:* Estrogen remains constant, but the progestin dosage increases during the second half of the cycle. *Triphasic:* Progestin changes for each phase of the cycle.

Over the past several years, options have expanded to include a combined hormonal patch (Ortho Evra), vaginal ring (NuvaRing), and extended cycle contraceptives (e.g., Loestrin-24 FE, Seasonale, Seasonique, Yaz). The latest oral contraceptive, Natazia, is a four-phase dosing regimen (estradiol steps down and dienogest, a progestin, steps up during the cycle to help avoid breakthrough bleeding).

COMMON COMPLAINTS WITH ORAL CONTRACEPTIVES

Too much estrogen	Nausea, bloating, breast tenderness, increased B/P, melasma, headache
Too little estrogen	Early or midcycle breakthrough bleeding, increased spotting, hypomenorrhea
Too much progestin	Breast tenderness, headache, fatigue, changes in mood
Too little progestin	Late breakthrough bleeding
Too much androgen	Increased appetite, weight gain, acne, oily skin, hirsutism, decreased libido, increased breast size, breast tenderness, increased LDL cholesterol, decreased HDL cholesterol

HDL, High-density lipoprotein; ***LDL,*** low-density lipoprotein.

CONTRACEPTIVES

Name	Estrogen Content	Progestin Content
Low-Dose Monophasic Pills		
Aviane-28 Lessina Lutera Sronyx	EE 20 mcg	Levonorgestrel 0.1 mg
Junel 1/20 Junel Fe 1/20 Loestrin Fe 1/20 Microgestin Fe 1/20	EE 20 mcg	Norethindrone 1 mg
Levora Nordette-28 Portia-28	EE 30 mcg	Levonorgestrel 0.15 mg
Cryselle-28 Lo/Ovral-28 Low-Ogestrel-21, -28	EE 30 mcg	Norgestrel 0.3 mg
Junel 1.5/30 Junel Fe 1.5/30 Loestrin Fe 1.5/30 Microgestin 1.5/30 Microgestin Fe 1.5/30	EE 30 mcg	Norethindrone acetate 1.5 mg
Apri Desogen Ortho-Cept Reclipsen Solia	EE 30 mcg	Desogestrel 0.15 mg

Yasmin Ocella	EE 30 mcg	Drospirenone 3 mg
Kelnor 1/35 Zovia 1/35	EE 35 mcg	Ethynodiol diacetate 1 mg
Ortho-Cyclen-28 Mononessa Previfem Sprintec	EE 35 mcg	Norgestimate 0.25 mg
Necon 1/50 Norinyl 1+50	Mestranol 50 mcg	Norethindrone 1 mg
Balziva Femcon Fe Ovcon-35 Zenchent	EE 35 mcg	Norethindrone 0.4 mg
Brevicon-28 Modicon-28 Necon 0.5/35 Nortrel 0.5/35	EE 35 mcg	Norethindrone 0.5 mg (total of 10.5 mg/cycle)
Necon 1/35-28 Norinyl 1+35-28 Nortrel 1/35-28 Ortho-Novum 1/35-28	EE 35 mcg	Norethindrone 1 mg (total of 21 mg/cycle)
High-Dose Monophasic Pills		
Zovia 1/50-28	EE 50 mcg	Ethynodiol diacetate 1 mg
Ogestrel 0.5/50-28	EE 50 mcg	Norgestrel 0.5 mg
Ovcon-50	EE 50 mcg	Norethindrone 1 mg

Continued

CONTRACEPTIVES—cont'd

Name	Estrogen Content	Progestin Content
Biphasic Pills		
Azurette Kariva Mircette	EE 20 mcg × 21 days, placebo × 2 days, 10 mcg × 5 days	Desogestrel 0.15 mg × 21 days
Necon 10/11	EE 35 mcg	Norethindrone 0.5 mg × 10 days, 1 mg × 11 days
Triphasic Pills		
Estrostep Fe Tilia Tilia Fe Tri-Legest Fe	EE 20 mcg × 5 days, 30 mcg × 7 days, 35 mcg × 9 days	Norethindrone 1 mg × 21 days
Ortho Tri-Cyclen Lo Tri Lo Sprintec	EE 25 mcg × 21 days	Norgestimate 0.18 mg × 7 days, 0.215 mg × 7 days, 0.25 mg × 7 days
Caziant Cesia Cyclessa Velivet	EE 25 mcg × 21 days	Desogestrel 0.1 mg × 7 days, 0.125 mg × 7 days, 0.15 mg × 7 days
Enpresse Trivora	EE 30 mcg × 6 days, 40 mcg × 5 days, 30 mcg × 10 days	Levonorgestrel 0.05 mg × 6 days, 0.075 mg × 5 days, 0.125 mg × 10 days
Ortho Tri-Cyclen Trinessa Tri-Previfem Tri-Sprintec	EE 35 mcg × 21 days	Norgestimate 0.18 mg × 7 days, 0.215 mg × 7 days, 0.25 mg × 7 days
Aranelle Leena Tri-Norinyl	EE 35 mcg × 21 days	Norethindrone 0.5 mg × 7 days, 1 mg × 9 days, 0.5 mg × 5 days

Ortho-Novum 7/7/7 Nortrel 7/7/7 Necon 7/7/7	EE 35 mcg × 21 days	Norethindrone 0.5 mg × 7 days, 0.75 mg × 7 days, 1 mg × 7 days
Four Phasic		
Natazia	Estradiol 3 mg × 2 days, then 2 mg × 22 days, then 1 mg × 2 days, then 2-day pill-free interval	Dienogest none × 2 days, then 2 mg × 5 days, then 3 mg × 17 days, then none for 4 days
Extended-Cycle Pills		
Loestrin-24 FE	EE 20 mcg × 24 days	Norethindrone 1 mg × 24 days
Jolessa	EE 30 mcg × 84 days	Levonorgestrel 0.15 mg × 84 days
Quartette Quasense Seasonale	EE 20 mcg × 42 days, 25 mcg × 21 days, 30 mcg × 21 days, then 10 mcg × 7 days	Levonorgestrel 0.15 mg × 84 days
Seasonique	EE 30 mcg × 84 days, 10 mcg × 7 days	Levonorgestrel 0.15 mg × 84 days
Yaz Gianvi	EE 20 mcg × 24 days	Drospirenone 3 mg × 24 days
Continuous Cycle Pill		
Lybrel	EE 20 mcg	Levonorgestrel 90 mcg

Continued

CONTRACEPTIVES—cont'd

Name	Estrogen Content	Progestin Content
Progestin-Only Pills		
Camilia Errin Jolivette Micronor Nor-QD Nora-BE	N/A	Norethindrone 0.35 mg
Emergency Contraception		
Plan B Next Choice	N/A	Levonorgestrel 0.75-mg tablets taken 12 hrs apart
Ella (Ulipristal)	N/A	Ulipristal 30 mg one time within 5 days after unprotected intercourse
Hormonal Alternative to Oral Contraception		
Depo-Provera CI Medroxyprogesterone Acetate	None	Medroxyprogesterone 150 mg
Depo-SubQ Provera 104	None	Medroxyprogesterone 104 mg
Implanon	None	Etonogestrel (release rate varies over time)
Mirena	None	Levonorgestrel 20 mcg/day for 5 yrs
NuvaRing	Ethinyl estradiol 15 mcg/day	Etonogestrel 0.12 mg/day
Ortho Evra	Ethinyl estradiol 20 mcg/day	Norelgestromin 150 mcg/day

EE, ethinyl estradiol

Corticosteroids

USES	ACTION
Replacement therapy in adrenal insufficiency, including Addison's disease. Symptomatic treatment of multiorgan disease/conditions. Rheumatoid arthritis (RA), osteoarthritis, severe psoriasis, ulcerative colitis, lupus erythematosus, anaphylactic shock, acute exacerbation of asthma, status asthmaticus, organ transplant.	Suppress migration of polymorphonuclear leukocytes (PML) and reverse increased capillary permeability by their anti-inflammatory effect. Suppress immune system by decreasing activity of lymphatic system.

CORTICOSTEROIDS

Name	Availability	Route of Administration	Side Effects
Beclomethasone (Beconase, Qnasl, QVAR)	**Aerosol (oral inhalation), QVAR:** 40 mcg/inhalation, 80 mcg/inhalation **Aerosol (spray, intranasal), Qnasl:** 80 mcg/inhalation **Suspension (intranasal), Beconase:** 42 mcg/inhalation	Inhalation, intranasal	**I:** Cough, dry mouth/throat, headaches, throat irritation, increased blood glucose **Nasal:** Headaches, sore throat, intranasal ulceration, increased blood glucose
Betamethasone (Celestone)	**I:** 6 mg/ml	IV, intralesional, intra-articular	Nausea, vomiting, increased appetite, weight gain, insomnia, increased blood glucose
Budesonide (Pulmicort, Rhinocort)	**Nasal:** 32 mcg/spray **Suspension for nebulization:** 250 mcg, 500 mcg	Intranasal	Headaches, sore throat, intranasal ulceration, increased blood glucose
Cortisone (Cortone)	**T:** 5 mg, 10 mg, 25 mg	PO	Insomnia, nervousness, increased appetite, indigestion, increased blood glucose

Continued

CORTICOSTEROIDS—cont'd

Name	Availability	Route of Administration	Side Effects
Dexamethasone (Decadron)	**T:** 0.5 mg, 1 mg, 4 mg, 6 mg **OS:** 0.5 mg/5 ml **I:** 4 mg/ml, 10 mg/ml	PO, parenteral	Insomnia, weight gain, increased appetite, increased blood glucose
Fludrocortisone (Florinef)	**T:** 0.1 mg	PO	Edema, headache, peptic ulcer, increased blood glucose
Flunisolide (Nasalide)	**Nasal:** 25 mcg/spray	Inhalation, intranasal	Headache, nasal congestion, pharyngitis, upper respiratory infections, altered taste/smell, increased blood glucose
Fluticasone (Flonase, Flovent)	**Inhalation:** 44 mcg, 110 mg, 220 mcg **Nasal:** 50 mg, 100 mcg	Inhalation, intranasal	Headache, burning/stinging, nasal congestion, upper respiratory infections, increased blood glucose
Hydrocortisone (Solu-Cortef)	**T:** 5 mg, 10 mg, 25 mg **I:** 100 mg, 250 mg, 500 mg, 1 g	PO, parenteral	Insomnia, headache, nausea, vomiting, increased blood glucose
Methylprednisolone (Solu-Medrol)	**T:** 4 mg **I:** 40 mg, 125 mg, 500 mg, 1 g, 2 g	PO, parenteral	Headache, insomnia, nervousness, increased appetite, nausea, vomiting, increased blood glucose
Prednisolone (Prelone)	**T:** 5 mg **OS:** 5 mg/5 ml, 15 mg/5 ml	PO	Headache, insomnia, weight gain, nausea, vomiting, increased blood glucose
Prednisone	**T:** 1 mg, 2.5 mg, 5 mg, 10 mg, 20 mg, 50 mg	PO	Headache, insomnia, weight gain, nausea, vomiting, increased blood glucose
Triamcinolone (Kenalog, Nasacort AQ)	**Injection, suspension:** 10 mg/ml, 40 mg/ml **Intranasal, suspension:** 55 mcg/inhalation	IM, inhalation (nasal)	**PO:** Insomnia, increased appetite, nausea, vomiting, increased blood glucose **I:** Cough, dry mouth/throat, headaches, throat irritation, increased blood glucose

I, Injection; ***OS,*** oral suspension; ***T,*** tablets.

Corticosteroids: Topical

USES	ACTION
Provide relief of inflammation/pruritus associated with corticosteroid-responsive disorders (e.g., contact dermatitis, eczema, insect bite reactions, first- and second-degree localized burns/sunburn).	Diffuse across cell membranes, form complexes with cytoplasm. Complexes stimulate protein synthesis of inhibitory enzymes responsible for anti-inflammatory effects (e.g., inhibit edema, erythema, pruritus, capillary dilation, phagocytic activity). Topical corticosteroids can be classified based on potency: May use for facial and intertriginous application for only limited time. *High potency:* For more severe inflammatory conditions (e.g., lichen simplex chronicus, psoriasis). May use for facial and intertriginous application for short time only. Used in areas of thickened skin due to chronic conditions. *Low potency:* Modest anti-inflammatory effect, safest for chronic application, facial and intertriginous application, with occlusion, for infants/young children. *Medium potency:* For moderate inflammatory conditions (e.g., chronic eczematous dermatoses). *Very high potency:* Alternative to systemic therapy for local effect (e.g., chronic lesions caused by psoriasis). Increased risk of skin atrophy. Used for short periods on small areas. Avoid occlusive dressings.

CORTICOSTEROIDS: TOPICAL

Name	Availability	Potency	Side Effects
Alclometasone (Aclovate)	**C, O:** 0.05%	Low	Skin atrophy, contact dermatitis, stretch marks on skin, enlarged blood vessels in the skin, hair loss, pigment changes, secondary infections
Amcinonide (Cyclocort)	**C, O, L:** 0.1%	High	Same as alclometasone

Continued

CORTICOSTEROIDS: TOPICAL—cont'd

Name	Availability	Potency	Side Effects
Betamethasone dipropionate	**C, O, G, L:** 0.05%	High	Same as alclometasone
Betamethasone valerate	**C:** 0.01%, 0.05%, 0.1% **O:** 0.1% **L:** 0.1%	High	Same as alclometasone
Clobetasol (Temovate)	**C, O:** 0.05%	High	Same as alclometasone
Desonide (Tridesilon)	**C, O, L:** 0.05%	Low	Same as alclometasone
Desoximetasone (Topicort)	**C:** 0.25%, 0.5% **O:** 0.25% **G:** 0.05%	High	Same as alclometasone
Dexamethasone (Decadron)	**C:** 0.1%	Medium	Same as alclometasone
Fluocinolone (Synalar)	**C:** 0.01%, 0.025%, 0.2% **O:** 0.025%	High	Same as alclometasone
Fluocinonide (Lidex)	**C, O, G:** 0.05%	High	Same as alclometasone
Flurandrenolide (Cordran)	**C, O, L:** 0.025%, 0.05%	Medium	Same as alclometasone
Fluticasone (Cutivate)	**C:** 0.05% **O:** 0.005%	Medium	Same as alclometasone
Halobetasol (Ultravate)	**C, O:** 0.05%	High	Same as alclometasone
Hydrocortisone (Hytone)	**C, O:** 0.5%, 1%, 2.5%	Medium	Same as alclometasone
Mometasone (Elocon)	**C, O, L:** 0.1%	Medium	Same as alclometasone
Prednicarbate (Dermatop)	**C:** 0.1%	—	Same as alclometasone
Triamcinolone (Aristocort, Kenalog)	**C, O, L:** 0.025%, 0.1%, 0.5%	Medium	Same as alclometasone

C, Cream; ***G,*** gel; ***L,*** lotion; ***O,*** ointment.

Diuretics

USES

Thiazides: Management of edema resulting from a number of causes (e.g., HF, hepatic cirrhosis); hypertension either alone or in combination with other antihypertensives.

Loop: Management of edema associated with HF, cirrhosis of the liver, and renal disease. Furosemide used in treatment of hypertension alone or in combination with other antihypertensives.

Potassium-sparing: Adjunctive treatment with thiazides, loop diuretics in treatment of HF and hypertension.

ACTION

Increase the excretion of water/sodium and other electrolytes via the kidneys. Exact mechanism of antihypertensive effect unknown; may be due to reduced plasma volume or decreased peripheral vascular resistance. Subclassifications of diuretics are based on their mechanism and site of action.

Thiazides: Act at cortical diluting segment of nephron, block reabsorption of Na, Cl, and water; promote excretion of Na, Cl, K, and water. *Loop:* Act primarily at the thick ascending limb of Henle's loop to inhibit Na, Cl, and water absorption.

Potassium-sparing: Spironolactone blocks aldosterone action on distal nephron (causes K retention, Na excretion). Triamterene, amiloride act on distal nephron, decreasing Na reuptake, reducing K secretion.

DIURETICS

Name	Availability	Dosage Range	Side Effects
Thiazide, Thiazide-related			
Chlorothiazide (Diuril)	**T:** 250 mg, 500 mg **S:** 250 mg/5 ml **I:** 500 mg	**Edema:** 500–1,000 mg 1–2 times/day **HTN:** 500–2,000 mg/day in 1–2 divided doses	Confusion, fatigue, muscle cramps, abdominal discomfort
Chlorthalidone (Hygroton)	**Hygroton:** 25 mg, 50 mg	**Edema:** 50–200 mg/day **HTN:** 12.5–100 mg/day	Same as chlorothiazide

Continued

DIURETICS—cont'd

Name	Availability	Dosage Range	Side Effects
Hydrochlorothiazide (HydroDIURIL)	**T:** 12.5 mg, 25 mg, 50 mg **C:** 12.5 mg	**Edema:** 25–100 mg/day in 1–2 divided doses **HTN:** 12.5/50 mg once daily	Orthostatic hypotension, photosensitivity, hypokalemia, anorexia, epigastric distress, increased blood glucose
Indapamide (Lozol)	**T:** 1.25 mg, 2.5 mg	**Edema:** 2.5–5 mg once daily **HTN:** 1.25–5 mg once daily	Loss of appetite, diarrhea, headaches, dizziness, light-headedness, insomnia, upset stomach
Metolazone (Zaroxolyn)	**T:** 2.5 mg, 5 mg, 10 mg	**Edema:** 2.5–20 mg once daily **HTN:** 2.5–5 mg once daily	Orthostatic hypotension, dizziness, hypokalemia, nausea, diarrhea, abdominal pain
Loop			
Bumetanide (Bumex)	**T:** 0.5 mg, 1 mg, 2 mg **I:** 0.25 mg/ml	**Edema:** 1–10 mg/day	Orthostatic hypotension, cramps or pain, hypokalemia (dry mouth, fatigue, muscle cramps), blurred vision, headaches
Furosemide (Lasix)	**T:** 20 mg, 40 mg, 80 mg **OS:** 10 mg/ml, 40 mg/5 ml **I:** 10 mg/ml	**HTN:** 20–80 mg/day in 2 divided doses **Edema:** Up to 600 mg/day	Orthostatic hypotension, cramps or pain, hypokalemia (dry mouth, fatigue, muscle cramps), blurred vision, headaches
Torsemide (Demadex)	**T:** 5 mg, 10 mg, 20 mg, 100 mg **I:** 10 mg/ml	**Edema:** 10–200 mg/day **HTN:** 5–10 mg/day	Constipation, dizziness, upset stomach, headache, hypokalemia (dry mouth, fatigue, muscle cramps)

Potassium-sparing			
Amiloride (Midamor)	**T:** 5 mg	**Edema:** 5–20 mg/day **HTN:** 5–10 mg/day in 1–2 divided doses	Hyperkalemia, nausea, abdominal pain, diarrhea
Eplerenone (Inspra)	**T:** 25 mg, 50 mg	**Heart Failure:** 25–50 mg/day **HTN:** 50–100 mg/day	Hyperkalemia, hypertriglyceridemia
Spironolactone (Aldactone)	**T:** 25 mg, 50 mg, 100 mg	**Edema:** 100 mg/day **HTN:** 50–200 mg/day **Hypokalemia:** 25–100 mg/day **Heart Failure:** 25–50 mg/day	Hyperkalemia, nausea, vomiting, abdominal cramps, diarrhea
Triamterene (Dyrenium)	**C:** 50 mg, 100 mg	**Edema, HTN:** 100–300 mg/day in 1–2 divided doses	Same as amiloride

C, Capsules; ***HTN,*** hypertension; ***I,*** injection; ***OS,*** oral solution; ***S,*** suspension; ***T,*** tablets.

Fertility Agents

Infertility is defined as unsuccessful conception after 12 months of attempting to conceive, as opposed to *sterility,* the inability to reproduce. Infertility may be due to reproduction dysfunction of the male, female, or both.

Female infertility can be due to disruption of any phase of the reproductive process. The most critical phases include follicular maturation, ovulation, transport of the ovum through the fallopian tubes, fertilization of the ovum, nidation, and growth/development of the conceptus. Causes of infertility include the following:

Anovulation, failure of follicular maturation: Absence of adequate hormonal stimulation; ovarian follicles do not ripen, and ovulation will not occur.

Unfavorable cervical mucus: Normally the cervical glands secrete large volumes of thin, watery mucus, but if the mucus is unfavorable (scant, thick, or sticky), sperm is unable to pass through to the uterus.

Hyperprolactinemia: Excessive prolactin secretion may cause amenorrhea, galactorrhea, and infertility.

Luteal phase defect: Progesterone secretion by the corpus luteum is insufficient to maintain endometrial integrity.

Endometriosis: Endometrial tissue is implanted in abnormal locations (e.g., uterine wall, ovary, extragenital sites).

Androgen excess: May decrease fertility (most common condition is polycystic ovary).

Male infertility is due to decreased density or motility of sperm or semen of abnormal volume or quality. The most obvious manifestation of male infertility is impotence (inability to achieve erection). Whereas in female infertility an identifiable endocrine disorder can be found, most cases of male infertility are not associated with an identifiable endocrine disorder.

ACTION

Antiestrogens: Nonsteroidal estrogen antagonists that increase follicle-stimulating hormone (FSH) and leutinizing hormone (LH) levels by blocking estrogen-negative feedback at the hypothalamus.

Gonadotropins: Produce ovulation induction in women with hypogonadotropic hypogonadism and polycystic ovary syndrome (PCOS). Ovaries must be able to respond normally to FSH and LH stimulation.

Gonadotropin-releasing hormone (GnRH) agonists: Cause downregulation of endogenous FSH and LH levels. GnRH agonists stimulate release of pituitary gonadotropins. Suppression of endogenous LH can decrease number of oocytes released prematurely, improve oocyte quality, and increase pregnancy rates.

Gonadotropin-releasing hormone (GnRH) antagonists: Suppress endogenous LH surges during ovarian stimulation. GnRH antagonists avoid initial flare-up seen with GnRH agonists, shortening the number of days needed for LH suppression and allowing ovarian stimulation to begin within the spontaneous cycle.

MEDICATIONS TO INDUCE OVULATION

Name	Category	Availability	Uses	Side Effects
Cetrorelix (Cetrotide)	GnRH antagonist	**I:** 0.25 mg, 3 mg	Inhibition of premature LH surges in women undergoing ovarian hyperstimulation	Ovarian hyperstimulation syndrome (OHSS): Abdominal pain, indigestion, bloating, decreased urinary output, nausea, vomiting, diarrhea, rapid weight gain, dyspnea, peripheral/dependent edema, headaches, pain/redness at injection site, mood swings, hot flashes, insomnia, vaginal dryness
Chorionic gonadotropin (Novarel, Ovidrel, Pregnyl)	Gonadotropin	**I:** 5,000 units, 10,000 units, 20,000 units **Ovidrel:** 250 mcg/ 0.5 ml	In conjunction with clomiphene, human menotropins or urofolitropin to stimulate ovulation	OHSS: Abdominal pain, indigestion, bloating, decreased urinary output, nausea, vomiting, diarrhea, rapid weight gain, dyspnea, peripheral/dependent edema, ovarian enlargement, ovarian cyst formation, headache, pain at injection site
Clomiphene (Clomid, Milophene, Serophene)	Antiestrogen	**T:** 50 mg	Anovulation, oligo-ovulation with intact pituitary/ovarian response and endogenous estrogen	Ovarian cyst formation, ovarian enlargement, visual disturbances, premenstrual syndrome, hot flashes, headaches, blurred vision, nausea, breast tenderness
Follitropin alpha (Gonal-F)	Gonadotropin	**Injection, powder:** 75 units, 450 units, 1,050 units **Injection, solution:** 300 units/0.5 ml, 450 units/0.75 ml, 900 units/15 ml	In conjunction with human chorionic gonadotropin to stimulate ovarian follicular development in pts with ovulatory dysfunction not due to primary ovarian failure (e.g., anovulation, oligo-ovulation)	OHSS: Abdominal pain, indigestion, bloating, decreased urinary output, nausea, vomiting, diarrhea, rapid weight gain, dyspnea, peripheral/dependent edema, flu-like symptoms, upper respiratory tract infections, bleeding between menstrual periods, nausea, ovarian enlargement, ovarian cysts, acne, breast pain/tenderness, mood swings

Continued

MEDICATIONS TO INDUCE OVULATION—cont'd

Name	Category	Availability	Uses	Side Effects
Follitropin beta (Follistim AQ)	Gonadotropin	**I:** 75, 350, 650, 975 international units FSH	In conjunction with human chorionic gonadotropin to stimulate ovarian follicular development in patients with ovulatory dysfunction not due to primary ovarian failure (e.g., anovulation, oligo-ovulation)	OHSS: Abdominal pain, indigestion, bloating, decreased urinary output, nausea, vomiting, diarrhea, rapid weight gain, shortness of breath, peripheral/dependent edema, flu-like symptoms, breast tenderness, dry skin, rash, dizziness, fever, headaches, nausea, fatigue, mood swings
Goserelin (Zoladex)	GnRH agonist	**Implant:** 3.6 mg, 10.8 mg	Endometriosis, adjunct to menotropins for ovulation induction	Hot flashes, amenorrhea, blurred vision, edema, headaches, nausea, vomiting, breast tenderness, weight gain, mood swings, insomnia, vaginal dryness
Leuprolide (Eligard, Lupron)	GnRH agonist	**Injection, Solution:** 5 mg/ml for subcutaneous injection **Injection, powder:** 3.75 mg, 7.5 mg, 11.25 mg, 15 mg, 22.5 mg, 30 mg	Endometriosis, adjunct to menotropins/human chorionic gonadotropin for ovulation induction	Hot flashes, amenorrhea, blurred vision, edema, headaches, nausea, vomiting, breast tenderness, weight gain, mood swings, insomnia, vaginal dryness
Menotropins (Menopur, Repronex)	Gonadotropin	75 units FSH, 75 units LH activity	In conjunction with chorionic gonadotropin for ovulation stimulation in pts with ovulatory dysfunction due to primary ovarian failure	OHSS: Abdominal pain, indigestion, bloating, decreased urinary output, nausea, vomiting, diarrhea, rapid weight gain, dyspnea, edema of lower extremities, ovarian enlargement, ovarian cyst formation, breast tenderness, mood swings

Nafarelin (Synarel)	GnRH	2 mg/ml nasal spray (200 mcg/spray)	Endometriosis, adjunct to menotropins/human chorionic gonadotropin for ovulation induction	Loss of bone mineral density, breast enlargement, bleeding between regular menstrual periods, acne, mood swings, seborrhea, hot flashes, headache, insomnia, vaginal dryness
Urofollitropin (Bravelle)	Gonadotropin	75 units FSH activity	In conjunction with human chorionic gonadotropin for ovulation stimulation in pts with polycystic ovary syndrome who have elevated LH:FSH ratio and have failed clomiphene therapy	OHSS: Abdominal pain, indigestion, bloating, decreased urinary output, nausea, vomiting, diarrhea, rapid weight gain, shortness of breath, edema of lower extremities, ovarian enlargement, ovarian cyst formation, pain/redness at injection site, breast tenderness, nausea, vomiting, diarrhea, mood swings

I, Injection; ***T,*** tablets.

H_2 Antagonists

USES

Short-term treatment of duodenal ulcer (DU), active benign gastric ulcer (GU), maintenance therapy of DU, pathologic hypersecretory conditions (e.g., Zollinger-Ellison syndrome), gastroesophageal reflux disease (GERD), and prevention of upper GI bleeding in critically ill pts.

ACTION

Inhibit gastric acid secretion by interfering with histamine at the histamine H_2 receptors in parietal cells. Also inhibit acid secretion caused by gastrin. Inhibition occurs with basal (fasting), nocturnal, food-stimulated, or fundic distention secretion. H_2 antagonists decrease both the volume and H_2 concentration of gastric juices.

H_2 ANTAGONISTS

Name	Availability	Dosage Range	Side Effects
Cimetidine (Tagamet)	**T:** 200 mg, 300 mg, 400 mg, 800 mg **L:** 300 mg/5 ml	**Treatment of DU:** 800 mg at bedtime, 400 mg 2 times/day or 300 mg 4 times/day **Maintenance of DU:** 400 mg at bedtime **Treatment of GU:** 800 mg at bedtime or 300 mg 4 times/day **GERD:** 1,600 mg/day **Hypersecretory:** 1,200–2,400 mg/day	Headaches, fatigue, dizziness, confusion, diarrhea, gynecomastia
Famotidine (Pepcid)	**T:** 10 mg, 20 mg, 40 mg **T (chewable):** 10 mg **DT:** 20 mg, 40 mg **Gelcap:** 10 mg **OS:** 40 mg/5 ml **I:** 10 mg/ml	**Treatment of DU:** 40 mg/day **Maintenance of DU:** 20 mg/day **Treatment of GU:** 40 mg/day **GERD:** 40–80 mg/day **Hypersecretory:** 80–640 mg/day	Headaches, dizziness, diarrhea, constipation, abdominal pain, tinnitus

Nizatidine (Axid)	**OS:** 15 mg/ml **C:** 150 mg, 300 mg	**Treatment of DU:** 300 mg/day **Maintenance of DU:** 150 mg/day	Fatigue, urticaria, abdominal pain, constipation, nausea
Ranitidine (Zantac)	**T:** 75 mg, 150 mg, 300 mg **C:** 150 mg, 300 mg **Syrup:** 15 mg/ml **I:** 25 mg/ml	**Treatment of DU:** 300 mg/day **Maintenance of DU:** 150 mg/day **Treatment of GU:** 300 mg/day **GERD:** 300 mg/day **Hypersecretory:** 0.3–6 g/day	Blurred vision, constipation, nausea, abdominal pain

C, Capsules; ***DT,*** disintegrating tablets; ***I,*** injection; ***L,*** liquid; ***OS,*** oral suspension; ***T,*** tablets.

Hematinic Preparations

USES	ACTION
Prevention or treatment of iron deficiency resulting from improper diet, pregnancy, impaired absorption, or prolonged blood loss.	Iron supplements are provided to ensure adequate supplies for the formation of hemoglobin, which is needed for erythropoiesis and O_2 transport.

HEMATINIC (IRON) PREPARATIONS

Name	Availability	Side Effects
Ferrous fumarate (Femiron, Feostat)	**T:** 63 mg, 200 mg, 324 mg	Constipation, nausea, vomiting, diarrhea, abdominal pain/cramps
Ferrous gluconate (Fergon)	**T:** 240 mg, 325 mg	Same as ferrous fumarate
Ferrous sulfate (Fer-In-Sol)	**T:** 325 mg **Liquid:** 300 mg/5 ml **E:** 220 mg/5 ml **D:** 75 mg/ml	Same as ferrous fumarate
Ferrous sulfate exsiccated (Slow-Fe)	**T:** 200 mg	Same as ferrous fumarate

C, Caplets; ***D,*** drops; ***E,*** elixir; ***ER,*** extended-release; ***S,*** suspension; ***SR,*** sustained-release; ***T,*** tablets.

Hormones

USES

Functions of the body are regulated by two major control systems: the nervous system and the endocrine (hormone) system. Together they maintain homeostasis and control different metabolic functions in the body.

Hormones are concerned with control of different metabolic functions in the body (e.g., rates of chemical reactions in cells, transporting substances through cell membranes, cellular metabolism [growth/secretions]). By definition, a hormone is a chemical substance secreted into body fluids by cells and has control over other cells in the body.

Hormones can be local or general:

- *Local hormones* have specific local effects (e.g., acetylcholine, which is secreted at parasympathetic and skeletal nerve endings).

ACTION

- *General hormones* are mostly secreted by specific endocrine glands (e.g., epinephrine/norepinephrine are secreted by the adrenal medulla in response to sympathetic stimulation), transported in the blood to all parts of the body, causing many different reactions.

Some general hormones affect all or almost all cells of the body (e.g., thyroid hormone from the thyroid gland increases the rate of most chemical reactions in almost all cells of the body); other general hormones affect only specific tissue (e.g., ovarian hormones are specific to female sex organs and secondary sexual characteristics of the female).

Endocrine hormones almost never directly act intracellularly affecting chemical reactions. They first combine with hormone receptors either on the cell surface or inside the cell (cell cytoplasm or nucleus). The combination of hormone and receptors alters the function of the receptor, and the receptor is the direct cause of the hormone effects. Altered receptor function may include the following:

Altered cell permeability, which causes a change in protein structure of the receptor, usually opening or closing a channel for one or more ions. The movement of these ions causes the effect of the hormone.

Activation of intracellular enzymes immediately inside the cell membrane (e.g., hormone combines with receptor that then becomes the activated enzyme adenyl cyclase, which causes formation of cAMP).

◄**ALERT**► cAMP has effects inside the cell. It is not the hormone but cAMP that causes these effects.

Regulation of hormone secretion is controlled by an internal control system, the negative feedback system:

- Endocrine gland oversecretes.
- Hormone exerts more and more of its effect.
- Target organ performs its function.
- Too much function in turn feeds back to endocrine gland to decrease secretory rate.

The endocrine system contains many glands and hormones. A summary of the important glands and their hormones secreted are as follows:

The pituitary gland (hypophysis) is a small gland found in the sella turcica at the base of the brain. The pituitary is divided into two portions physiologically: the anterior pituitary (adenohypophysis) and the posterior pituitary (neurohypophysis). Six important hormones are secreted from the anterior pituitary and two from the posterior pituitary.

Anterior pituitary hormones:

- Growth hormone (GH)
- Adrenocorticotropin (corticotropin)
- Thyroid-stimulating hormone (thyrotropin) (TSH)
- Follicle-stimulating hormone (FSH)
- Luteinizing hormone (LH)
- Prolactin

Continued

Hormones—cont'd

ACTION—cont'd

Posterior pituitary hormones:

- Antidiuretic hormone (vasopressin)
- Oxytocin

Almost all secretions of the pituitary hormones are controlled by hormonal or nervous signals from the hypothalamus. The hypothalamus is a center of information concerned with the well-being of the body, which in turn is used to control secretions of the important pituitary hormones just listed. Secretions from the posterior pituitary are controlled by nerve signals originating in the hypothalamus; anterior pituitary hormones are controlled by hormones secreted within the hypothalamus. These hormones are as follows:

- Thyrotropin-releasing hormone (TRH) releasing thyroid-stimulating hormone
- Corticotropin-releasing hormone (CRH) releasing adrenocorticotropin
- Growth hormone–releasing hormone (GHRH) releasing growth hormone and growth hormone inhibitory hormone (GHIH) (same as somatostatin)
- Gonadotropin-releasing hormone (GnRH) releasing the two gonadotropic hormones LH and FSH
- Prolactin inhibitory factor (PIF) causing inhibition of prolactin and prolactin-releasing factor

Anterior Pituitary Hormones

All anterior pituitary hormones (except growth hormone) have as their principal effect stimulating target glands.

Growth Hormone (GH)

Growth hormone affects almost all tissues of the body. GH (somatopropin) causes growth in almost all tissues of the body (increases cell size, increases mitosis with increased number of cells, and differentiates certain types of cells). Metabolic effects include increased rate of protein synthesis, mobilization of fatty acids from adipose tissue, decreased rate of glucose utilization.

Thyroid-Stimulating Hormone (TSH)

Thyroid-stimulating hormone controls secretion of the thyroid hormones. The thyroid gland is located immediately below the larynx on either side of and anterior to the trachea and secretes two significant hormones, thyroxine (T_4) and triiodothyroxine (T_3), which have a profound effect on increasing the metabolic rate of the body. The thyroid gland also secretes calcitonin, an important hormone for calcium metabolism. Calcitonin promotes deposition of calcium in the bones, which decreases calcium concentration in the extracellular fluid.

Adrenocorticotropin

Adrenocorticotropin causes the adrenal cortex to secrete adrenocortical hormones. The adrenal glands lie at the superior poles of the two kidneys. Each gland is composed of two distinct parts: the adrenal medulla and the cortex. The adrenal medulla, related to the sympathetic nervous system, secretes the hormones epinephrine and norepinephrine. When stimulated, they cause constriction of blood vessels, increased activity of the heart, inhibitory effects on the GI tract, and dilation of the pupils. The adrenal cortex secretes corticosteroids, of which there are two major types: mineralocorticoids and glucocorticoids. Aldosterone, the principal mineralocorticoid, primarily affects electrolytes of the extracellular fluids. Cortisol, the principal glucocorticoid, affects glucose, protein, and fat metabolism.

Luteinizing Hormone (LH)

Luteinizing hormone plays an important role in ovulation and causes secretion of female sex hormones by the ovaries and testosterone by the testes.

Follicle-Stimulating Hormone (FSH)

Follicle-stimulating hormone causes growth of follicles in the ovaries before ovulation and promotes formation of sperm in the testes.

Ovarian sex hormones are estrogens and progestins. Estradiol is the most important estrogen; progesterone is the most important progestin.

Estrogens mainly promote proliferation and growth of specific cells in the body and are responsible for development of most of the secondary sex characteristics. Primarily cause cellular proliferation and growth of tissues of sex organs/other tissue related to reproduction. Ovaries, fallopian tubes, uterus, vagina increase in size. Estrogen initiates growth of breast and milk-producing apparatus, external appearance.

Progesterone stimulates secretion of the uterine endometrium during the latter half of the female sexual cycle, preparing the uterus for implantation of the fertilized ovum. Decreases the frequency of uterine contractions (helps prevent expulsion of the implanted ovum). Progesterone promotes development of breasts, causing alveolar cells to proliferate, enlarge, and become secretory in nature.

Testosterone is secreted by the testes and formed by the interstitial cells of Leydig. Testosterone production increases under the stimulus of the anterior pituitary gonadotropic hormones. It is responsible for distinguishing characteristics of the masculine body (stimulates the growth of male sex organs and promotes the development of male secondary sex characteristics, e.g., distribution of body hair, effect on voice, protein formation, and muscular development).

Prolactin

Prolactin promotes the development of breasts and secretion of milk.

POSTERIOR PITUITARY HORMONES

Antidiuretic Hormone (ADH) (Vasopressin)

ADH can cause antidiuresis (decreased excretion of water by the kidneys). In the presence of ADH, the permeability of the renal-collecting ducts and tubules to water increases, which allows water to be absorbed, conserving water in the body. ADH in higher concentrations is a very potent vasoconstrictor, constricting arterioles everywhere in the body, increasing B/P.

Oxytocin

Oxytocin contracts the uterus during the birthing process, esp. toward the end of the pregnancy, helping expel the baby. Oxytocin also contracts myoepithelial cells in the breasts, causing milk to be expressed from the alveoli into the ducts so that the baby can obtain it by suckling.

PANCREAS

The pancreas is composed of two tissue types: *acini* (secrete digestive juices in the duodenum) and *islets of Langerhans* (secrete insulin/glucagons directly into the blood). The islets of Langerhans contain three cells: alpha, beta, and delta. Alpha cells secrete glucagon, beta cells secrete insulin, and delta cells secrete somatostatin.

Insulin promotes glucose entry into most cells, thus controlling the rate of metabolism of most carbohydrates. Insulin also affects fat metabolism.

Glucagon effects are opposite those of insulin, the most important of which is increasing blood glucose concentration by releasing it from the liver into the circulating body fluids.

Somatostatin (same chemical as secreted by the hypothalamus) has multiple inhibitory effects: depresses secretion of insulin and glucagon, decreases GI motility, decreases secretions/absorption of the GI tract.

Human Immunodeficiency Virus (HIV) Infection

USES	ACTION	
Antiretroviral agents are used in the treatment of HIV infection.	Seven classes of antiretroviral agents are used in the treatment of HIV disease. *Nucleoside reverse transcriptase inhibitors (NRTIs)* compete with natural substrates for formation of proviral DNA by reverse transcriptase inhibiting viral replication. *Nucleotide reverse transcriptase inhibitors* (*NtRTIs*) inhibit reverse transcriptase by competing with the natural substrate deoxyadenosine triphosphate and by DNA chain termination. *Non-nucleoside reverse transcriptase inhibitors (NNRTIs)* directly bind to reverse transcriptase and block RNA-dependent and DNA-dependent DNA polymerase activities by disrupting the enzyme's catalytic site.	*Protease inhibitors (PIs)* bind to the active site of HIV-1 protease and prevent the processing of viral gag and gag-pol polyprotein precursors resulting in immature, noninfectious viral particles. *Fusion inhibitors* interfere with the entry of HIV-1 into cells by inhibiting fusion of viral and cellular membranes. *CCR5 co-receptor antagonist* selectively binds to human chemokine receptor CCR5 present on cell membrane preventing HIV-1 from entering cells. *Integrase inhibitor* inhibits catalytic activity of HIV-1 integrase, an HIV-1 encoded enzyme required for viral replication.

ANTIRETROVIRAL AGENTS FOR TREATMENT OF HIV INFECTION

Name	Availability	Dosage Range	Side Effects
Nucleoside Analogues			
Abacavir (Ziagen)	**T:** 300 mg **OS:** 20 mg/ml	**A:** 300 mg 2 times/day or 600 mg once daily	Nausea, vomiting, malaise, rash, fever, headaches, asthenia (loss of strength, energy), fatigue, hypersensitivity reactions
Abacavir/lamivudine (Epzicom)	**T:** 600 mg abacavir/ 300 mg lamivudine	**A:** 600 mg/300 mg once daily	Allergic reaction, insomnia, headaches, depression, dizziness, fatigue, diarrhea, fever, abdominal pain, anxiety
Didanosine (Videx EC)	**DR:** 125 mg, 200 mg, 250 mg, 400 mg **OS:** 2 g/bottle, 4 g/bottle	**DR (weighing 60 kg or more):** 400 mg once daily; **(weighing 25–59 kg):** 250 mg once daily; **(weighing 20–24 kg):** 200 mg once daily **OS (weighing more than 60 kg):** 200 mg q12h or 400 mg once daily; **(weighing less than 60 kg):** 125 mg q12h or 250 mg once daily	Peripheral neuropathy, pancreatitis, diarrhea, nausea, vomiting, headaches, insomnia, rash, hepatitis, seizures
Emtricitabine (Emtriva)	**C:** 200 mg **OS:** 10 mg/ml	**A:** 200 mg/day **(C)** 240 mg/day **(OS)**	Headaches, insomnia, depression, diarrhea, nausea, vomiting, rhinitis, asthenia (loss of strength, energy), rash
Emtricitabine/efavirenz/ tenofovir (Atripla)	**T:** 200 mg emtricitabine/ 600 mg efavirenz/ 300 mg tenofovir	**A:** 200 mg/600 mg/300 mg once daily	Lactic acidosis, headaches, dizziness, abdominal pain, nausea, vomiting, rash
Emtricitabine/rilpivirine/ tenofovir (Complera)	**T:** 200 mg emtricitabine/ 25 mg rilpivirine/300 mg tenofovir	**A:** 200 mg/25 mg/300 mg once daily with food	Insomnia, headache, diarrhea, nausea, fatigue, dizziness, depression, rash

Continued

ANTIRETROVIRAL AGENTS FOR TREATMENT OF HIV INFECTION—cont'd

Name	Availability	Dosage Range	Side Effects
Emtricitabine/tenofovir (Truvada)	**T:** 200 mg emtricitabine/ 300 mg tenofovir	**A:** 200 mg/300 mg once daily with food	Dizziness, diarrhea, headaches, rash, belching/ flatulence, skin discoloration
Emtricitabine/elvitegravir/ cobicistat/tenofovir (Stribild)	**T:** 200 mg emtricitabine 150 mg elvitegravir 150 mg cobicistat 300 mg tenofovir	**A:** 200 mg/150 mg/150 mg/300 mg once daily with food	Nausea, diarrhea
Lamivudine (Epivir)	**T:** 100 mg, 150 mg, 300 mg **OS:** 5 mg/ml, 10 mg/ml	**A:** 150 mg 2 times/day or 300 mg once daily **C:** 4 mg/kg 2 times/day	Diarrhea, malaise, fatigue, headaches, nausea, vomiting, abdominal pain, peripheral neuropathy, arthralgia, myalgia, skin rash
Stavudine (Zerit)	**C:** 15 mg, 20 mg, 30 mg, 40 mg **OS:** 1 mg/ml	**A (weighing more than 60 kg):** 40 mg 2 times/day (20 mg 2 times/day if peripheral neuropathy occurs); **(weighing 60 kg or less):** 30 mg 2 times/day (15 mg 2 times/day if peripheral neuropathy occurs)	Peripheral neuropathy, anemia, leukopenia, neutropenia
Zidovudine (Retrovir)	**C:** 100 mg **T:** 300 mg **Syrup:** 50 mg/5 ml, 10 mg/ml	**A:** 300 mg 2 times/day	Anemia, granulocytopenia, myopathy, nausea, malaise, fatigue, insomnia
Zidovudine/lamivudine (AZT/3TC) (Combivir)	**C:** 300 mg AZT/150 mg 3TC	**A:** 300 mg/150 mg 2 times/day	Myelosuppression, peripheral neuropathy, pancreatitis
Zidovudine/lamivudine/ abacavir (AZT/3TC/ABC) (Trizivir)	**C:** 300 mg AZT/150 mg 3TC/300 mg ABC	**A:** 300 mg/150 mg/300 mg 2 times/day	Myelosuppression, peripheral neuropathy, anaphylactic reaction

Nucleotide Analogues			
Tenofovir (Viread)	**T:** 300 mg	**A:** 300 mg once daily	Nausea, vomiting, diarrhea, headache, fatigue
Tenofovir/ elvitegravir/cobicistat/ emtricitabine (Stribild)	**T:** 300 mg tenofovir 150 mg elvitegravir 150 mg cobicistat 200 mg emtricitabine	**A:** 300 mg/150 mg/150 mg/200 mg once daily with food	Nausea, diarrhea
Non-nucleoside Analogues			
Delavirdine (Rescriptor)	**T:** 100 mg, 200 mg	**A:** 200 mg 3 times/day for 14 days, then 400 mg 3 times/day	Rash, nausea, headaches, elevated hepatic function tests
Efavirenz (Sustiva)	**C:** 50 mg, 200 mg **T:** 600 mg	**A:** 600 mg/day **C:** 200–600 mg/day based on weight	Headaches, dizziness, insomnia, fatigue, rash, nightmares
Etravirine (Intelence)	**T:** 100 mg, 200 mg	**A:** 200 mg 2 times/day	Skin reactions (e.g., Stevens-Johnson syndrome, erythema multiforme), nausea, abdominal pain, vomiting
Nevirapine (Viramune, Viramune XR)	**T:** 200 mg **T (ER):** 400 mg **S:** 50 mg/ml	**A:** 200 mg/day for 14 days, then (if no rash) 200 mg 2 times/day	Rash, nausea, fatigue, fever, headaches, abnormal hepatic function tests
Rilpivirine (Edurant)	**T:** 25 mg	**A:** 25 mg once daily with a meal	Depression, insomnia, headache, rash
Protease Inhibitors			
Atazanavir (Reyataz)	**C:** 100 mg, 150 mg, 200 mg, 300 mg	**A:** 400 mg/day or 300 mg (with 100 mg ritonavir) once daily	Headaches, diarrhea, abdominal pain, nausea, rash
Darunavir (Prezista)	**T:** 400 mg, 600 mg	**A:** 600 mg 2 times/day (with ritonavir 100 mg) or 800 mg once daily with ritonavir 100 mg	Diarrhea, nausea, vomiting, headaches, skin rash, constipation

Continued

ANTIRETROVIRAL AGENTS FOR TREATMENT OF HIV INFECTION—cont'd

Name	Availability	Dosage Range	Side Effects
Fosamprenavir (Lexiva)	**T:** 700 mg **OS:** 50 mg/ml	**A:** 1,400–2,800 mg/day with 100 mg ritonavir	Headaches, fatigue, rash, nausea, diarrhea, vomiting, abdominal pain
Indinavir (Crixivan)	**C:** 200 mg, 400 mg	**A:** 800 mg q8h or 800 mg 2 times/day with ritonavir 100 mg	Nephrolithiasis, hyperbilirubinemia, abdominal pain, asthenia (loss of strength, energy), fatigue, flank pain, nausea, vomiting, diarrhea, headaches, insomnia, dizziness, altered taste
Lopinavir/ritonavir (Kaletra)	**C:** 133/33 mg **OS:** 80/20 mg	**A:** 400 mg/100 mg 2 times/day or 800 mg/200 mg once daily **C (4–12 yrs):** 10–13 mg/kg 2 times/day	Diarrhea, nausea, vomiting, abdominal pain, headaches, rash
Nelfinavir (Viracept)	**T:** 250 mg **Oral Powder:** 50 mg/g	**A:** 750 mg q8h or 1,250 mg 2 times/day **C:** 20–25 mg/kg q8h	Diarrhea, fatigue, asthenia (loss of strength, energy), headaches, hypertension, impaired concentration
Ritonavir (Norvir)	**C:** 100 mg **OS:** 80 mg/ml	**A:** Titrate up to 800 mg/day based on protease inhibitor	Nausea, vomiting, diarrhea, altered taste, fatigue, elevated hepatic function tests and triglyceride levels
Saquinavir (Invirase)	**C:** 200 mg **T:** 500 mg	**A:** 1,000 mg 2 times/day with ritonavir 100 mg	Diarrhea, elevated hepatic function tests, hypertriglycerides, cholesterol, abnormal fat accumulation, hyperglycemia
Tipranavir (Aptivus)	**C:** 250 mg **OS:** 100 mg/ml	**A:** 500 mg (with 200 mg ritonavir) 2 times/day	Diarrhea, nausea, fatigue, headaches, vomiting

Fusion Inhibitors			
Enfuvirtide (Fuzeon)	**I:** 108 mg (90 mg when reconstituted)	**Subcutaneous:** 90 mg 2 times/day	Insomnia, depression, peripheral neuropathy, decreased appetite, constipation, asthenia (loss of strength, energy), cough
CCR5 Antagonists			
Maraviroc (Selzentry)	**T:** 150 mg, 300 mg	**A:** 300 mg 2 times/day **CYP3A4 inducers:** 600 mg 2 times/day **CYP3A4 inhibitors:** 150 mg 2 times/day	Cough, pyrexia, upper respiratory tract infections, rash, musculoskeletal symptoms, abdominal pain, dizziness
Integrase Inhibitor			
Raltegravir (Isentress)	**T:** 400 mg	**A:** 400 mg 2 times/day	Nausea, headache, diarrhea, pyrexia
Dolutegravir (Tivicay)	**T:** 50 mg	**A:** 50 mg once daily or 50 mg bid (with CYP3A inducers or resistance)	Insomnia, headache

A, Adults; ***C,*** capsules; ***C** (dosage),* children; ***DR,*** delayed-release; ***ER,*** extended-release; ***I,*** injection; ***OS,*** oral solution; ***S,*** suspension; ***T,*** tablets.

Immunosuppressive Agents

USES	ACTION
Improvement of both short- and long-term allograft survivals.	*Basiliximab:* An interleukin-2 (IL-2) receptor antagonist inhibiting IL-2 binding. This prevents activation of lymphocytes, and the response of the immune system to antigens is impaired. *Cyclosporine:* Inhibits production and release of IL-2. *Daclizumab:* An IL-2 receptor antagonist inhibiting IL-2 binding. *Mycophenolate:* A prodrug that reversibly binds and inhibits inosine monophosphate dehydrogenase (IMPD), resulting in inhibition of purine nucleotide synthesis, inhibiting DNA and RNA synthesis and subsequent synthesis of T and B cells. *Sirolimus:* Inhibits IL-2–stimulated T-lymphocyte activation and proliferation, which may occur through formation of a complex. *Tacrolimus:* Inhibits IL-2–stimulated T-lymphocyte activation and proliferation, which may occur through formation of a complex.

IMMUNOSUPPRESSIVE AGENTS

Name	Availability	Dosage	Side Effects
Basiliximab (Simulect)	**I:** 10 mg, 20 mg	20 mg for 2 doses (on day of transplant, then 4 days after transplantation)	Abdominal pain, asthenia (loss of strength, energy), cough, dizziness, dyspnea, dysuria, edema, hypertension, infection, tremors
Cyclosporine (Neoral, Sandimmune)	**C:** 25 mg, 50 mg, 100 mg **S:** 100 mg/ml **I:** 50 mg/ml	Dose dependent on type of transplant and formulation	Hypertension, hyperkalemia, nephrotoxicity, coarsening of facial features, hirsutism, gingival hyperplasia, nausea, vomiting, diarrhea, hepatotoxicity, hyperuricemia, hypertriglyceridemia, hypercholesterolemia, tremors, paresthesia, seizures, risk of infection/malignancy
Mycophenolate (CellCept)	**C:** 250 mg **I:** 500 mg **S:** 200 mg/ml **T:** 500 mg	1–1.5 g 2 times/ day based on type of transplant	Diarrhea, vomiting, leukopenia, neutropenia, infections
Sirolimus (Rapamune)	**S:** 1 mg/ml **T:** 0.5 mg, 1 mg, 2 mg	2–6 mg/day	Dyspnea, leukopenia, thrombocytopenia, hyperlipidemia, abdominal pain, acne, arthralgia, fever, diarrhea, constipation, headaches, vomiting, weight gain
Tacrolimus (Prograf)	**C:** 0.5 mg, 1 mg, 5 mg **I:** 5 mg/ml	**Heart:** 0.075 mg/ kg/day in 2 divided doses q12h **Kidney:** 0.1–0.2 mg/kg/day in 2 divided doses q12h **Liver:** 0.1–0.15 mg/ kg/day in 2 divided doses q12h	Nephrotoxicity, neurotoxicity, hyperglycemia, nausea, vomiting, photophobia, infections, hypertension, hyperlipidemia

C, Capsules; ***I,*** injection; ***S,*** oral solution or suspension; ***T,*** tablets.

Laxatives

USES

Short-term treatment of constipation; colon evacuation before rectal/bowel examination; prevention of straining (e.g., after anorectal surgery, MI); to reduce painful elimination (e.g., episiotomy, hemorrhoids, anorectal lesions); modification of effluent from ileostomy, colostomy; prevention of fecal impaction; removal of ingested poisons.

ACTION

Laxatives ease or stimulate defecation. Mechanisms by which this is accomplished include (1) attracting, retaining fluid in colonic contents due to hydrophilic or osmotic properties; (2) acting directly or indirectly on mucosa to decrease absorption of water and NaCl; or (3) increasing intestinal motility, decreasing absorption of water and NaCl by virtue of decreased transit time.

Bulk-forming: Act primarily in small/large intestine. Retain water in stool, may bind water, ions in colonic lumen (soften feces, increase bulk); may increase colonic bacteria growth (increases fecal mass). Produce soft stool in 1–3 days.

Osmotic agents: Act in colon. Similar to saline laxatives. Osmotic action may be enhanced in distal ileum/colon by bacterial metabolism to lactate, other organic acids. This decrease in pH increases motility, secretion. Produce soft stool in 1–3 days.

Saline: Acts in small/large intestine, colon (sodium phosphate). Poorly, slowly absorbed; causes hormone cholecystokinin release from duodenum (stimulates fluid secretion, motility); possesses osmotic properties; produces watery stool in 2–6 hrs (small doses produce semifluid stool in 6–12 hrs).

Stimulant: Acts in colon. Enhances accumulation of water/electrolytes in colonic lumen, enhances intestinal motility. May act directly on intestinal mucosa. Produces semifluid stool in 6–12 hrs.

◄**ALERT**► Bisacodyl suppository acts in 15–60 min.

Stool softener: Acts in small/large intestine. Hydrates and softens stools by its surfactant action, facilitating penetration of fat and water into stool. Produces soft stool in 1–3 days.

LAXATIVES

Name	Onset of Action	Uses	Side Effects/Precautions
Bulk-forming			
Methylcellulose (Citrucel)	12–24 hrs up to 3 days	Treatment of constipation for postpartum women, elderly, pts with diverticulosis, irritable bowel syndrome, hemorrhoids	Gas, bloating, esophageal obstruction, colonic obstruction, calcium and iron malabsorption
Psyllium (Metamucil)	Same as methylcellulose	Treatment of chronic constipation and constipation associated with rectal disorders; management of irritable bowel syndrome	Diarrhea, constipation, abdominal cramps, esophageal/colon obstruction, broncho-spasm
Stool Softener			
Docusate (Colace, Surfak)	1–3 days	Treatment of constipation due to hard stools, in painful anorectal conditions, and for those who need to avoid straining during bowel movements	Stomachache, mild nausea, cramping, diarrhea, irritated throat (with liquid and syrup dose forms)
Saline			
Magnesium citrate (Citrate of Magnesia, Citro-Mag)	30 min–3 hrs	Bowel evacuation prior to certain surgical and diagnostic procedures	Hypotension, abdominal cramping, diarrhea, gas formation, electrolyte abnormalities
Magnesium hydroxide	30 min–3 hrs	Short-term treatment of occasional constipation	Electrolyte abnormalities can occur; use caution in pts with renal or cardiac impairment; diarrhea, abdominal cramps, hypotension
Sodium phosphate (Fleet Phospho-Soda)	2–15 min	Relief of occasional constipation; bowel evacuation prior to certain surgical and diagnostic procedures	Electrolyte abnormalities; do not use for pts with HF, severe renal impairment, ascites, GI obstruction, active inflammatory bowel disease

Continued

LAXATIVES—cont'd

Name	Onset of Action	Uses	Side Effects/Precautions
Osmotic			
Lactulose (Kristalose)	24–48 hrs	Short-term relief of constipation	Nausea, vomiting, diarrhea, abdominal cramping, bloating, gas
Polyethylene glycol (MiraLax)	24–48 hrs	Short-term relief of constipation	Bitter taste, diarrhea
Stimulant			
Bisacodyl (Dulcolax)	**PO:** 6–12 hrs **Rectal:** 15–60 min	Short-term relief of constipation	Elecrolyte imbalance, abdominal discomfort, gas, potential for overuse/abuse
Senna (Senokot)	6–12 hrs	Short-term relief of constipation	Abdominal discomfort, cramps

Nitrates

USES	ACTION
Sublingual: Acute relief of angina pectoris. *Oral, topical:* Long-term prophylactic treatment of angina pectoris. *Intravenous:* Adjunctive treatment in HF associated with acute MI. Produce controlled hypotension during surgical procedures; control B/P in perioperative hypertension, angina unresponsive to organic nitrates or beta blockers.	Relaxes most smooth muscles, including arteries and veins. Effect is primarily on veins (decrease left/right ventricular end-diastolic pressure). In angina, nitrates decrease myocardial work and O_2 requirements (decrease preload by venodilation and afterload by arteriodilation). Nitrates also appear to redistribute blood flow to ischemic myocardial areas, improving perfusion without increasing coronary blood flow.

NITRATES

Name	Availability	Dosage Range	Side Effects
Isosorbide dinitrate (Isordil)	**T:** 5 mg, 10 mg, 20 mg, 30 mg, 40 mg **T (ER):** 40 mg **SL:** 2.5 mg, 5 mg **C (SR):** 40 mg	**SL:** 2.5–5 mg **PO:** 10–40 mg 2–3 times/day **PO (SR):** 40 mg 1–2 times/day	Flushing, headaches, nausea, vomiting, orthostatic hypotension, restlessness, tachycardia
Isosorbide mononitrate (Imdur, ISMO)	**T:** 30 mg, 60 mg, 120 mg	**PO:** 30–240 mg once daily	Same as isosorbide dinitrate

Continued

NITRATES—cont'd

Name	Availability	Dosage Range	Side Effects
Nitroglycerin (Minitran, Nitro-Bid, Nitro-Dur, Nitrostat)	**SL:** 0.4 mg **C (SR):** 2.5 mg, 6.5 mg, 9 mg **Topical:** 2% ointment **Trans:** 0.1 mg/hr, 0.2 mg/hr, 0.3 mg/hr, 0.4 mg/hr, 0.6 mg/hr, 0.8 mg/hr **I:** 5 mg/ml **Infusion:** 100 mcg/ml, 200 mcg/ml	**SL:** 0.4 mg up to 3 times q15min **SR:** 2.5–26 mg 3–4 times/day **Trans:** 0.1–0.8 mg/hr **T:** 1–2 inches up to 4–5 inches q4h	Flushing, hypotension, tachycardia, headache, dizziness, nausea, dyspnea

C, Capsules; ***ER,*** extended-release; ***I,*** injection; ***SL,*** sublingual; ***SR,*** sustained-release; ***T,*** tablets; ***Trans,*** transdermal.

Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)

USES

Provide symptomatic relief from *pain/inflammation* in the treatment of musculoskeletal disorders (e.g., rheumatoid arthritis [RA], osteoarthritis, ankylosing spondylitis), *analgesic* for low to moderate pain, *reduction in fever* (many agents not suited for routine/prolonged therapy due to toxicity). By virtue of its action on platelet function, aspirin is used in treatment or prophylaxis of diseases associated with hypercoagulability (reduces risk of stroke/heart attack).

ACTION

Exact mechanism for anti-inflammatory, analgesic, antipyretic effects unknown. Inhibition of enzyme cyclo-oxygenase, the enzyme responsible for prostaglandin synthesis, appears to be a major mechanism of action. May inhibit other mediators of inflammation (e.g., leukotrienes). Direct action on hypothalamus heat-regulating center may contribute to antipyretic effect.

NSAIDs

Name	Availability	Dosage Range	Side Effects
Aspirin	**Caplet:** 500 mg **Suppository:** 300 mg, 600 mg **T:** 325 mg **T (EC):** 81 mg, 325 mg **T (chew):** 81 mg	**Analgesic/antipyretic:** 325–650 mg q4–6h prn **Anti-inflammatory:** 2.4–3.6 g/day	GI discomfort, dizziness, headaches, increased risk of bleeding
Celecoxib (Celebrex)	**C:** 50 mg, 100 mg, 200 mg, 400 mg	200 mg q12h (**Maximum:** 600 mg day 1, then 400 mg/day)	Diarrhea, back pain, dizziness, heartburn, headaches, nausea, abdominal pain
Diclofenac (Voltaren)	**T:** 25 mg, 50 mg, 75 mg	50 mg tid	Indigestion, constipation, diarrhea, nausea, headaches, fluid retention, abdominal cramps
Diflunisal (Dolobid)	**T:** 500 mg	**Arthritis:** 0.5–1 g/day in 2 divided doses **P:** 250–500 mg q8–12h	Headaches, abdominal cramps, indigestion, diarrhea, nausea
Etodolac (Lodine)	**T:** 400 mg, 500 mg **T (ER):** 400 mg, 500 mg, 600 mg **C:** 200 mg, 300 mg	**Arthritis:** 600–1,000 mg/day in divided doses **P:** 200–400 mg q6–8h as needed	Indigestion, dizziness, headaches, bloated feeling, diarrhea, nausea, weakness, abdominal cramps
Fenoprofen (Nalfon)	**C:** 200 mg, 400 mg **T:** 600 mg	**Arthritis:** 300–600 mg 3–4 times/day **P:** 200 mg q4–6h as needed	Nausea, indigestion, anxiety, constipation, shortness of breath, heartburn
Ibuprofen (Advil, Caldolor, Motrin)	**I:** 100 mg/ml **T:** 100 mg, 200 mg, 400 mg, 600 mg, 800 mg **T (chewable):** 50 mg, 100 mg **C:** 200 mg **S:** 100 mg/5 ml, 100 mg/2.5 ml	**Inflammatory disease:** 400–800 mg/dose 3–4 times/day **P:** 200–400 mg/dose q4–6h as needed	Dizziness, abdominal cramps, abdominal pain, heartburn, nausea

Continued

NSAIDs—cont'd

Name	Availability	Dosage Range	Side Effects
Indomethacin (Indocin)	**C:** 25 mg, 50 mg **C (SR):** 75 mg **S:** 25 mg/5 ml	**Arthritis:** 25–50 mg/dose 2–3 times/day **Bursitis/tendonitis:** 75–150 mg/day **GA:** 150 mg/day	Fluid retention, dizziness, headaches, abdominal pain, indigestion, nausea
Ketoprofen (Orudis KT)	**C:** 25 mg, 50 mg **C (ER):** 200 mg	**Arthritis:** 50 mg 4 times/day or 75 mg 3 times/day **P:** 25–50 mg q6–8h as needed	Headaches, anxiety, abdominal pain, bloated feeling, constipation, diarrhea, nausea
Ketorolac (Toradol)	**T:** 10 mg **I:** 15 mg/ml, 30 mg/ml	**P: (PO):** 10 mg q4–6h as needed; **(IM/IV):** 60–120 mg/day in divided doses	Fluid retention, abdominal pain, diarrhea, dizziness, headaches, nausea
Meloxicam (Mobic)	**C:** 7.5 mg, 15 mg **S:** 7.5 mg/5 ml	**Arthritis:** 7.5–15 mg once daily	Heartburn, indigestion, nausea, diarrhea, headaches
Nabumetone (Relafen)	**T:** 500 mg, 750 mg	**Arthritis:** 1–2 g/day in 1–2 divided doses	Fluid retention, dizziness, headaches, abdominal pain, constipation, diarrhea, nausea
Naproxen (Anaprox, Naprosyn)	**T:** 250 mg, 375 mg, 500 mg **T (CR):** 375 mg, 500 mg **S:** 125 mg/5 ml	**Arthritis:** 500–1,000 mg/day in 2 divided doses **P:** 250 mg q6–8h as needed	Tinnitus, fluid retention, shortness of breath, dizziness, drowsiness, headaches, abdominal pain, constipation, heartburn, nausea
Oxaprozin (Daypro)	**C:** 600 mg **T:** 600 mg	**Arthritis:** 600–1,200 mg once daily	Constipation, diarrhea, nausea, indigestion
Piroxicam (Feldene)	**C:** 10 mg, 20 mg	**Arthritis:** 10–20 mg/day in 1–2 divided doses	Abdominal pain, stomach pain, nausea
Sulindac (Clinoril)	**T:** 150 mg, 200 mg	**Arthritis:** 150 mg bid **GA:** 200 mg bid	Dizziness, abdominal pain, constipation, diarrhea, nausea

A, Adults; ***C,*** capsules; ***CR,*** controlled-release; ***ER,*** extended-release; ***GA,*** gouty arthritis; ***I,*** injection; ***P,*** pain; ***S,*** suspension; ***SR,*** sustained-release; ***T,*** tablets.

Nutrition: Enteral

Enteral nutrition (EN), also known as *tube feedings*, provides food/nutrients via the GI tract using special formulas, delivery techniques, and equipment. All routes of EN consist of a tube through which liquid formula is infused.

INDICATIONS

Tube feedings are used in pts with major trauma, burns; those undergoing radiation and/or chemotherapy; pts with hepatic failure, severe renal impairment, physical or neurologic impairment; preop and postop to promote anabolism; prevention of cachexia, malnutrition; dysphagia, pts requiring mechanical ventilation.

ROUTES OF ENTERAL NUTRITION DELIVERY

NASOGASTRIC (NG):

INDICATIONS: Most common for short-term feeding in pts unable or unwilling to consume adequate nutrition by mouth. Requires at least a partially functioning GI tract.

ADVANTAGES: Does not require surgical intervention and is fairly easily inserted. Allows full use of digestive tract. Decreases abdominal distention, nausea, vomiting that may be caused by hyperosmolar solutions.

DISADVANTAGES: Temporary. May be easily pulled out during routine nursing care. Has potential for pulmonary aspiration of gastric contents, risk of reflux esophagitis, regurgitation.

NASODUODENAL (ND), NASOJEJUNAL (NJ):

INDICATIONS: Pts unable or unwilling to consume adequate nutrition by mouth. Requires at least a partially functioning GI tract.

ADVANTAGES: Does not require surgical intervention and is fairly easily inserted. Preferred for pts at risk for aspiration. Valuable for pts with gastroparesis.

Continued

Nutrition: Enteral—cont'd

ROUTES OF ENTERAL NUTRITION DELIVERY—cont'd

DISADVANTAGES: Temporary. May be pulled out during routine nursing care. May be dislodged by coughing, vomiting. Small lumen size increases risk of clogging when medication is administered via tube, more susceptible to rupturing when using infusion device. Must be radiographed for placement, frequently extubated.

GASTROSTOMY:

INDICATIONS: Pts with esophageal obstruction or impaired swallowing; pts in whom NG, ND, or NJ not feasible; when long-term feeding indicated.

ADVANTAGES: Permanent feeding access. Tubing has larger bore, allowing noncontinuous (bolus) feeding (300–400 ml over 30–60 min q3–6h). May be inserted endoscopically using local anesthetic (procedure called *percutaneous endoscopic gastrostomy* [PEG]).

DISADVANTAGES: Requires surgery; may be inserted in conjunction with other surgery or endoscopically (see **ADVANTAGES**). Stoma care required. Tube may be inadvertently dislodged. Risk of aspiration, peritonitis, cellulitis, leakage of gastric contents.

JEJUNOSTOMY:

INDICATIONS: Pts with stomach or duodenal obstruction, impaired gastric motility; pts in whom NG, ND, or NJ not feasible; when long-term feeding indicated.

ADVANTAGES: Allows early postop feeding (small bowel function is least affected by surgery). Risk of aspiration reduced. Rarely pulled out inadvertently.

DISADVANTAGES: Requires surgery (laparotomy). Stoma care required. Risk of intraperitoneal leakage. Can be dislodged easily.

INITIATING ENTERAL NUTRITION

With continuous feeding, initiation of isotonic (about 300 mOsm/L) or moderately hypertonic feeding (up to 495 mOsm/L) can be given full strength, usually at a slow rate (30–50 ml/hr) and gradually increased (25 ml/hr q6–24h). Formulas with osmolality greater than 500 mOsm/L are generally started at half strength and gradually increased in rate, then concentration. Tolerance is increased if the rate and concentration are not increased simultaneously.

SELECTION OF FORMULAS

Protein: Has many important physiologic roles and is the primary source of nitrogen in the body. Provides 4 kcal/g protein. Sources of protein in enteral feedings: sodium caseinate, calcium caseinate, soy protein, dipeptides.

Carbohydrate (CHO): Provides energy for the body and heat to maintain body temperature. Provides 3.4 kcal/g carbohydrate. Sources of CHO in enteral feedings: corn syrup, cornstarch, maltodextrin, lactose, sucrose, glucose.

Fat: Provides concentrated source of energy. Referred to as *kilocalorie dense* or *protein sparing.* Provides 9 kcal/g fat. Sources of fat in enteral feedings: corn oil, safflower oil, medium-chain triglycerides.

Electrolytes, vitamins, trace elements: Contained in formulas (not found in specialized products for renal/hepatic insufficiency).

All products containing protein, fat, carbohydrate, vitamin, electrolytes, trace elements are nutritionally complete and designed to be used by pts for long periods.

COMPLICATIONS

MECHANICAL: Usually associated with some aspect of the feeding tube.

Aspiration pneumonia: Caused by delayed gastric emptying, gastroparesis, gastroesophageal reflux, or decreased gag reflex. May be prevented or treated by reducing infusion rate, using lower-fat formula, feeding beyond pylorus, checking residuals, using small-bore feeding tubes, elevating head of bed 30–45 degrees during and for 30–60 min after intermittent feeding, and regularly checking tube placement.

Esophageal, mucosal, pharyngeal irritation, otitis: Caused by using large-bore NG tube. Prevented by use of small bore whenever possible.

Irritation, leakage at ostomy site: Caused by drainage of digestive juices from site. Prevented by close attention to skin/stoma care.

Tube, lumen obstruction: Caused by thickened formula residue, formation of formula-medication complexes. Prevented by frequently irrigating tube with clear water (also before and after giving formulas/medication), avoiding instilling medication if possible.

GASTROINTESTINAL: Usually associated with formula, rate of delivery, unsanitary handling of solutions or delivery system.

Diarrhea: Caused by low-residue formulas, rapid delivery, use of hyperosmolar formula, hypoalbuminemia, malabsorption, microbial contamination, or rapid GI transit time. Prevented by using fiber supplemented formulas, decreasing rate of delivery, using dilute formula, and gradually increasing strength.

Cramps, gas, abdominal distention: Caused by nutrient malabsorption, rapid delivery of refrigerated formula. Prevented by delivering formula by continuous methods, giving formulas at room temperature, decreasing rate of delivery.

Nausea, vomiting: Caused by rapid delivery of formula, gastric retention. Prevented by reducing rate of delivery, using dilute formulas, selecting low-fat formulas.

Constipation: Caused by inadequate fluid intake, reduced bulk, inactivity. Prevented by supplementing fluid intake, using fiber-supplemented formula, encouraging ambulation.

Continued

Nutrition: Enteral—cont'd

COMPLICATIONS—cont'd

METABOLIC: Fluid/serum electrolyte status should be monitored. Refer to monitoring section. In addition, the very young and very old are at greater risk of developing complications such as dehydration or overhydration.

MONITORING

Daily: Estimate nutrient intake, fluid intake/output, weight of pt, clinical observations.

Weekly: Serum electrolytes (potassium, sodium, magnesium, calcium, phosphorus), blood glucose, BUN, creatinine, hepatic function tests (e.g., AST, ALT, alkaline phosphatase), 24-hr urea and creatinine excretion, total iron-binding capacity (TIBC) or serum transferrin, triglycerides, cholesterol.

Monthly: Serum albumin.

Other: Urine glucose, acetone (when blood glucose is greater than 250), vital signs (temperature, respirations, pulse, B/P) q8h.

DRUG THERAPY: DOSAGE FOR SELECTION/ADMINISTRATION:

Drug therapy should not have to be compromised in pts receiving enteral nutrition:

- Temporarily discontinue medications not immediately necessary.
- Consider an alternate route for administering medications (e.g., transdermal, rectal, intravenous).
- Consider alternate medications when current medication is not available in alternate dosage forms.

ENTERAL ADMINISTRATION OF MEDICATIONS:

Medications may be given via feeding tube with several considerations:

- Tube type
- Tube location in the GI tract
- Site of drug action
- Site of drug absorption
- Effects of food on drug absorption
- Use of liquid dosage forms is preferred whenever possible; many tablets may be crushed; contents of many capsules may be emptied and given through large-bore feeding tubes.
- Many oral products should not be crushed (e.g., sustained-release, enteric coated, capsule granules).
- Some medications should not be given with enteral formulas because they form precipitates that may clog the feeding tube and reduce drug absorption.
- Feeding tube should be flushed with water before and after administration of medications to clear any residual medication.

Nutrition: Parenteral

Parenteral nutrition (PN), also known as *total parenteral nutrition* (TPN) or *hyperalimentation* (HAL), provides required nutrients to pts by IV route of administration. The goal of PN is to maintain or restore nutritional status caused by disease, injury, or inability to consume nutrients by other means.

INDICATIONS

Conditions when pt is unable to use alimentary tract via oral, gastrostomy, or jejunostomy route. Impaired absorption of protein caused by obstruction, inflammation, or antineoplastic therapy. Bowel rest necessary because of GI surgery or ileus, fistulas, or anastomotic leaks. Conditions with increased metabolic requirements (e.g., burns, infection, trauma). Preserve tissue reserves (e.g., acute renal failure). Inadequate nutrition from tube feeding methods.

COMPONENTS OF PN

To meet IV nutritional requirements, six essential categories in PN are needed for tissue synthesis and energy balance.

Protein: In the form of crystalline amino acids (CAA), primarily used for protein synthesis. Several products are designed to meet specific needs for pts with renal failure (e.g., NephrAmine), hepatic disease (e.g., HepatAmine), stress/trauma (e.g., Aminosyn HBC), use in neonates and pediatrics (e.g., Aminosyn PF, TrophAmine). Calories: 4 kcal/g protein.

Energy: In the form of dextrose, available in concentrations of 5%–70%. Dextrose less than 10% may be given peripherally; concentrations greater than 10% must be given centrally. Calories: 3.4 kcal/g dextrose.

IV fat emulsion: Available in 10% and 20% concentrations. Provides a concentrated source of energy/calories (9 kcal/g fat) and is a source of essential fatty acids. May be administered peripherally or centrally.

Continued

Nutrition: Parenteral—cont'd

COMPONENTS OF PN—cont'd

Electrolytes: Major electrolytes (calcium, magnesium, potassium, sodium; also acetate, chloride, phosphate). Doses of electrolytes are individualized, based on many factors (e.g., renal/hepatic function, fluid status).

Vitamins: Essential components in maintaining metabolism and cellular function; widely used in PN.

Trace elements: Necessary in long-term PN administration. Trace elements include zinc, copper, chromium, manganese, selenium, molybdenum, iodine.

Miscellaneous: Additives include insulin, albumin, heparin, and H_2 blockers (e.g., cimetidine, ranitidine, famotidine). Other medication may be included, but compatibility for admixture should be checked on an individual basis.

ROUTE OF ADMINISTRATION

PN is administered via either peripheral or central vein.

Peripheral: Usually involves 2–3 L/day of 5%–10% dextrose with 3%–5% amino acid solution along with IV fat emulsion. Electrolytes, vitamins, trace elements are added according to pt needs. Peripheral solutions provide about 2,000 kcal/day and 60–90 g protein/day.

ADVANTAGES: Lower risks vs. central mode of administration.

DISADVANTAGES: Peripheral veins may not be suitable (esp. in pts with illness of long duration); more susceptible to phlebitis (due to osmolalities greater than 600 mOsm/L); veins may be viable only 1–2 wks; large volumes of fluid are needed to meet nutritional requirements, which may be contraindicated in many pts.

Central: Usually utilizes hypertonic dextrose (concentration range of 15%–35%) and amino acid solution of 3%–7% with IV fat emulsion. Electrolytes, vitamins, trace elements are added according to pt needs. Central solutions provide 2,000–4,000 kcal/day. Must be given through large central vein with high blood flow, allowing rapid dilution, avoiding phlebitis/thrombosis (usually through percutaneous insertion of catheter into subclavian vein, then advancement of catheter to superior vena cava).

ADVANTAGES: Allows more alternatives/flexibility in establishing regimens; allows ability to provide full nutritional requirements without need of daily fat emulsion; useful in pts who are fluid restricted (increased concentration), those needing large nutritional requirements (e.g., trauma, malignancy), or those for whom PN indicated more than 7–10 days.

DISADVANTAGES: Risk with insertion, use, maintenance of central line; increased risk of infection, catheter-induced trauma, and metabolic changes.

MONITORING

May vary slightly from institution to institution.

Baseline: CBC, platelet count, prothrombin time (PT), weight, body length/head circumference (in infants), serum electrolytes, glucose, BUN, creatinine, uric acid, total protein, cholesterol, triglycerides, bilirubin, alkaline phosphatase, lactate dehydrogenase (LDH), AST, albumin, prealbumin, other tests as needed.

Daily: Weight, vital signs (temperature, pulse, respirations [TPR]), nutritional intake (kcal, protein, fat), serum electrolytes (potassium, sodium chloride), glucose (serum, urine), acetone, BUN, osmolarity, other tests as needed.

2–3 times/wk: CBC, coagulation studies (PT, partial thromboplastin time [PTT]), serum creatinine, calcium, magnesium, phosphorus, acid-base status, other tests as needed.

Weekly: Nitrogen balance, total protein, albumin, prealbumin, transferrin, hepatic function tests (AST, ALT), serum alkaline phosphatase, LDH, bilirubin, Hgb, uric acid, cholesterol, triglycerides, other tests as needed.

COMPLICATIONS

Mechanical: Malfunction in system for IV delivery (e.g., pump failure; problems with lines, tubing, administration sets, catheter). Pneumothorax, catheter misdirection, arterial puncture, bleeding, hematoma formation may occur with catheter placement.

Infectious: Infections (pts often more susceptible to infections), catheter sepsis (e.g., fever, shaking, chills, glucose intolerance where no other site of infection is identified).

Metabolic: Includes hyperglycemia, elevated serum cholesterol and triglycerides, abnormal serum hepatic function tests.

Fluid, electrolyte, acid-base disturbances: May alter serum potassium, sodium, phosphate, magnesium levels.

Nutritional: Clinical effects seen may be due to lack of adequate vitamins, trace elements, essential fatty acids.

DRUG THERAPY/ADMINISTRATION METHODS: Compatibility of other intravenous medications pts may be administered while receiving parenteral nutrition is an important concern.

Intravenous medications usually are given as a separate admixture via piggyback to the parenteral nutrition line, but in some instances may be added directly to the parenteral nutrition solution. Because of the possibility of incompatibility when adding medication directly to the parenteral nutrition solution, specific criteria should be considered:

- Stability of the medication in the parenteral nutrition solution
- Properties of the medication, including pharmacokinetics that determine if the medication is appropriate for continuous infusion
- Documented chemical and physical compatibility with the parenteral nutrition solution

In addition, when medication is given via piggyback using the parenteral nutrition line, important criteria should include the following:

- Stability of the medication in the parenteral nutrition solution
- Documented chemical and physical compatibility with the parenteral nutrition solution

Obesity Management

USES	ACTIONS	
Adjunct to diet and physical activity in the treatment of chronic, relapsing obesity.	Two categories of medications are used for weight control. *Appetite suppressants:* Block neuronal uptake of norepinephrine, serotonin, dopamine, causing a feeling of fullness or satiety.	*Digestion inhibitors:* Reversible lipase inhibitors that block the breakdown and absorption of fats, decreasing appetite and reducing calorie intake.

ANOREXIANTS

Name	Availability	Dosage	Side Effects
Diethylpropion (Tenuate, Tenuate Dospan)	**T:** 25 mg, **T (CR):** 75 mg	25 mg 3–4 times/day or 75 mg once daily in midmorning	Headaches, insomnia, nervousness, anxiety, irritability, dry mouth, constipation, euphoria, palpitations, hypertension, pulmonary hypertension, valvular heart disease, seizures, bone marrow depression
Lorcaserin (BelViq)	**C:** 10 mg	10 mg 2 times/day	Nausea, headache, dizziness, fatigue, dry mouth, diarrhea, constipation, hypoglycemia, hallucinations, decreased white/red blood cells
Orlistat (Alli, Xenical)	**C:** 60 mg, 120 mg	**Alli:** 60 mg up to tid with meals **Xenical:** 120 mg tid with each meal containing fat	Flatulence, rectal incontinence, oily stools, cholelithiasis, abdominal/rectal pain, hepatitis, pancreatitis
Phenteramine (Apidex-P)	**C:** 15 mg, 30 mg, 37.5 mg **T:** 37.5 mg **T (ODT):** 15 mg, 30 mg	15–37.5 mg/day in 1 or 2 divided doses **ODT:** 15–30 mg once daily in morning	Headaches, insomnia, nervousness, anxiety, irritability, dry mouth, constipation, euphoria, palpitations, hypertension, pulmonary hypertension, valvular heart disease, tremor
Phenteramine/topiramate (Qsymia)	**C:** 13.75 mg/23 mg	3.75 mg/23 mg to 15 mg/92 mg once daily in the morning	Paresthesia, dizziness, insomnia, depression, tachycardia, cognitive impairment, angle-closure glaucoma, hypokalemia, metabolic acidosis

AS, Appetite suppressant; ***C,*** capsules; ***CR,*** controlled-release; ***DI,*** digestion inhibitor; ***ODT,*** orally disintegrating tablets; ***T,*** tablets.

Ophthalmic Medications for Allergic Conjunctivitis

Ophthalmic products used for allergic conjunctivitis include antihistamines, mast cell stabilizing agents, combination antihistamine/decongestants, and corticosteroids. **Antihistamines** selectively inhibit the H_1 histamine receptor, thus antagonizing histamine-stimulated vascular permeability in the conjunctiva.

Mast cell stabilizing agents block the release of mediators of hypersensitivity reactions from mast cells, eosinophils, neutrophils, macrophages, monocytes, and platelets. They inhibit the release of histamine from mast cells. **Combination antihistamine/decongestants** are used only for a short time because the regular use of a decongestant may cause rebound congestion.

Mast cell stabilizers/antihistamine combinations provide both the quick action of the antihistamine and more delayed action of the mast cell stabilizer. This latter combination is used for mild to moderately severe allergic conjunctivitis. **Corticosteroids,** although having no definite mechanism of action, exert their effect by controlling the biosynthesis of potent mediators of inflammation.

ANTIHISTAMINE

Names	Dosage	Comments/Side Effects
Alcaftadine 0.25% (Lastacaft)	One drop each eye once daily	Eye irritation, burning/stinging on instillation, eye redness/pruritus, nasopharyngitis, headache, influenza

ANTIHISTAMINE/DECONGESTANTS

Names	Dosage	Comments/Side Effects
Naphazoline/pheniramine (Naphcon-A, Opcon-A, Visine-A)	One or two drops into affected eye(s) up to 4 times/day	Remove contact lenses prior to using Do not use for more than 3 days Not for use in pts with heart disease, enlarged prostate, high blood pressure, and/or glaucoma Side effects: headache, mydriasis, pain in eye

MAST CELL STABILIZER

Names	Dosage	Comments/Side Effects
Lodoxamine 0.1% (Alomide)	One to two drops in affected eye(s) 4 times/day	Avoid wearing contact lenses during treatment Side effects: burning, stinging, or irritation of eyes; watery, itching eyes; blurred vision; headache; dizziness; nausea or stomach discomfort
Nedocromil 2% (Alocril)	One or two drops in affected eye(s) 2 times/day	Remove contact lenses prior to using; may reinsert after 15 min if eyes are not red Side effects: headache, dizziness, blurring sensation in eye, light intolerance
Pemirolast 0.1% (Alamast)	One or two drops in affected eye(s) 4 times/day	Avoid wearing contact lenses if eyes are red Remove contact lenses prior to using; may reinsert after 10 min if eyes are not red Side effects: foreign body sensation, headache, dry eyes, burning sensation

ANTIHISTAMINE/MAST CELL STABILIZER

Names	Dosage	Comments/Side Effects
Azelastine 0.05% (Optivar)	One drop in affected eye(s) 2 times/day	Avoid wearing contact lenses if eyes are red Remove soft contact lenses prior to using; may reinsert after 10 min if eyes are not red Side effects: headache, drowsiness, burning sensation in eye
Epinastine 0.05% (Elestat)	One drop in affected eye(s) 2 times/day	Avoid wearing contact lenses if eyes are red Remove soft contact lenses prior to using; may reinsert after 10 min if eyes are not red Side effects: headache, burning sensation in eye

Ketotifen 0.025% (Alaway, Zaditor)	One drop in affected eye(s) 2 times/day	Avoid wearing contact lenses if eyes are red Remove soft contact lenses prior to using; may reinsert after 10 min if eyes are not red Side effects: headache, dry eyes, eye irritation, pain in eye
Olopatadine 0.1% (Patanol)	One drop in affected eye(s) 2 times/day	Avoid wearing contact lenses if eyes are red Remove soft contact lenses prior to using; may reinsert after 10 min if eyes are not red Side effects: headache, burning sensation in eye

CORTICOSTEROIDS

Names	Dosage	Comments/Side Effects
Loteprednol 0.2% (Alrex)	One drop in affected eye(s) 4 times/day	Recommended for short-term use only Remove soft contact lenses prior to using; may reinsert after 10 min if eyes are not red Side effects: abnormal vision, blurred vision, burning sensation in eye, itching in eye, light intolerance
Loteprednol 0.5% (Lotemax)	One or two drops in affected eye(s) 4 times/day	Recommended for short-term use only Remove soft contact lenses prior to using; may reinsert after 10 min if eyes are not red Side effects: abnormal vision, blurred vision, burning sensation in eye, itching in eye, light intolerance
Prednisolone 1% (AK-Pred)	Two drops in affected eye(s) 2–4 times/day	Recommended for short-term use only Remove soft contact lenses prior to using; may reinsert after 10 min if eyes are not red Side effects: blurred vision, burning sensation or irritation in eye, pain in eye

Osteoporosis

HISTORY

Osteoporosis is a bone disease that can lead to fractures. Bone mineral density (BMD) is reduced, bone microarchitecture is disrupted, and the amount and variety of proteins in bone are altered. Osteoporosis primarily affects women after menopause (postmenopausal osteoporosis) but may develop in men, in anyone in the presence of particular hormonal disorders (e.g., parathyroid glands), after overconsumption of dietary proteins, or as a result of medications (e.g., glucocorticoids). Several pharmacologic options, along with lifestyle changes, that can be used to prevent and/or treat osteoporotic fractures include bisphosphonates, selective estrogen receptor modulator (SERM), parathyroid hormone (PTH), calcitonin, and monoclonal antibodies.

ACTION

Bisphosphonates: Inhibit bone resorption via actions on osteoclasts or osteoclast precursors, decrease rate of bone resorption, leading to an indirect increase in BMD.

Selective estrogen receptor modulator (SERM): Decreases bone resorption, increasing BMD and decreasing the incidence of fractures.

Parathyroid hormone: Stimulates osteoblast function, increasing gastrointestinal calcium absorption and increasing renal tubular reabsorption of calcium. This increases BMD, bone mass, and strength, resulting in a decrease in osteoporosis-related fractures.

Calcitonin: Inhibitor of bone resorption. Efficacy not observed in early postmenopausal women and is used only in women with osteoporosis who are at least 5 yrs beyond menopause.

Monoclonal antibody: Inhibits the RANK ligand (RANKL), a cytokine member of the tumor necrosis factor family. This inhibits osteoclast formation, function, and survival, which decreases bone resorption and increases bone mass and strength in cortical and trabecular bone.

BISPHOSPHONATES

Name	Availability	Dosage	Side Effects
Alendronate (Binosto, Fosamax)	**T:** 5 mg, 10 mg, 35 mg, 40 mg, 70 mg **S:** 70 mg/75ml	**Prevention:** 5 mg/day or 35 mg/wk **Treatment:** 10 mg/day or 70 mg/wk	Transient, mild hypocalcemia, hypophosphatemia, dysphagia, esophagitis, esophageal and gastric ulcer, abdominal pain, diarrhea, musculoskeletal pain
Ibandronate (Boniva)	**T:** 150 mg **I:** 1 mg/ml	**Prevention and treatment:** 150 mg/mo **IV Injection: Treatment:** 3 mg/3 mos	Dyspepsia, back pain, dysphagia, esophagitis, esophageal and gastric ulcer, abdominal pain, diarrhea, musculoskeletal pain

Risedronate (Actonel)	**T:** 5 mg, 30 mg, 35 mg, 150 mg **T (DR):** 35 mg	**Prevention and treatment:** 5 mg/day, 35 mg/wk, or 150 mg/mo	Hypertension, headache, rash, dysphagia, esophagitis, esophageal and gastric ulcer, abdominal pain, diarrhea, musculoskeletal pain
Zoledronic acid (Reclast)	**I:** 5 mg	**Prevention: IV:** 5 mg every 2 yrs **Treatment: IV:** 5 mg every yr	Hypertension, pain, fever, headache, chills, fatigue, nausea, musculoskeletal pain

SERM

Name	Availability	Dosage	Side Effects
Raloxifene (Evista)	**T:** 60 mg	**Prevention and treatment:** 60 mg/day	Peripheral edema, hot flashes, arthralgia, leg cramps, muscle spasms, flu syndrome, infection

PARATHYROID HORMONE

Name	Availability	Dosage	Side Effects
Teriparatide (Forteo)	**I:** 250 mcg/ml syringe delivers 20 mcg/dose	**Treatment:** 20 mcg subcutaneously once daily	Hypercalcemia, muscle cramps, nausea, dizziness, headache

CALCITONIN

Name	Availability	Dosage	Side Effects
Calcitonin (Fortical, Miacalcin)	**I (Miacalcin):** 200 units/ml **Nasal (Fortical, Miacalcin):** 200 units/activation	**Treatment: IM/Subcutaneous (Miacalcin):** 100 units every other day **Nasal:** 200 units in 1 nostril daily	Rhinitis, local nasal irritation. **Injection:** nausea, local inflammation, flushing of face, hands

MONOCLONAL ANTIBODY RANKL INHIBITOR

Name	Availability	Dosage	Side Effects
Denosumab (Prolia)	**I:** 60 mg/ml	**Subcutaneous:** 60 mg once every 6 mos	Back pain, pain in extremity, hypercholesterolemia, musculoskeletal pain, cystitis

DR, Delayed-release; ***I,*** injection; ***S,*** solution (oral); ***T,*** tablet.

Parkinson's Disease Treatment

USES	ACTION
To slow or stop clinical progression of Parkinson's disease and to improve function and quality of life in pts with Parkinson's disease, a progressive neurodegenerative disorder.	Normal motor function is dependent on the synthesis and release of dopamine by neurons projecting from the substantia nigra to the corpus striatum. In Parkinson's disease, disruption of this pathway results in diminished levels of the neurotransmitter dopamine. Medication is aimed at providing improved function using the lowest effective dose.

TYPES OF MEDICATIONS FOR PARKINSON'S DISEASE

DOPAMINE PRECURSOR

Levodopa/carbidopa:

Levodopa: Dopamine precursor supplementation to enhance dopaminergic neurotransmission. A small amount of levodopa crosses the blood-brain barrier and is decarboxylated to dopamine, which is then available to stimulate dopaminergic receptors.

Carbidopa: Inhibits peripheral decarboxylation of levodopa, decreasing its conversion to dopamine in peripheral tissues, which results in an increased availability of levodopa for transport across the blood-brain barrier.

COMT INHIBITORS

Entacapone, tolcapone: Reversible inhibitor of catechol-*O*-methyltransferase (COMT). COMT is responsible for catalyzing levodopa. In the presence of a decarboxylase inhibitor (carbidopa), COMT becomes the major metabolizing enzyme for levodopa in the brain and periphery. By inhibiting COMT, higher plasma levels of levodopa are attained, resulting in more dopaminergic stimulation in the brain and lessening the symptoms of Parkinson's disease.

DOPAMINE RECEPTOR AGONISTS

Bromocriptine: Stimulates postsynaptic dopamine type 2 receptors in the neostriatum of the CNS.

Pramipexole: Stimulates dopamine receptors in the striatum of the CNS.

Ropinirole: Stimulates postsynaptic dopamine D2 type receptors within the caudate putamen in the brain.

MONOAMINE OXIDASE B INHIBITORS

Rasagiline, Selegiline: Increase dopaminergic activity due to irreversible inhibition of monoamine oxidase type B (MAO B). MAO B is involved in the oxidative deamination of dopamine in the brain.

Parkinson's Disease Treatment

MEDICATIONS FOR TREATMENT OF PARKINSON'S DISEASE

Name	Type	Availability	Dosage	Side Effects
Bromocriptine (Parlodel)	Dopamine agonist	**T:** 2.5 mg **C:** 5 mg	1.25 mg bid, increase by 2.5 mg/dose in 2–4 wk intervals (**Maximum:** 100 mg/day)	Nausea, drowsiness, lower extremity edema, postural hypotension, confusion, toxic psychosis (avoid use in pts with dementia)
Carbidopa/levodopa (Parcopa, Sinemet, Sinemet CR)	Dopamine precursor	**OD (Parcopa):** 10/100 mg, 25/100 mg, 25/250 mg **Immediate-release (Sinemet):** 10/100 mg, 25/100 mg, 25/250 mg **Controlled-release (Sinemet CR):** 25/100 mg, 50/200 mg	**Parcopa:** 300–1,500 mg levodopa in divided doses **Sinemet:** 300–1,500 mg levodopa in divided doses **Sinemet CR:** 400–1,600 mg levodopa in divided doses	Anorexia, nausea, vomiting, orthostatic hypotension initially; vivid dreams, hallucinations, delusions, confusion, and sleep disturbances with chronic use
Entacapone (Comtan)	COMT inhibitor	**T:** 200 mg	200 mg 3–4 times/day up to **maximum** of 8 times/day (1,600 mg)	Dyskinesias, nausea, diarrhea, urine discoloration
Pramipexole (Mirapex, Mirapex ER)	Dopamine agonist	**T:** 0.125 mg, 0.25 mg, 0.5 mg, 1 mg, 1.5 mg **ER:** 0.375 mg, 0.75 mg, 1.5 mg, 2.25 mg, 3 mg, 3.75 mg, 4.5 mg	**T:** 0.5–1.5 mg 3 times/day **ER:** 0.375–4.5 mg/day	Nausea, drowsiness, lower extremity edema, postural hypotension, confusion, toxic psychosis (avoid use in pts with dementia)
Rasagiline (Azilect)	MAO B inhibitors	**T:** 0.5 mg, 1 mg	0.5–1 mg once daily	Nausea, orthostatic hypotension

Ropinirole (Requip, Requip XL)	Dopamine agonist	**T:** 0.25 mg, 0.5 mg, 1 mg, 2 mg, 3 mg, 4.5 mg **XL:** 2 mg, 4 mg, 6 mg, 8 mg, 12 mg	**T:** 3–8 mg 3 times/day **XL:** Up to 24 mg/day	Nausea, drowsiness, lower extremity edema, postural hypotension, confusion, toxic psychosis (avoid use in pts with dementia)
Selegiline (Eldepryl, Zelapar)	MAO B inhibitor	**C (Eldepryl):** 5 mg **OD (Zelapar):** 1.25 mg	**C:** 5 mg with breakfast and lunch **OD:** 1.25–2.5 mg daily in the morning	Nausea, orthostatic hypotension
Tolcapone (Tasmar)	COMT inhibitor	**T:** 100 mg, 200 mg	100–200 mg 3 times/day	Dyskinesias, nausea, diarrhea, urine discoloration

C, Capsules; ***COMT,*** catechol-*O*-methyltransferase; ***ER,*** extended-release; ***I,*** injection; ***MAO B,*** monoamine oxidase B; ***OD,*** orally disintegrating; ***T,*** tablets; ***XL,*** extended-release.

Proton Pump Inhibitors

USES	ACTION
Treatment of various gastric disorders, including gastric and duodenal ulcers, gastroesophageal reflex disease (GERD), pathologic hypersecretory conditions.	Suppresses gastric acid secretion by specific inhibition of the hydrogen-potassium-adenosine triphosphatase (H^+/K^+ ATPase) enzyme system, which transports the acid at the gastric parietal cells. These agents do not have anticholinergic or histamine receptor antagonistic properties.

PROTON PUMP INHIBITORS

Name	Availability	Indications	Usual Dosage	Side Effects
Dexlansoprazole (Dexilant)	**C:** 30 mg, 60 mg	Erosive esophagitis, heartburn associated with nonerosive GERD	30 mg/day	Diarrhea, abominal pain, nausea, upper respiratory tract infection, vomiting, flatulence
Esomeprazole (Nexium)	**C:** 20 mg, 40 mg **I:** 20 mg, 40 mg	*Helicobacter pylori* eradication, GERD, erosive esophagitis	20–40 mg/day	Headaches, diarrhea, abdominal pain, nausea
Lansoprazole (Prevacid)	**C:** 15 mg, 30 mg **T (ODT):** 15 mg, 30 mg	Duodenal ulcer, gastric ulcer, NSAID-associated gastric ulcer, hypersecretory conditions, *H. pylori* eradication, GERD, erosive esophagitis	15–30 mg/day	Diarrhea, skin rash, pruritus, headaches
Omeprazole (Prilosec)	**C:** 10 mg, 20 mg, 40 mg	Duodenal ulcer, gastric ulcer, hypersecretory conditions, *H. pylori* eradication, GERD, erosive esophagitis	20–40 mg/day	Headaches, diarrhea, abdominal pain, nausea
Omeprazole and Sodium Bicarbonate (Zegerid)	**P:** 20 mg, 40 mg	Duodenal ulcer, benign gastric ulcer, GERD, erosive esophagitis	20–40 mg/day	Headaches, abdominal pain, diarrhea, nausea
Pantoprazole (Protonix)	**T:** 20 mg, 40 mg **I:** 40 mg	Erosive esophagitis, hypersecretory conditions	40 mg/day	Diarrhea, headaches
Rabeprazole (Aciphex)	**T:** 20 mg **S:** 5 mg, 10 mg	Duodenal ulcer, hypersecretory conditions, *H. pylori* eradication, GERD, erosive esophagitis	20 mg/day	Headaches

C, Capsules; ***GERD,*** gastroesophageal reflux disease; ***I,*** injection; ***NSAID,*** nonsteroidal anti-inflammatory drug; ***ODT,*** orally disintegrating tablets; ***P,*** powder for suspension; ***S,*** sprinkles; ***T,*** tablets.

Sedative-Hypnotics

USES	ACTION
Treatment of insomnia (i.e., difficulty falling asleep initially, frequent awakening, awakening too early).	*Benzodiazepines* are the most widely used agents and largely replace barbiturates due to greater safety, lower incidence of drug dependence. Benzodiazepines nonselectively bind to at least three receptor subtypes accounting for sedative, anxiolytic, relaxant, and anticonvulsant properties. Benzodiazepines enhance the effect of the inhibitory neurotransmitter gamma-aminobutyric acid (GABA), which inhibits impulse transmission in the CNS reticular formation in brain. Benzodiazepines decrease sleep latency, number of nocturnal awakenings, and time spent in awake stage of sleep; increase total sleep time. The *nonbenzodiazepines* zaleplon and zolpidem preferentially bind with one receptor subtype, reducing sleep latency and nocturnal awakenings and increasing total sleep time. Ramelteon is a selective agonist of melatonin receptors (responsible for determining circadian rhythms and synchronizing sleep-wake cycles).

SEDATIVE-HYPNOTICS

Name	Availability	Dosage Range	Side Effects
Benzodiazepines			
Estazolam (ProSom)	**T:** 1 mg, 2 mg	**A:** 1–2 mg **E:** 0.5–1 mg	Daytime sedation, memory and psychomotor impairment, tolerance, withdrawal reactions, rebound insomnia, dependence
Flurazepam (Dalmane)	**C:** 15 mg, 30 mg	**A/E:** 15–30 mg	Headaches, unpleasant taste, dry mouth, dizziness, anxiety, nausea
Quazepam (Doral)	**T:** 15 mg	**A:** 7.5–15 mg **E:** 7.5 mg	Same as flurazepam
Temazepam (Restoril)	**C:** 7.5 mg, 15 mg, 30 mg	**A:** 15–30 mg **E:** 7.5–15 mg	Same as flurazepam

Continued

SEDATIVE-HYPNOTICS—cont'd

Name	Availability	Dosage Range	Side Effects
Nonbenzodiazepines			
Eszopiclone (Lunesta)	**T:** 1 mg, 2 mg, 3 mg	**A:** 2–3 mg **E:** 1–2 mg	Headaches, unpleasant taste, dry mouth, dizziness, anxiety, nausea
Ramelteon (Rozerem)	**T:** 8 mg	**A, E:** 8 mg	Headaches, dizziness, fatigue, nausea
Zaleplon (Sonata)	**C:** 5 mg, 10 mg	**A:** 5–20 mg **E:** 5 mg	Headaches, dizziness, myalgia, drowsiness, asthenia (loss of strength, energy), abdominal pain
Zolpidem (Ambien, Ambien CR, Edluar, Zolpimist)	**T:** 5 mg, 10 mg **CR:** 6.25 mg, 12.5 mg **SL:** 5 mg, 10 mg **OS:** 5 mg/actuation	**OS, T, SL:** 5 mg (females); 5–10 mg (males) **CR:** 6.25 mg (females); 6.25–12.5 mg (males)	Dizziness, daytime drowsiness, headaches, confusion, depression, hangover, asthenia (loss of strength, energy)

A, Adults; ***C,*** capsules; ***CR,*** controlled-release; ***E,*** elderly; ***OS,*** oral solution; ***SL,*** sublingual; ***T,*** tablets.

Skeletal Muscle Relaxants

USES	ACTION
Central acting muscle relaxants: Adjunct to rest, physical therapy for relief of discomfort associated with acute, painful musculoskeletal disorders (i.e., local spasms from muscle injury).	*Central acting muscle relaxants:* Exact mechanism unknown. May act in CNS at various levels to depress polysynaptic reflexes; sedative effect may be responsible for relaxation of muscle spasm.
Baclofen, dantrolene, diazepam: Treatment of spasticity characterized by heightened muscle tone, spasm, loss of dexterity caused by multiple sclerosis, cerebral palsy, spinal cord lesions, CVA.	*Baclofen, diazepam:* May mimic actions of gamma-aminobutyric acid on spinal neurons; do not directly affect skeletal muscles. *Dantrolene:* Acts directly on skeletal muscle, relieving spasticity.

SKELETAL MUSCLE RELAXANTS

Name	Indication	Dosage Range	Side Effects/Comments
Baclofen (Lioresal)	Spasticity associated with multiple sclerosis, spinal cord injury	Initially 5 mg 3 times/day Increase by 5 mg 3 times/day q3days **Maximum:** 20 mg 4 times/day	Drowsiness, dizziness, GI effects Caution with renal impairment, seizure disorders Withdrawal syndrome (e.g., hallucinations, psychosis, seizures)

Continued

SKELETAL MUSCLE RELAXANTS—cont'd

Name	Indication	Dosage Range	Side Effects/Comments
Carisoprodol (Rela)	Discomfort due to acute, painful, musculoskeletal conditions	250–350 mg 4 times/day	Drowsiness, dizziness, GI effects Hypomania at higher than recommended doses Withdrawal syndrome Hypersensitivity reaction (skin reaction, bronchospasm, weakness, burning eyes, fever) or idiosyncratic reaction (weakness, visual or motor disturbances, confusion) usually occurring within first 4 doses
Chlorzoxazone (Lorzone)	Discomfort due to acute, painful, musculoskeletal conditions	Initially 250–500 mg 3–4 times/day **Maximum:** 750 mg 3–4 times/day	Drowsiness, dizziness, GI effects, rare hepatotoxicity Hypersensitivity reaction (urticaria, itching) Urine discoloration to orange, red, or purple
Cyclobenzaprine (Flexeril)	Muscle spasm, pain, tenderness, restricted movement due to acute, painful, musculoskeletal conditions	Initially 5–10 mg 3 times/day	Drowsiness, dizziness, GI effects Anticholinergic effects (dry mouth, urinary retention) Quinidine-like effects on heart (QT prolongation) Long half-life
Dantrolene (Dantrium)	Spasticity associated with multiple sclerosis, cerebral palsy, spinal cord injury	Initially 25 mg/day for 1 week, then 25 mg 3 times/day for 1 week, then 50 mg 3 times/day for 1 week, then 100 mg 3 times/day **Maximum:** 100 mg 4 times/day	Drowsiness, dizziness, GI effects Contraindicated with hepatic disease Dose-dependent hepatotoxicity Diarrhea that is dose dependent and may be severe, requiring discontinuation
Diazepam (Valium)	Spasticity associated with cerebral palsy, spinal cord injury; reflex spasm due to muscle, joint trauma or inflammation	2–10 mg 3–4 times/day	Drowsiness, dizziness, GI effects Abuse potential

Metaxalone (Skelaxin)	Discomfort due to acute, painful, musculoskeletal conditions	800 mg 3–4 times/day	Drowsiness (low risk), dizziness, GI effects Paradoxical muscle cramps Mild withdrawal syndrome Contraindicated in serious hepatic or renal disease
Methocarbamol (Robaxin)	Discomfort due to acute, painful, musculoskeletal conditions	Initially 1,500 mg 4 times/day **Maintenance:** 1,000 mg 4 times/day	Drowsiness, dizziness, GI effects Urine discoloration to brown, brown-black, or green
Orphenadrine (Norflex)	Discomfort due to acute, painful, musculoskeletal conditions	100 mg 2 times/day	Drowsiness, dizziness, GI effects Long half-life Anticholinergic effects (dry mouth, urinary retention) Rare aplastic anemia Some products may contain sulfites
Tizanidine (Zanaflex)	Spasticity	Initially 4 mg q6–8h (**maximum** 3 times/day), may increase by 2–4 mg as needed/tolerated **Maximum:** 36 mg (limited information on doses greater than 24 mg)	Drowsiness, dizziness, GI effects Hypotension (20% decrease in B/P) Hepatotoxicity (usually reversible) Withdrawal syndrome (hypertension, tachycardia, hypertonia) Effect is short lived (3–6 hrs) Dose cautiously with creatinine clearance less than 25 ml/min

Smoking Cessation Agents

Tobacco smoking is associated with the development of lung cancer and chronic obstructive pulmonary disease. Smoking is harmful not just to the smoker but also to family members, coworkers, and others breathing cigarette smoke.

Quitting smoking decreases the risk of developing lung cancer, other cancers, heart disease, stroke, and respiratory illnesses. Several medications have proved useful as smoking cessation aids. Nausea and light-headedness are possible signs of overdose of nicotine warranting a reduction in dosage.

SMOKING CESSATION AGENTS

Name	Availability	Dose Duration	Cautions/Side Effects	Comments
Bupropion (Zyban)	**T:** 150 mg	150 mg every morning for 3 days, then 150 mg 2 times/day Start 1–2 wks before quit date **Duration:** 7–12 wks up to 6 mos for maintenance	History of seizure, eating disorder, use of MAOI within previous 14 days, bipolar disorder **Side Effects:** Insomnia, dry mouth, tremor, rash	Stop smoking during second wk of treatment and use counseling support services along with medication
Clonidine (Catapres, Catapres-TTS)	**T:** 0.1 mg, 0.2 mg **Patch:** 0.1 mg/24 hrs, 0.2 mg/24 hrs, 0.3 mg/24 hrs	**Oral:** 0.15–0.75 mg/day **Patch:** 0.1–0.2 mg daily **Duration:** 3–10 wks	Rebound hypertension. **Side Effects:** Dry mouth, drowsiness, dizziness, sedation, constipation	Abrupt discontinuation can result in anxiety, agitation, headaches, tremors accompanied or followed by rapid rise in B/P

Nicotine gum (Nicorette, Thrive)	**Squares:** 2 mg, 4 mg	1 gum q1–2h for 6 wks, then q2–4h for 3 wks then q4–8h for 3 wks **Maximum:** 24 pieces/day **Duration:** up to 12 wks	Recent MI (within 2 wks), serious arrhythmias, serious or worsening angina pectoris **Side Effects:** Dyspepsia, mouth soreness, hiccups	2 mg recommended for pts smoking less than 25 cigarettes/day, 4 mg for pts smoking 25 or more cigarettes/day Chew until a peppery or minty taste emerges and then "park" between cheek and gums to facilitate nicotine absorption through oral mucosa Chew slowly and intermittently to avoid jaw ache and achieve maximum benefit Only water should be taken 15 min before and during chewing
Nicotine inhaler (Nicotrol)	**Cartridge:** 10 mg (delivers 4 mg nicotine)	6–16 cartridges daily; taper frequency of use over the last 6–12 wks **Duration:** up to 6 mos	Recent MI (within 2 wks), serious arrhythmias, serious or worsening angina pectoris **Side Effects:** Local irritation of mouth and throat, coughing, rhinitis	Use at or above room temperature (cold temperatures decrease amount of nicotine inhaled)
Nicotine lozenge (Commit)	**Lozenges:** 2 mg, 4 mg	One lozenge q1–2h for 6 wks, then q2–4h for 3 wks, then q4–8h for 3 wks **Duration:** 12 wks	Recent MI (within 2 wks), serious arrhythmias, serious or worsening angina pectoris **Side Effects:** Local skin reaction, insomnia, nausea, sore throat	First cigarette smoked within 30 min of waking, use 4 mg; after 30 min of waking, use 2 mg Use at least 9 lozenges/day first 6 wks Only 1 lozenge at a time, 5 per 6 hrs and 20 per 24 hrs Do not chew or swallow
Nicotine nasal spray (Nicotrol NS)	10 mg/ml (delivers 0.5 mg/spray)	8–40 doses/day A dose consists of one 0.5 mg delivery to each nostril; initial dose is 1–2 sprays/hr, increasing as needed **Duration:** 3–6 mos	Recent MI (within 2 wks), serious arrhythmias, serious or worsening angina pectoris **Side Effects:** Nasal irritation	Do not sniff, swallow, or inhale through nose while administering nicotine doses (may increase irritation) Tilt head back slightly for best results

Continued

SMOKING CESSATION AGENTS—cont'd

Name	Availability	Dose Duration	Cautions/Side Effects	Comments
Nicotine patch (NicoDerm CQ)	**Nicoderm CQ:** 7 mg/24 hrs, 14 mg/24 hrs, 21 mg/24 hrs **Nicotrol:** 5 mg/16 hrs, 10 mg/16 hrs, 15 mg/16 hrs	Apply upon waking on quit date: **Nicoderm CQ (greater than 10 cigarettes/day):** 21 mg/24 hrs for 4 wks, then 14 mg/24 hrs for 2 wks, then 7 mg/24 hrs for 2 wks **(10 or fewer cigarettes/day):** 14 mg/24 hrs for 6 wks, then 7 mg/24 hrs for 2 wks	Recent MI (within 2 wks), serious arrhythmias, serious or worsening angina pectoris **Side Effects:** Local skin reaction, insomnia	The 16- and 24-hr patches are of comparable efficacy Begin with a lower-dose patch in pts smoking 10 or fewer cigarettes/day Place new patch on relatively hair-free location, usually between neck and waist, in the morning If insomnia occurs, remove the 24-hr patch prior to bedtime or use the 16-hr patch Rotate patch site to diminish skin irritation
Nortriptyline (Pamelor)	**T:** 25 mg, 50 mg, 75 mg, 100 mg	Initially 25 mg/day, increasing gradually to target dose of 75–100 mg/day 10–28 days prior to selected "quit" date, continue for 12 wks or more after "quit" day **Duration:** up to 12 wks	Risk of arrhythmias **Side Effects:** Sedation, dry mouth, blurred vision, urinary retention, lightheadedness, shaky hands	Initiate therapy 10–28 days before the quit date to allow steady state of nortriptyline at target dose
Varenicline (Chantix)	**T:** 0.5 mg, 1 mg	**Days 1–3:** 0.5 mg daily; **days 4–7:** 0.5 mg 2 times/day; **day 8 to end of treatment:** 1 mg 2 times/day **Duration:** begin 1 wk before set quit date, continue for 12 wks. May use additional 12 wks if failed to quit after first 12 wks	**Side Effects:** Nausea; sleep disturbances; headaches; may impair ability to drive, operate machinery; depressed mood; altered behavior; suicidal ideation reported	Use lower dosage if not able to tolerate nausea and vomiting Use counseling support services along with medication

MAOI, Monoamine oxidase inhibitor; ***MI,*** myocardial infarction; ***T,*** tablets.

Vitamins

INTRODUCTION

Vitamins are organic substances required for growth, reproduction, and maintenance of health and are obtained from food or supplementation in small quantities (vitamins cannot be synthesized by the body or the rate of synthesis is too slow/inadequate to meet metabolic needs). Vitamins are essential for energy transformation and regulation of metabolic processes. They are catalysts for all reactions using proteins, fats, carbohydrates for energy, growth, and cell maintenance.

WATER SOLUBLE

Water-soluble vitamins include vitamin C (ascorbic acid), B_1 (thiamine), B_2 (riboflavin), B_3 (niacin), B_5 (pantothenic acid), B_6 (pyridoxine), folic acid, B_{12} (cyanocobalamin). Water-soluble vitamins act as coenzymes for almost every cellular reaction in the body. B-complex vitamins differ from one another in both structure and function but are grouped together because they first were isolated from the same source (yeast and liver).

FAT SOLUBLE

Fat-soluble vitamins include vitamins A, D, E, and K. They are soluble in lipids and are usually absorbed into the lymphatic system of the small intestine and then into the general circulation. Absorption is facilitated by bile. These vitamins are stored in the body tissue when excessive quantities are consumed. May be toxic when taken in large doses (see sections on individual vitamins).

VITAMINS

Name	Uses	Deficiency	Side Effects
Vitamin A (Aquasol A)	Required for normal growth, bone development, vision, reproduction, maintenance of epithelial tissue	Dry skin, poor tooth development, night blindness	**High dosages:** Hepatotoxicity, cheilitis, facial dermatitis, photosensitivity, mucosal dryness
Vitamin B_1 (thiamine)	Important in red blood cell formation, carbohydrate metabolism, neurologic function, myocardial contractility, growth, energy production	Fatigue, anorexia, growth retardation	**Large parenteral doses:** May cause pain on injection
Vitamin B_2 (riboflavin)	Necessary for function of coenzymes in oxidation-reduction reactions, essential for normal cellular growth, assists in absorption of iron and pyridoxine	Numbness in extremities, blurred vision, photophobia, cheilosis	Orange-yellow discoloration in urine

Continued

VITAMINS—cont'd

Name	Uses	Deficiency	Side Effects
Vitamin B_3 (niacin)	Coenzyme for many oxidation-reduction reactions	Pellegra, headache, anorexia, memory loss, insomnia	**High dosages (more than 500 mg):** Nausea, vomiting, diarrhea, gastritis, hepatotoxicity, skin rash, facial flushing, headaches
Vitamin B_5 (pantothenic acid)	Precursor to coenzyme A, important in synthesis of cholesterol, hormones, fatty acids	Natural deficiency unknown	Occasional GI disturbances (e.g., diarrhea)
Vitamin B_6 (pyridoxine)	Enzyme cofactor for amino acid metabolism, essential for erythrocyte production, Hgb synthesis	Neuritis, anemia, lymphopenia	**High dosages:** May cause sensory neuropathy
Vitamin B_{12} (cyanocobalamin)	Coenzyme in cells, including bone marrow, CNS, and GI tract, necessary for lipid metabolism, formation of myelin	Gastrointestinal disorders, anemias, poor growth	Skin rash, diarrhea, pain at injection site
Vitamin C (ascorbic acid)	Cofactor in various physiologic reactions, necessary for collagen formation, acts as antioxidant	Poor wound healing, bleeding gums, scurvy	**High dosages:** May cause calcium oxalate crystalluria, esophagitis, diarrhea
Vitamin D (Calciferol)	Necessary for proper formation of bone, calcium, mineral homeostasis, regulation of parathyroid hormone, calcitonin, phosphate	Rickets, osteomalacia	Hypercalcemia, kidney stones, renal failure, hypertension, psychosis, diarrhea, nausea, vomiting, anorexia, fatigue, headaches, altered mental status
Vitamin E (Aquasol E)	Antioxidant, promotes formation, functioning of red blood cells, muscle, other tissues	Red blood cell breakdown	**High dosages:** GI disturbances, malaise, headaches

F, Females; ***M,*** males.

Generic Drugs A

abacavir
abatacept
abciximab
abiraterone
acetaminophen
acetaZOLAMIDE
acetylcysteine (N-acetylcysteine)
aclidinium
acyclovir
adalimumab
adefovir
adenosine
ado-trastuzumab
afatinib
albiglutide
albumin, human
albuterol
alemtuzumab
alendronate
alfuzosin
aliskiren
allopurinol
almotriptan
alogliptin
alprazolam
alprostadil (prostaglandin E_1; PGE_1)
alteplase
amantadine
ambrisentan
amikacin
amiodarone
amitriptyline
amlodipine
amoxicillin
amoxicillin/clavulanate
amphotericin B
ampicillin
ampicillin/sulbactam
anakinra
anastrozole
anidulafungin
antihemophilic factor (factor VIII, AHF)
apixaban
apremilast
aprepitant/fosaprepitant
argatroban
aripiprazole
armodafinil
arsenic trioxide
ascorbic acid (vitamin C)
asparaginase
aspirin (acetylsalicylic acid, ASA)
atazanavir
atenolol
atomoxetine
atorvastatin
atovaquone
atropine
avanafil
axitinib
azacitidine
azathioprine
azilsartan
azithromycin
aztreonam

inactive metabolites. Primarily excreted in urine. Unknown if removed by hemodialysis. **Half-life:** 1.5 hrs.

SIDE EFFECTS

ADULT: Frequent (47%–11%): Nausea, nausea with vomiting, diarrhea, decreased appetite. **Occasional (39%–11%):** Insomnia (7%). **CHILDREN: Frequent:** Nausea with vomiting, fever, headache, diarrhea, rash. **Occasional:** Decreased appetite (9%).

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reaction may be life-threatening. Signs and symptoms include fever, rash, fatigue, intractable nausea/vomiting, severe diarrhea, abdominal pain, cough, pharyngitis, dyspnea. Life-threatening hypotension may occur. Lactic acidosis, severe hepatomegaly may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, LFT before beginning therapy and at periodic intervals during therapy. Question for possibility of pregnancy. Increased risk of sensitivity (cutaneous, GI, pulmonary) in those with positive HLA-B*5701 genotype status. Offer emotional support.

INTERVENTION/EVALUATION

Assess for nausea, vomiting. Monitor daily pattern of bowel activity, stool consistency. Assess dietary pattern; monitor for weight loss. Monitor lab values, hepatic function. Stop abacavir if 3 or more of the following occur: rash, fever, GI disturbances (diarrhea, nausea, vomiting), flu-like symptoms, respiratory difficulty.

PATIENT/FAMILY TEACHING

- Do not take any medications, including OTC drugs, without consulting physician.
- Small, frequent meals may offset anorexia, nausea.
- Abacavir is not a cure for HIV infection, nor does it reduce risk of transmission to others.
- Pt must continue practices to prevent HIV transmission.

abatacept

TOP 100

a-**bay**-ta-sept
(Orencia)
Do not confuse Orencia with Oracea.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Selective T-cell costimulation modulator. **CLINICAL:** Rheumatoid arthritis agent.

USES

Reduction of signs and symptoms, progression of structural damage in adults with moderate to severe rheumatoid arthritis (RA) alone or in combination with other disease-modifying antirheumatic medications. Treatment of moderate to severe active polyarticular juvenile idiopathic arthritis in pts 6 yrs and older. May use alone or in combination with methotrexate. NOTE: Do not use with anakinra or tumor necrosis factor [TNF] antagonists.

PRECAUTIONS

Contraindications: None known. **Cautions:** Chronic, latent, or localized infection; conditions predisposing to infections; COPD (higher incidence of adverse effects); elderly; Hx recurrent infections.

ACTION

Inhibits T-lymphocyte activation, necessary in the inflammatory cascade leading to joint inflammation and destruction. Blocks production of inflammatory mediators. **Therapeutic Effect:** Induces positive clinical response in adult pts with moderate to severely active RA or juvenile idiopathic arthritis.

PHARMACOKINETICS

Higher clearance with increasing body weight. Age, gender do not affect clearance. **Half-life:** 8–25 days.

initial therapy, give 2 wks and 4 wks after first infusion, then q4wks thereafter.

Dosage Adjustment for Toxicity
Discontinue in pts developing a serious infection.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (18%): Headache. **Occasional (9%–6%):** Dizziness, cough, back pain, hypertension, nausea.

ADVERSE EFFECTS/ TOXIC REACTIONS

Upper respiratory tract infection, nasopharyngitis, sinusitis, UTI, influenza, bronchitis occur in 5% of pts. Serious infections manifested as pneumonia, cellulitis, diverticulitis, acute pyelonephritis occur in 3% of pts. Hypersensitivity reaction (rash, urticaria, hypotension, dyspnea) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain/inflammation. Inspect appearance of affected joint for immobility, deformities, skin condition. Screen for latent TB infection prior to initiating therapy.

INTERVENTION/EVALUATION

Assess for therapeutic response: relief of pain, stiffness, swelling; increased joint mobility; reduced joint tenderness; improved grip strength. Monitor for hypersensitivity reaction.

PATIENT/FAMILY TEACHING

• Consult physician if infection, hypersensitivity reaction, infusion-related reaction occurs. • Do not receive live vaccines during treatment or within 3 mos of its discontinuation. • COPD pts must report worsening of respiratory symptoms.

abciximab

HIGH ALERT

ab-**sik**-si-mab
(ReoPro)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Glycoprotein IIb/IIIa receptor inhibitor. **CLINICAL:** Antiplatelet; antithrombotic.

USES

Adjunct to aspirin and heparin therapy to prevent cardiac ischemic complications in pts undergoing percutaneous coronary intervention (PCI) and those with unstable angina not responding to conventional medical therapy when PCI is planned within 24 hrs. **OFF-LABEL:** Support PCI during ST-segment elevation myocardial infarction (STEMI).

PRECAUTIONS

Contraindications: Active internal bleeding, arteriovenous malformation or aneurysm, CVA with residual neurologic deficit, history of CVA (within the past 2 yrs) or oral anticoagulant use within the past 7 days unless PT is less than 1.2× control, history of vasculitis, hypersensitivity to murine proteins, intracranial neoplasm, prior IV dextran use before or during percutaneous transluminal coronary angioplasty (PTCA), recent surgery or trauma (within the past 6 wks), recent GI or GU bleeding (within the past 6 wks), thrombocytopenia (less than 100,000 cells/mcl), and severe uncontrolled hypertension. Concomitant use of another glycoprotein IIb/IIIa inhibitor. **Cautions:** Increased risk of bleeding in pts who weigh less than 75 kg; pts older than 65 yrs; those with history of GI disease; those receiving thrombolytics; PTCA in less than 12 hrs of onset of symptoms for acute MI; prolonged PTCA (longer than 70 min); failed PTCA.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Heparin should be discontinued 4 hrs before arterial sheath removal. Maintain pt on bed rest for 6–8 hrs following sheath removal or drug discontinuation, whichever is later. Check platelet count, PT, aPTT, PFA, before infusion (assess for preexisting blood abnormalities), 2–4 hrs following treatment, and at 24 hrs or before discharge, whichever is first. Check insertion site, distal pulse of affected limb while femoral artery sheath is in place, and then routinely for 6 hrs following femoral artery sheath removal. Minimize need for injections, blood draws, catheters, other invasive procedures.

INTERVENTION/EVALUATION

Monitor ACT, PT, aPTT, platelet count, Hgb, Hct. Stop abciximab and/or heparin infusion if serious bleeding occurs that is uncontrolled by pressure. Observe for mental status changes. Assess skin for ecchymosis, petechiae, particularly at femoral arterial access, also at catheter insertion, arterial and venous puncture, cutdown, needle sites. Handle pt carefully and as infrequently as possible to prevent bleeding. Do not obtain B/P in lower extremities (possible deep vein thrombi). Assess for decrease in B/P, increase in pulse rate, complaint of abdominal or back pain, severe headache, evidence of GI hemorrhage. Question for increase in discharge during menses. Assess urinary output for hematuria. Monitor for hematoma. Use care in removing any dressing, tape.

PATIENT/FAMILY TEACHING

• Assess skin for bruising up to 3 days after infusion. • Report signs of bleeding.

abiraterone

TOP 100

a-bir-**a**-ter-one
(Zytiga)

Do not confuse Zytiga with Zetia or Zyrtec.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Androgen biosynthesis inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of metastatic castration-resistant prostate cancer in combination with prednisone.

◀ALERT▶ Must be given on empty stomach. No food is to be consumed 2 hrs before or 1 hr after each dose. Food may increase absorption up to 10 times normal limit. Sexually active men must wear condoms during and for 1 wk after treatment due to potential risks to fetus.

PRECAUTIONS

Contraindications: Use in women who are pregnant or may become pregnant. **Cautions:** History of cardiovascular disease (especially HF, recent MI, or ventricular arrhythmia) due to potential for hypertension, hypokalemia, or fluid retention; moderate hepatic impairment, adrenal insufficiency. Avoid use with strong CYP3A4 inducers.

ACTION

Inhibits androgen production in adrenal gland, testes, and prostate tumors. Inhibits formation of testosterone precursors. **Therapeutic Effect:** Lowers serum testosterone to castrate levels.

PHARMACOKINETICS

Protein binding: 99%. Primarily excreted in feces. **Peak plasma concentration:** 2 hrs. **Half-life:** 12 hrs (up to 19 hrs with hepatic impairment).

less than 50%. Tachycardia, atrial fibrillation, supraventricular tachycardia, atrial flutter, complete AV block, bradyarrhythmia reported in 7% of pts. Chest pain, unstable angina, HF reported in less than 4% of pts. Stress, infection, or interruption of daily steroids may cause adrenocortical insufficiency. Hepatotoxicity (ALT, AST greater than 5 times ULN) reported in 2% of pts. Pts with hepatic impairment are more likely to develop hepatotoxicity.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Evaluate history of HF, myocardial infarction, arrhythmias, angina pectoris, peripheral edema, hepatic impairment, adrenal or pituitary abnormalities, left ventricular ejection fraction if applicable. Obtain baseline ALT, AST, alkaline phosphatase, bilirubin, BMP. Question possibility of pregnancy before treatment (Pregnancy Category X). Question history of corticosteroid intolerance if applicable.

INTERVENTION/EVALUATION

Assess for peripheral edema behind medial malleolus (sacral area in bedridden patients). Monitor BMP, hepatic function. Monitor for mineralocorticoid excess (hypokalemia, hypertension, fluid retention) at least once monthly. Assess for cardiac arrhythmia if hypokalemia occurs. Obtain EKG for palpitations, dyspnea, dizziness. Monitor for signs and symptoms of adrenocortical insufficiency during prednisone interruption, periods of stress, infection. Measure ALT, AST, alkaline phosphatase, bilirubin every 2 wks for 3 mos, then monthly. If hepatotoxicity occurs, dosage modification will be necessary. Pts with moderate hepatic impairment must have hepatic function tests every wk for first month, then every 2 wks for 2 mos, then monthly. If ALT, AST above 5 times ULN or bilirubin above 3 times ULN, treatment should be discontinued.

PATIENT/FAMILY TEACHING

• Must be taken on empty stomach (no food 2 hrs before and 1 hr after dose). • If taken with food, toxic levels may result. • Sexually active men must wear condom during treatment and for 1 wk after treatment. • Women who are pregnant or are planning pregnancy may not touch medication without gloves. • Dizziness, palpitations, headache, confusion, muscle weakness, leg swelling/discomfort may become more apparent during periods of unusual stress, infection, or interruption of prednisone therapy. • Blood tests will be performed routinely. • Report signs of liver problems (yellowing of skin, bruising, light-colored stool, right upper quadrant pain), chest pain, palpitations. • An increase in urinary frequency or nocturia is expected as treatment becomes therapeutic. Do not chew, crush, dissolve, or divide.

acetaminophen TOP 100

a-**seet**-a-**min**-oh-fen
(Abenol, Acephen, Apo-Acetaminophen, Atasol, Feverall, Mapap, Ofirmev, Tempra, Tylenol, Tylenol Arthritis Pain, Tylenol Children's Meltaways, Tylenol Junior Meltaways, Tylenol Extra Strength)

■ **BLACK BOX ALERT** ■ Potential for severe liver injury. Acetaminophen injection associated with acute liver failure.

Do not confuse Acephen with Aciphex, Feverall with Fiberall, Fioricet with Fiorinal, Percocet with Percodan, Tylenol with atenolol, timolol, Tylenol PM, or Tylox, or Vicodin with Hycodan.

FIXED-COMBINATION(S)

Note: The amount of acetaminophen in combination products will be limited to no more than 325 mg per FDA mandate.

may decrease rate of absorption. **LAB VALUES:** May increase serum ALT, AST, bilirubin, prothrombin levels (may indicate hepatotoxicity).

AVAILABILITY (OTC)

Caplets (Tylenol): 325 mg, 500 mg, 650 mg. **Elixir:** 160 mg/5 ml. **Injection, Solution (Ofirmev):** 1,000 mg/100 ml glass vial. **Liquid (Oral [Tylenol Extra Strength]):** 160 mg/5 ml, 500 mg/5 ml, 500 mg/15 ml. **Solution (Oral Drops [Mapap]):** 80 mg/0.8 ml. **Suppository (Acephen, Feverall):** 80 mg, 120 mg, 325 mg, 650 mg. **Suspension (Mapap):** 160 mg/5 ml. **Tablets (Mapap, Tylenol):** 325 mg, 500 mg. **Tablets (Chewable [Mapap]):** 80 mg. **Tablets (Orally Disintegrating):** 80 mg, 160 mg.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 90%. Excreted unchanged in urine. **Half-life:** Tablets: 10–15 hrs.

INTERACTIONS

DRUG: May increase levels/effects of **anticonvulsants (barbituates, hydantoins), antihypertensives, carbamazepine, memantine, cyclosporine, amphetamines.** **HERBAL:** **Licorice** may increase serum sodium, potassium. **FOOD:** None known. **LAB VALUES:** May increase serum ammonia, bilirubin, glucose, calcium, uric acid, chloride; may decrease serum bicarbonate, potassium.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution: 500 mg. **Tablets:** 125 mg, 250 mg.

Canadian trade name

Store unopened vials at room temperature. Following dilution in D_5W, stable for 24 hrs at room temperature. Color change of opened vials may occur (does not affect potency).

Three-Bag Method (as Antidote): Loading, Second, and Third Doses

Pts Greater Than or Equal to 40 kg:

Loading dose: 150 mg/kg in 200 ml of diluent administered over 60 min.
Second dose: 50 mg/kg in 500 ml of diluent administered over 4 hrs.
Third dose: 100 mg/kg in 1,000 ml of diluent administered over 16 hrs.

Pts Greater Than 20 kg but Less Than 40 kg:

Loading dose: 150 mg/kg in 100 ml of diluent administered over 60 min.
Second dose: 50 mg/kg in 250 ml of diluent administered over 4 hrs.
Third dose: 100 mg/kg in 500 ml of diluent administered over 16 hrs.

Pts Less Than or Equal to 20 kg:

Loading dose: 150 mg/kg in 3 ml/kg of body weight of diluent administered over 60 min.
Second dose: 50 mg/kg in 7 ml/kg of body weight of diluent administered over 4 hrs.
Third dose: 100 mg/kg in 14 ml/kg of body weight of diluent administered over 16 hrs.

PO

• For treatment of acetaminophen overdose. • Give as 5% solution. • Dilute 20% solution 1:3 with cola, orange juice, other soft drink. • Give within 1 hr of preparation.

Inhalation, Nebulization

• 20% solution may be diluted with 0.9% NaCl or sterile water; 10% solution may be used undiluted.

IV COMPATIBILITIES

Cefepime (Maxipime), ceftazidime (Fortaz).

INDICATIONS/ROUTES/DOSAGE

Bronchopulmonary Disease

Inhalation, Nebulization

◀ALERT▶ Bronchodilators should be given 10–15 min before acetylcysteine. **ADULTS, ELDERLY, CHILDREN:** 3–5 ml (20% solution) 3–4 times a day or 6–10 ml (10% solution) 3–4 times a day. Range: 1–10 ml (20% solution) q2–6h or 2–20 ml (10% solution) q2–6h. **INFANTS:** 1–2 ml (20%) or 2–4 ml (10%) 3–4 times a day.

Intratracheal: ADULTS, CHILDREN: 1–2 ml of 10% or 20% solution instilled into tracheostomy q1–4h.

Acetaminophen Overdose

◀ALERT▶ It is essential to initiate treatment as soon as possible after overdose and, in any case, within 24 hrs of ingestion.

PO *(Oral Solution 5%)*: ADULTS, ELDERLY, CHILDREN: Loading dose of 140 mg/kg, followed in 4 hrs by maintenance dose of 70 mg/kg q4h for 17 additional doses (or until acetaminophen assay reveals nontoxic level). Repeat dose if emesis occurs within 1 hr of administration. **IV: ADULTS, ELDERLY, CHILDREN:** 150 mg/kg infused over 60 min, then 50 mg/kg infused over 4 hrs, then 100 mg/kg infused over 16 hrs (see Administration/Handling for dilution). **GREATER THAN 100 KG:** 15 g over 60 min; 5 g over 4 hrs; 10 g over 16 hrs. Duration of administration may vary depending on acetaminophen levels and hepatic function tests obtained during treatment. Pts who still have detectable levels of acetaminophen or elevated LFT results continue to benefit from additional acetylcysteine administration beyond 24 hrs.

Prevention of Contrast-Induced Nephropathy

PO: ADULTS, ELDERLY: 600–1,200 mg twice a day for 4 doses starting the day before the procedure. Hydrate pt with 0.9% NaCl concurrently.

amount excreted in feces. **Half-life:** 5–8 hrs.

may require decreased dosage. May experience more neurologic effects (e.g., agitation, confusion, hallucinations).

INTERACTIONS

DRUG: None significant. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase serum BUN, creatinine concentrations, hepatic function tests.

AVAILABILITY (Rx)

Cream: 5%. **Injection, Powder for Reconstitution:** 500 mg, 1,000 mg. **Injection, Solution:** 50 mg/ml. **Ointment:** 5%. **Suspension, Oral:** 200 mg/5 ml. **Tablets:** 400 mg, 800 mg.

SIDE EFFECTS

Frequent: Parenteral (9%–7%): Phlebitis or inflammation at IV site, nausea, vomiting. **Topical (28%):** Burning, stinging. **Occasional: Parenteral (3%):** Pruritus, rash, urticaria. **PO (12%–6%):** Malaise, nausea. **Topical (4%):** Pruritus. **Rare: PO (3%–1%):** Vomiting, rash, diarrhea, headache. **Parenteral (2%–1%):** Confusion, hallucinations, seizures, tremors. **Topical (less than 1%):** Rash.

ADVERSE EFFECTS/ TOXIC REACTIONS

Rapid parenteral administration, excessively high doses, or fluid and electrolyte imbalance may produce renal failure (abdominal pain, decreased urination, decreased appetite, increased thirst, nausea, vomiting). Toxicity not reported with oral or topical use.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of allergies, esp. to acyclovir. Assess herpes simplex lesions before treatment to compare baseline with treatment effect.

INTERVENTION/EVALUATION

Assess IV site for phlebitis (heat, pain, red streaking over vein). Evaluate cutaneous lesions. Ensure adequate ventilation. Manage chickenpox and disseminated herpes zoster with strict isolation. Provide analgesics and comfort measures; esp. exhausting to elderly. Encourage fluids.

PATIENT/FAMILY TEACHING

• Drink adequate fluids. • Do not touch lesions with bare fingers to prevent spreading infection to new site. • **Genital Herpes:** Continue therapy for full length of treatment. • Space doses evenly. • Use finger cot/rubber glove to apply topical ointment. • Avoid sexual intercourse during duration of lesions to prevent infecting partner. • Acyclovir does not cure herpes infections. • Pap smear should be done at least annually due to increased risk of cervical cancer in women with genital herpes.

adalimumab

TOP 100

a-da-**lim**-ue-mab
(Humira)

■ **BLACK BOX ALERT** ■ Increased risk for serious infections. Tuberculosis, invasive fungal infections, other opportunistic infections have occurred. Test for tuberculosis prior to and during treatment. Lymphoma, other malignancies reported in children/adolescents. Lymphoma, other malignancies reported primarily in pts with Crohn's disease or ulcerative colitis and concomitant azathioprine or mercaptopurine.

Do not confuse Humira with Humalog or Humulin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Monoclonal antibody. **CLINICAL:** Rheumatoid arthritis agent.

USES

Reduces signs/symptoms, progression of structural damage and improves physical function in adults with moderate to severe RA. May be used alone or in combination with other disease-modifying antirheumatic drugs. First-line treatment of moderate to severe RA, treatment of psoriatic arthritis, treatment of ankylosing spondylitis, to induce/maintain remission of moderate to severe active Crohn's disease, moderate to severe plaque psoriasis in pts 6 yrs of age and older. Reduces signs and symptoms of moderate to severe active polyarticular juvenile rheumatoid arthritis in pts 2 yrs and older. Treatment of active ulcerative colitis in pts unresponsive to immunosuppressants.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reactions (rash, urticaria, hypotension, dyspnea), infections (primarily upper respiratory tract, bronchitis, urinary tract) occur rarely. More serious infections (pneumonia, tuberculosis, cellulitis, pyelonephritis, septic arthritis) also occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain or inflammation. Inspect appearance of affected joints for immobility, deformities, skin condition. If pt is to self-administer, instruct on subcutaneous injection technique, including areas of the body acceptable for injection sites.

INTERVENTION/EVALUATION

Monitor lab values, particularly CBC. Assess for therapeutic response: relief of pain, stiffness, swelling; increased joint mobility; reduced joint tenderness; improved grip strength.

PATIENT/FAMILY TEACHING

• Injection site reaction generally occurs in first month of treatment and decreases in frequency during continued therapy. • Do not receive live vaccines during treatment. Report rash, nausea.

adefovir

a-**def**-o-veer
(Hepsera)

■ **BLACK BOX ALERT** ■ May cause HIV resistance in unrecognized or untreated HIV infection. Lactic acidosis, severe hepatomegaly with steatosis (fatty liver), acute exacerbation of hepatitis have occurred. Use with caution in pts with renal dysfunction or in pts at risk for renal toxicity.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antiviral.
CLINICAL: Hepatitis B agent.

USES

Treatment of chronic hepatitis B in adults with evidence of active viral replication based on persistent elevations of serum ALT or AST or histologic evidence.

PRECAUTIONS

Contraindications: None known. **Cautions:** Pts with known risk factors for hepatic disease (female gender, obesity, prolonged treatment), renal impairment, elderly. Concurrent administration with tenofovir-containing products.

ACTION

Inhibits DNA polymerase, an enzyme, causing DNA chain termination after its incorporation into viral DNA. **Therapeutic Effect:** Prevents viral cell replication.

PHARMACOKINETICS

Rapidly converted to adefovir in intestine. Binds to proteins after PO administration. Protein binding: less than 4%. Excreted in urine. **Half-life:** 7 hrs (increased in renal impairment).

diagnostic aid in myocardial perfusion imaging or stress echocardiography by causing coronary vasodilation and increased blood flow. **Therapeutic Effect:** Restores normal sinus rhythm.

INTERACTIONS

DRUG: **Methylxanthines (e.g., theophylline)** may decrease effect. **Dipyridamole, nicotine** may increase effect. **Carbamazepine** may increase degree of heart block caused by adenosine. **HERBAL:** None significant. **FOOD:** Avoid **caffeine** (may decrease effect). **LAB VALUES:** None significant.

AVAILABILITY (Rx)

Injection Solution (Adenocard): 3 mg/ml in 2-ml, 4-ml vials. **Injection Solution (Adenoscan):** 3 mg/ml in 20-ml, 30-ml vials.

ADMINISTRATION/HANDLING

initial dose over 90 min. • Infuse subsequent doses over 30 min. • Slow or interrupt infusion rate if hypersensitivity reaction occurs.

Storage • Refrigerate unused vials. • Reconstituted vials, diluted solutions should be used immediately (may be refrigerated for up to 24 hrs).

IV INCOMPATIBILITIES

Do not use dextrose-containing solutions.

INDICATIONS/ROUTES/DOSAGE

Metastatic Breast Cancer

IV Infusion: ADULTS/ELDERLY: 3.6 mg/kg every 3 wks.

Dose Modification

Reduction Schedule for Adverse Effects:

Initial dose: 3.6 mg/kg. First reduction: 3 mg/kg. Second reduction: 2.4 mg/kg.

Increased ALT, AST: If less than 5 times upper limit normal (ULN), continue same dose. If 5–20 times ULN, hold until less than 5 times ULN and reduce by one dose level. If greater than 20 times ULN, discontinue. **Increased Bilirubin:** Hold until less than 1.5 times ULN, then continue same dose. If 3–10 times ULN, hold until less than 1.5 times ULN, then reduce by one dose level. If greater than 10 times ULN, discontinue. **Left Ventricular Dysfunction:** If LVEF greater than 45%, continue same dose. If LVEF 40%–45% with a decrease less than 10% from baseline, continue dose (or reduce) and repeat LVEF in 3 wks. If LVEF 40%–45% with decrease greater than 10% from baseline, hold and repeat assessment in 3 wks. Discontinue therapy if no recovery within 10% of baseline, LVEF less than 40%, or symptomatic HF. **Thrombocytopenia:** If platelet count is 25,000 mm^3–50,000 mm^3, hold until level greater than 75,000 mm^3 and then continue same dose. If platelet count is less than 25,000 mm^3, hold until level greater than 75,000 mm^3 and reduce one dose level.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (40%–21%): Nausea, fatigue, musculoskeletal pain, headache, constipation, diarrhea. **Occasional (19%–7%):** Abdominal pain, vomiting, pyrexia, arthralgia, asthenia, cough, dry mouth, stomatitis, myalgia, insomnia, rash, dizziness, dyspepsia, chills, dysgeusia, peripheral edema. **Rare (6%–3%):** Pruritus, blurry vision, dry eye, conjunctivitis, lacrimation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hepatotoxicity may include elevated transaminase, nodular regenerative hyperplasia, portal hypertension. Left ventricular dysfunction reported in 1.8% of pts. Interstitial lung disease (ILD), including pneumonitis, may lead to ARDS. Hypersensitivity reactions reported in 1.4% of pts. Thrombocytopenia (34% of pts) may increase risk of bleeding. Peripheral neuropathy observed rarely. Approx. 5.3% of pts tested positive for anti–ado-trastuzumab antibodies (immunogenicity).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, BMP, PT/INR if on anticoagulants. Confirm HER2-positive titer. Screen for baseline HF, hepatic impairment, peripheral edema, pulmonary disease, thrombocytopenia. Obtain negative pregnancy test before initiating treatment. Question current breastfeeding status. Obtain baseline echocardiogram for LVEF status.

INTERVENTION/EVALUATION

Observe for hypersensitivity reactions during infusion. Monitor LFT, potassium levels before and during treatment. Obtain LVEF q3mos or with any dose reduction regarding LVEF status. Assess for bruising, jaundice, right upper quadrant (RUQ) abdominal pain. Obtain anti–ado-trastuzumab antibody titer if immunogenicity suspected. Obtain stat EKG for

tolerated. **Chronic Use of P-glycoprotein Inducers:** Increase daily dose by 10 mg if tolerated. May resume initial dose 2–3 days after discontinuation of P-gp inducer. **Moderate to Severe Diarrhea (more than 48 hrs):** Withhold dose until resolution to mild diarrhea. **Moderate Cutaneous Skin Reaction (more than 7 days):** Withhold dose until reaction resolves, then reduce dose appropriately. **Suspected Keratitis:** Withhold until appropriately ruled out. If keratitis confirmed, continue only if benefits outweigh risks.

Permanent Discontinuation

Persistent severe diarrhea, respiratory distress, severe dry eye, or life-threatening bullous, blistering, exfoliating lesions, persistent ulcerative keratitis, interstitual lung disease.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (96%–58%): Diarrhea, rash, dermatitis, stomatitis, paronychia (nail infection). **Occasional (31%–11%):** Dry skin, decreased appetite, pruritus, epistaxis, weight loss, cystitis, pyrexia, cheilitis (lip inflammation), rhinorrhea, conjunctivitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Diarrhea may lead to severe, sometimes fatal, dehydration or renal impairment. Bullous and exfoliative skin lesions occur rarely. Rash, erythema, acneiform lesions occur in 90% of pts. Palmar-plantar erythrodysesthesia syndrome (PPES), a chemotherapy-induced skin condition that presents with redness, swelling, numbness, skin sloughing of the hands and feet, has been reported. Interstitial lung disease (ILD), including pulmonary infiltration, pneumonitis, ARDS, allergic alveolitis, reported in 2% of pts. Hepatotoxicity reported in 10% of pts. Keratitis such as eye inflammation, lacrimation, light sensitivity, blurred vision, red eye occur in 1% of pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, BMP, visual acuity. Obtain negative pregnancy test before initiating therapy. Question current breastfeeding status. Screen for history/co-morbidities, contact lens use. Receive full medication history including vitamins, herbal products. Assess skin for lesions, ulcers, open wounds.

INTERVENTION/EVALUATION

Monitor renal/hepatic function tests, urine output. Encourage PO intake. Assess for hydration status. Offer antidiarrheal medication for loose stool. Report oliguria, dark or concentrated urine. Immediately report skin lesions, vision changes, dry eye, severe diarrhea. Obtain chest X-ray if ILD suspected.

PATIENT/FAMILY TEACHING

• Most pts experience diarrhea and severe cases may lead to dehydration or kidney failure; maintain adequate hydration. • Avoid pregnancy; contraception should be used during treatment and up to 2 wks after discontinuation. • Report any yellowing of skin or eyes, abdominal pain, bruising, black/tarry stools, dark urine, decreased urine output. • Minimize exposure to sunlight. • Immediately report eye problems (pain, swelling, blurred vision, vision changes) or skin blistering/redness. • Do not eat 1 hr before or 2 hrs after dose. • Do not wear contact lenses (may increase risk of keratitis).

albiglutide

al-bi-**gloo**-tide
(Tanzeum)

■ **BLACK BOX ALERT** ■ Contraindicated in pts with a personal/family history of medullary thyroid

Patient Instruction for Reconstitution • Slowly and gently rock pen side to side 5 times to mix. • Avoid shaking; may cause foaming and alter desired dose. • Wait 15 min for 30-mg pen or 30 min for 50-mg pen to ensure solution is mixed. • After waiting, slowly and gently rock pen side-to side 5 additional times to finalize full reconstitution. • Visually inspect solution for particulate matter in viewing window.

Professional Healthcare Instruction for Reconstitution: • Hold pen with clear cartridge pointing up and maintain upward orientation throughout reconstitution. • Gently swirl pen in small circular motion for at least 1 min. • Avoid shaking; may cause foaming and alter desired dose. • Inspect solution and, if needed, continue to gently swirl pen until fully dissolved and free of all particles (2–5 min for 30-mg pen or 7–10 min for 50-mg pen). • A small amount of foaming on top of solution at end of reconstitution is normal. • Verify solution is yellow in color.

Preparation

• Holding pen upright, attach needle • Gently tap clear cartridge to bring large bubbles to top. • Remove air bubbles by slowly twisting pen until the [3] is seen in number window. • At same time, injection button will automatically release from bottom of pen.

Administration

• Subcutaneously insert needle into abdomen, thigh, or upper arm region. • Press injection button until "click" is heard, then hold button for additional 5 sec to deliver full dose. • Do not reuse needle. • Rotate injection sites.

Storage

• Mixed solution should appear yellow; free of all particles. • Use within 8 hrs of reconstitution. • Once needle is attached, use immediately; product can clog needle if allowed to dry after priming. • Refrigerate unused pens; do not freeze. • Once dispensed, may store pen at room temperature up to 4 wks.

INDICATIONS/ROUTES/DOSAGE

Type 2 Diabetes Mellitus

Subcutaneous: ADULTS/ELDERLY: 30 mg once weekly into abdomen, thigh, or upper arm region. May increase to 50 mg once weekly if glycemic response inadequate.

Dose Modification

Concomitant Use with Insulin Secretagogue (e.g., Sulfonylurea) or Insulin: Consider reduced dose based on glycemic goal.

Dosage in Renal Impairment

No adjustment necessary for mild, moderate, or severe impairment.

Dosage in Hepatic Impairment

Not specified.

SIDE EFFECTS

Occasional (14%–5%): Upper respiratory tract infection, diarrhea, nausea, injection site reactions (hematoma, erythema, rash, cough, back pain, arthralgia, sinusitis, influenza). **Rare (3%–2%):** Dyspepsia, vomiting, gastric reflux.

ADVERSE EFFECTS/TOXIC REACTIONS

May increase risk of acute renal failure or worsening of chronic renal impairment (esp. with dehydration), severe gastroparesis, thyroid C-cell tumors. May increase risk of hypoglycemia when used with other hypoglycemic agents or insulin. Dyspnea, pruritus, rash may indicate hypersensitivity reaction. Other adverse events included appendicitis (0.3% of pts), atrial fibrillation/flutter (1% of pts), pancreatitis (0.3% of pts), pneumonia (1.8% of pts). Immunogenicity (anti-alglutide antibody formation) reported in 5.5% of pts. Some pts with antibody formation also tested positive for antibodies to GLP-1 and human albumin. May cause increase risk hepatic injury (elevated LFT).

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	15 min (in well-hydrated pt)	N/A	Dependent on initial blood volume

Distributed throughout extracellular fluid. **Half-life:** 15–20 days.

potentiate cardiovascular effects. May increase effects of **loop diuretics** (produce hypokalemia), **sympathomimetics** (increase CNS stimulation). **HERBAL:** **St. John's wort** may decrease level/effects. **Ephedra, yohimbe** may cause CNS stimulation. **FOOD:** Limit caffeine (may cause CNS stimulation). **LAB VALUES:** May increase blood glucose level. May decrease serum potassium level.

AVAILABILITY (Rx)

Inhalation Aerosol (ProAir HFA, Proventil HFA, Ventolin HFA): 90 mcg/spray. **Solution for Nebulization: AccuNeb:** 0.63 mg/3 ml (0.021%), 1.25 mg/3 ml (0.042%). **Proventil:** 2.5 mg/3 ml (0.084%), 5 mg/ml (0.5%). **Syrup:** 2 mg/5 ml. **Tablets (Proventil, Ventolin):** 2 mg, 4 mg.

treatment and for at least 3 mos after last dose. **Pregnancy Category C. Children:** Safety and efficacy not established. **Elderly:** No age-related precautions noted.

INTERACTIONS

DRUG: May increase levels/effects of **clozapine, natalizumab, vaccines (live). Pimecrolimus, tacrolimus** may decrease level/effects. **HERBAL:** **Echinacea** may decrease effects. **FOOD:** None known. **LAB VALUES:** May decrease Hgb, platelet count, WBC count.

AVAILABILITY (Rx)

Injection Solution: 30 mg/ml.

ADMINISTRATION/HANDLING

INTERACTIONS

DRUG: **Calcium, antacids** may decrease absorption. **Aspirin, NSAIDs** may increase risk of ulcers, upper GI adverse effects. **HERBAL:** None significant. **FOOD:** Concurrent **beverages, dietary supplements, food** may interfere with absorption. **Caffeine** may reduce efficacy. **LAB VALUES:** Reduces serum calcium, phosphate concentrations. Significant decrease in serum alkaline phosphatase noted in pts with Paget's disease.

AVAILABILITY (Rx)

Solution, Oral: 70 mg/75 ml. **Tablets:** 5 mg, 10 mg, 35 mg, 40 mg, 70 mg. **Tablets, Effervescent:** **(Binosto):** 70 mg.

ADMINISTRATION/HANDLING

PO

• Give at least 30 min before first food, beverage, or medication of the day. • **Tablets:** Give with 6–8 oz plain water only (mineral water, coffee, tea, juice will decrease absorption). • **Tablets, Effervescent:** Dissolve in 4 oz water. Wait at least 5 min after effervescence stops. Stir for 10 sec and drink. **Oral Solution:** Follow with at least 2 oz of water.

INDICATIONS/ROUTES/DOSAGE

Osteoporosis (in Men)

PO: ADULTS, ELDERLY: 10 mg once a day in the morning or 70 mg weekly.

Glucocorticoid-Induced Osteoporosis

PO: ADULTS, ELDERLY: 5 mg once a day in the morning. **POSTMENOPAUSAL WOMEN NOT RECEIVING ESTROGEN:** 10 mg once a day in the morning.

Postmenopausal Osteoporosis

PO *(Treatment)*: ADULTS, ELDERLY: 10 mg once a day in the morning or 70 mg weekly.

PO *(Prevention)*: ADULTS, ELDERLY: 5 mg once a day in the morning or 35 mg weekly.

Paget's Disease

PO: ADULTS, ELDERLY: 40 mg once a day in the morning for 6 mos.

Dosage in Renal Impairment

Not recommended with creatinine clearance less than 35 ml/min.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (8%–7%): Back pain, abdominal pain. **Occasional (3%–2%):** Nausea, abdominal distention, constipation, diarrhea, flatulence. **Rare (less than 2%):** Rash; severe bone, joint, muscle pain.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose produces hypocalcemia, hypophosphatemia, significant GI disturbances. Esophageal irritation occurs if not given with 6–8 oz of plain water or if pt lies down within 30 min of administration.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Serum chemistries (esp. calcium, phosphorus, alkaline phosphatase serum levels). Hypocalcemia, vitamin D deficiency must be corrected before therapy.

INTERVENTION/EVALUATION

Monitor chemistries (esp. serum calcium, phosphorus, alkaline phosphatase levels).

PATIENT/FAMILY TEACHING

• Expected benefits occur only when medication is taken with full glass (6–8 oz) of plain water, first thing in the morning and at least 30 min before first food, beverage, or medication of the day is taken. Any other beverage (mineral water, orange juice, coffee) significantly reduces absorption of medication. • Do not lie down for at least 30 min after taking medication (potentiates delivery to stomach, reducing risk of esophageal irritation). • Report if

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NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for sensitivity to alfuzosin, use of other alpha-blocking agents (doxazosin, prazosin, tamsulosin, terazosin). Obtain B/P.

INTERVENTION/EVALUATION

Assist with ambulation if dizziness occurs. Report headache. Monitor for hypotension. Question for improvement in urine flow, hesitancy.

PATIENT/FAMILY TEACHING

- Take after the same meal each day.
- Avoid tasks that require alertness, motor skills until response to drug is established.
- Do not chew, crush, dissolve, or divide extended-release tablets.

aliskiren

HIGH ALERT

a-lis-**kye**-ren
(Rasilez, Tekturna)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

Do not confuse Tekturna with Valturna.

FIXED-COMBINATION(S)

Amturnide: aliskiren/amlodipine (a calcium channel blocker)/hydrochlorothiazide (a diuretic): 150 mg/5 mg/12.5 mg, 300 mg/5 mg/12.5 mg, 300 mg/5 mg/25 mg, 300 mg/10 mg/12.5 mg, 300 mg/10 mg/25 mg. **Tekamlo:** aliskiren/amlodipine (a calcium channel blocker): 150 mg/5 mg, 150 mg/10 mg, 300 mg/5 mg, 300 mg/10 mg. **Tekturna HCT:** aliskiren/hydrochlorothiazide (a diuretic): 150 mg/12.5 mg, 150 mg/25 mg, 300 mg/12.5 mg, 300 mg/25 mg. **Valturna:** aliskiren/valsartan (an angiotensin II receptor antagonist): 150 mg/160 mg, 300 mg/320 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Renin-angiotensin system antagonist. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension. May be used alone or in combination with other antihypertensives.

PRECAUTIONS

Contraindications: Concurrent use with ACE inhibitor or Angiotensin II Receptor Blockers in pts with diabetes. **Cautions:** Severe renal impairment. History of angioedema, dialysis, nephrotic syndrome, renovascular hypertension. Concurrent use with P-glycoprotein inhibitors (e.g., cyclosporine).

ACTION

Direct renin inhibitor. Decreases plasma renin activity (PRA), inhibiting the conversion of angiotensinogen to angiotensin I, blocking the effect of increased renin levels. **Therapeutic Effect:** Reduces B/P.

PHARMACOKINETICS

Peak plasma concentration reached within 1–3 hrs. Protein binding: 49%. Metabolized in liver. Minimally excreted in urine. Peak plasma steady-state levels reached in 7–8 days. **Half-life:** 24 hrs.

ACTION

Decreases uric acid production by inhibiting xanthine oxidase, an enzyme responsible for converting xanthine to uric acid. **Therapeutic Effect:** Reduces uric acid concentrations in serum and urine.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO, IV	2–3 days	1–3 wks	1–2 wks

Well absorbed from GI tract. Widely distributed. Protein binding: less than 1%. Metabolized in liver. Excreted primarily in urine. Removed by hemodialysis. **Half-life:** 1–3 hrs; metabolite, 12–30 hrs.

almotriptan

al-moe-**trip**-tan
(Axert)
Do not confuse almotriptan with alvimopan, or Axert with Antivert.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin receptor agonist (5-HT_{1B}). **CLINICAL:** Antimigraine.

USES

Acute treatment of migraine headache with or without aura in adults. Acute treatment of migraine headache in adolescents 12–17 yrs with history of migraine with or without aura and having attacks usually lasting 4 or more hrs when left untreated.

PRECAUTIONS

Contraindications: Cerebrovascular disease (e.g., stroke, transient ischemic attacks), peripheral vascular disease (e.g., ischemic bowel disease), hemiplegic or basilar migraine, ischemic heart disease (including angina pectoris, history of MI, silent ischemia, and Prinzmetal's angina), uncontrolled hypertension, use within 24 hrs of ergotamine-containing preparations or another 5-HT_{1B} agonist. **Cautions:** Mild to moderate renal or hepatic impairment, pt profile suggesting cardiovascular risks, controlled hypertension; history of CVA, sulfonamide allergy.

ACTION

Binds selectively to serotonin receptors in cranial arteries producing a vasoconstrictive effect. **Therapeutic Effect:** Produces relief of migraine headache.

PHARMACOKINETICS

Well absorbed after PO administration. Protein binding: 35%. Metabolized by liver. Primarily excreted in urine. **Half-life:** 3–4 hrs.

INTERACTIONS

DRUG: **Insulin, oral hypoglycemics** may increase risk of hypoglycemia. **HERBAL:** Herbal supplements having hypoglycemic effects may increase risk of hypoglycemia. **FOOD:** None known. **LAB VALUES:** May decrease serum glucose. May increase serum ALT, AST.

AVAILABILITY (Rx)

Tablets: 6.25 mg, 12.5 mg, 25 mg.

ADMINISTRATION/HANDLING

PO

- May give without regard to food.

INDICATIONS/ROUTES/DOSAGE

Type 2 Diabetes Mellitus

PO: ADULTS/ELDERLY: 25 mg once daily.

Dosage in Renal Impairment

Creatinine clearance 30–59 ml/min: 12.5 mg once daily. **Creatinine clearance less than 30 ml/min:** 6.25 mg once daily.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (4%): Nasopharyngitis, cough, headache, upper respiratory tract infections.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypoglycemia reported in 1.5% of pts (5% specifically in elderly). Concomitant use of hypoglycemic medication may increase hypoglycemic risk. Pancreatitis reported in less than 1%. Hypersensitivity reactions including angioedema (tongue/lip swelling), urticaria, bronchospasm occur rarely. Hepatic failure (fatal vs. nonfatal) reported in less than 2% of pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline serum chemistries, capillary blood glucose, hemoglobin A1c level. Assess pt's understanding of diabetes management, routine home glucose monitoring. Receive full medication history, including vitamins, minerals, herbal products. Question history of co-morbidities, esp. alcohol dependency, renal or hepatic impairment.

INTERVENTION/EVALUATION

Monitor blood glucose, hemoglobin A1c level, hepatic/renal function tests. Assess for hypoglycemia (diaphoresis, tremors, anxiety, headache, tachycardia, perioral numbness, diplopia, difficulty concentrating), hyperglycemia (polyuria, polydipsia, fatigue, Kussmaul breathing), hypersensitivity reaction. Screen for glucose-altering conditions: fever, increased activity or stress, surgical procedures. Obtain dietary consult for nutritional education. Severe abdominal pain, nausea may indicate pancreatitis.

PATIENT/FAMILY TEACHING

• Diabetes mellitus requires lifelong control. Diet and exercise are principal parts of treatment; do not skip or delay meals. • Test blood glucose regularly. • When taking combination drug therapy or when glucose demands are altered (e.g., by fever, infection, trauma, stress, heavy physical activity), have hypoglycemic treatment (glucagon, oral dextrose) available. • Report suspected pregnancy or plans of breastfeeding. • Monitor daily calorie intake. • Avoid alcohol. • Report abdominal pain, yellowing of the skin or eyes, fatigue, loss of appetite, dark urine, or decreased urine output.

alprazolam

al-**praz**-oh-lam

(Alprazolam Intensol, Apo-Alpraz, Niravam, Xanax, Xanax XR)

Do not confuse alprazolam with lorazepam, or Xanax with Tenex, Tylox, Xopenex, Zantac, or Zyrtec.

HEPATIC DISEASE OR LOW SERUM ALBUMIN: Initially, 0.25 mg 2–3 times a day. Gradually increase to optimum therapeutic response.

PO *(Orally Disintegrating)*: ADULTS: 0.25–0.5 mg 3 times a day. **Maximum:** 4 mg/day in divided doses.

Anxiety with Depression

PO: ADULTS: (average dose required) 2.5–3 mg/day in divided doses.

Panic Disorder

PO *(Immediate-Release)*: ADULTS: Initially, 0.5 mg 3 times a day. May increase at 3- to 4-day intervals in increments of 1 mg or less a day. Range: 5–6 mg/day. **Maximum:** 10 mg/day. **ELDERLY:** Initially, 0.125–0.25 mg twice a day. May increase in 0.125-mg increments until desired effect attained.

PO *(Extended-Release)*:

◀ALERT▶ To switch from immediate-release to extended-release form, give total daily dose (immediate-release) as a single daily dose of extended-release form.

ADULTS: Initially, 0.5–1 mg once a day. May titrate at 3- to 4-day intervals. Range: 3–6 mg/day. **Maximum:** 10 mg/day.

ELDERLY: Initially, 0.5 mg once a day.

PO *(Orally Disintegrating)*: ADULTS: Initially, 0.5 mg 3 times a day. May increase at 3- to 4-day intervals. Range: 5–6 mg/day. **Maximum:** 10 mg/day.

Dosage in Hepatic Impairment

Severe Disease: Immediate-Release: 0.25 mg 2–3 mg times/day. **Extended-Release:** 0.5 mg once daily.

SIDE EFFECTS

Frequent (41%–20%): Ataxia, lightheadedness, drowsiness, slurred speech (particularly in elderly or debilitated pts). **Occasional (15%–5%):** Confusion, depression, blurred vision, constipation, diarrhea, dry mouth, headache, nausea. **Rare (4% or less):** Behavioral problems such as anger, impaired memory; paradoxical reactions (insomnia, nervousness, irritability).

ADVERSE EFFECTS/ TOXIC REACTIONS

Abrupt or too-rapid withdrawal may result in restlessness, irritability, insomnia, hand tremors, abdominal/muscle cramps, diaphoresis, vomiting, seizures. Overdose results in drowsiness, confusion, diminished reflexes, coma. Blood dyscrasias noted rarely. **Antidote:** Flumazenil (see Appendix K for dosage).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess degree of anxiety; assess for drowsiness, dizziness, light-headedness. Assess motor responses (agitation, trembling, tension), autonomic responses (cold/clammy hands, diaphoresis).

INTERVENTION/EVALUATION

For pts on long-term therapy, perform hepatic/renal function tests, CBC periodically. Assess for paradoxical reaction, particularly during early therapy. Evaluate for therapeutic response: calm facial expression, decreased restlessness, insomnia. Monitor respiratory and cardiovascular status.

PATIENT/FAMILY TEACHING

• Drowsiness usually disappears during continued therapy. • If dizziness occurs, change positions slowly from recumbent to sitting position before standing. • Avoid tasks that require alertness, motor skills until response to drug is established. • Smoking reduces drug effectiveness. • Sour hard candy, gum, sips of water may relieve dry mouth. • Do not abruptly withdraw medication after long-term therapy. • Avoid alcohol. • Do not take other medications without consulting physician.

Canadian trade name

Overdose manifested as apnea, flushing of the face/arms, bradycardia. Cardiac arrest, sepsis, seizures, thrombocytopenia occur rarely.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Monitor arterial pressure by umbilical artery catheter, auscultation, Doppler transducer. Monitor for symptoms of hypotension. If significant decrease in arterial pressure occurs, decrease infusion rate immediately. Maintain continuous cardiac monitoring. Assess heart sounds, femoral pulse (circulation to lower extremities), arterial blood gases, respiratory status frequently. If apnea or bradycardia occurs, discontinue infusion and notify physician. In infants with restricted systemic blood flow, efficacy should be measured by monitoring improvement of systemic B/P and blood pH.

PATIENT/FAMILY TEACHING

- Therapy maintains patency of ductus arteriosus until surgery is performed.

alteplase

HIGH ALERT

al-te-plase
(Activase, Cathflo Activase)
Do not confuse alteplase or Activase with Altace, or Activase with Cathflo Activase.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Tissue plasminogen activator (tPA). **CLINICAL:** Thrombolytic.

USES

Treatment of acute MI for lysis of thrombi in coronary arteries, acute ischemic stroke, acute massive pulmonary embolism. Treatment of occluded central venous catheters. **OFF-LABEL:** Acute peripheral occlusive disease, prosthetic valve thrombosis. Acute ischemic stroke presenting 3–4½ hrs after onset of symptoms.

PRECAUTIONS

Contraindications: Active internal bleeding, AV malformation or aneurysm, bleeding diathesis CVA, intracranial neoplasm, intracranial or intraspinal surgery or trauma, recent (within past 2 mos), severe uncontrolled hypertension, suspected aortic dissection. **Cautions:** Recent (within 10 days) major surgery or GI bleeding, OB delivery, organ biopsy, recent trauma or CPR, left heart thrombus, endocarditis, severe hepatic disease, pregnancy, elderly, cerebrovascular disease, diabetic retinopathy, thrombophlebitis, occluded AV cannula at infected site.

ACTION

Binds to fibrin in a thrombus and converts entrapped plasminogen to plasmin, initiating fibrinolysis. **Therapeutic Effect:** Degrades fibrin clots, fibrinogen, other plasma proteins.

PHARMACOKINETICS

Rapidly metabolized in liver. Primarily excreted in urine. **Half-life:** 35 min.

Usual Neonatal Dosage

Occluded IV Catheter: Use 1 mg/ml conc (**maximum:** 2 mg/2 ml) leave in lumen up to 2 hrs, then aspirate.

Systemic Thrombosis: 0.1–0.6 mg/kg/hr for 6 hrs.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Superficial bleeding at puncture sites, decreased B/P. **Occasional:** Allergic reaction (rash, wheezing, bruising).

ADVERSE EFFECTS/ TOXIC REACTIONS

Severe internal hemorrhage may occur. Lysis of coronary thrombi may produce atrial or ventricular arrhythmias or stroke.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess for contraindications to therapy. Obtain baseline B/P, apical pulse. Record weight. Evaluate 12-lead EKG, cardiac enzymes, electrolytes. Assess Hct, platelet count, thrombin time (TT), prothrombin time (PT), activated partial thromboplastin time (aPTT), fibrinogen level before therapy is instituted. Type, crossmatch, hold blood.

INTERVENTION/EVALUATION

Perform continuous cardiac monitoring for arrhythmias. Check B/P, pulse, respirations q15min until stable, then hourly. Check peripheral pulses, heart and lung sounds. Monitor for chest pain relief and notify physician of continuation or recurrence (note location, type, intensity). Assess for bleeding: overt blood, occult blood in any body substance. Monitor aPTT per protocol. Maintain B/P; avoid any trauma that might increase risk of bleeding (e.g., injections, shaving). Assess neurologic status frequently.

amantadine

a-**man**-ta-deen
(Dom-Amantadine, PMS-Amantadine)

Do not confuse amantadine with ranitidine or rimantadine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Dopaminergic agonist. **CLINICAL:** Antiviral, antiparkinson agent.

USES

Prevention, treatment of respiratory tract infections due to influenza virus, Parkinson's disease, drug-induced extrapyramidal reactions.

PRECAUTIONS

Contraindications: None known. **Cautions:** History of seizures, orthostatic hypotension, HF, peripheral edema, hepatic disease, recurrent eczematoid dermatitis, cerebrovascular disease, renal dysfunction, those receiving CNS stimulants, uncontrolled psychosis. Untreated angle-closure glaucoma, severe psychoneurosis.

ACTION

Antiviral: Blocks uncoating of influenza A virus, preventing penetration into the host and inhibiting M2 protein in the assembly of progeny virions. **Antiparkinson:** Blocks reuptake of dopamine into presynaptic neurons and causes direct stimulation of postsynaptic receptors. **Therapeutic Effect:** Antiviral, antiparkinsonian activity.

PHARMACOKINETICS

Rapidly and completely absorbed from GI tract. Protein binding: 67%. Widely distributed. Primarily excreted in urine. Minimally removed by hemodialysis. **Half-life:** 11–15 hrs (increased in elderly, decreased in renal impairment).

INTERVENTION/EVALUATION

Monitor I&O, renal function tests; check for peripheral edema. Evaluate food tolerance, vomiting. Assess skin for mottling or rash. Assess for dizziness. **Parkinson's disease:** Assess for clinical reversal of symptoms (improvement of tremor of head/hands at rest, mask-like facial expression, shuffling gait, muscular rigidity).

PATIENT/FAMILY TEACHING

• Do not take any other medications without consulting physician. • Avoid alcohol. • Avoid tasks that require alertness, motor skills until response to drug is established (may cause dizziness, blurred vision). • Go from lying to standing slowly. • Report new symptoms, esp. blotching, rash, dizziness, blurred vision, nausea/vomiting, muscle rigidity. • Take nighttime dose several hours before bedtime to prevent insomnia.

ambrisentan

am-**bri**-sen-tan
(Letairis, Volibris)

■ **BLACK BOX ALERT** ■ Likely to produce serious birth defects if used by pregnant women.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Endothelin receptor antagonist. **CLINICAL:** Vasodilator.

USES

Treatment of pulmonary arterial hypertension (PAH) to improve exercise ability, decrease rate of clinical deterioration.

PRECAUTIONS

Contraindications: Pregnancy, women who may become pregnant, idiopathic pulmonary fibrosis. **Extreme Caution:** Moderate to severe hepatic impairment. **Cautions:** Mild hepatic impairment, low hemoglobin levels, clinically significant anemia.

ACTION

Blocks endothelin receptor subtypes ET_A and ET_B on vascular endothelium and smooth muscle, leading to vasodilation. **Therapeutic Effect:** Improves symptoms of pulmonary arterial hypertension (e.g., improves exercise ability), decreases rate of clinical deterioration.

PHARMACOKINETICS

Rapidly absorbed. Protein binding: 99%. Not eliminated by renal pathways. **Half-life:** 9 hrs.

PHARMACOKINETICS

Rapid, complete absorption after IM administration. Protein binding: 0%–10%. Widely distributed (penetrates blood-brain barrier when meninges are inflamed). Excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 2–4 hrs (increased in renal impairment, neonates; decreased in cystic fibrosis, burn pts, febrile pts).

USES

Management of life-threatening recurrent ventricular fibrillation, hemodynamically unstable ventricular tachycardia (VT) unresponsive to other therapy. **OFF-LABEL:** Treatment of atrial fibrillation, paroxysmal supraventricular tachycardia (SVT); ventricular tachyarrhythmias.

PRECAUTIONS

Contraindications: Bradycardia-induced syncope (except in the presence of a pacemaker), second- and third-degree AV block (except in presence of a pacemaker), severe sinus node dysfunction, cardiogenic shock. Hypersensitivity to iodine. **Cautions:** May prolong QT interval. Thyroid disease, electrolyte imbalance, hepatic disease, hypotension, left ventricular dysfunction, pulmonary disease. Pts taking warfarin, surgical pts.

ACTION

Prolongs duration of myocardial cell action potential and refractory period by acting directly on all cardiac tissue. Decreases AV and sinus node function. **Therapeutic Effect:** Suppresses arrhythmias.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	3 days–3 wks	1 wk–5 mos	7–50 days after discontinuation

Slowly, variably absorbed from GI tract. Protein binding: 96%. Extensively metabolized in liver. Excreted via bile; not removed by hemodialysis. **Half-life:** 26–107 days; metabolite, 61 days.

significant interval changes. Assess for nausea, fatigue, paresthesia, tremor. Monitor for signs of hypothyroidism (periorbital edema, lethargy, pudgy hands/feet, cool/pale skin, vertigo, night cramps) and hyperthyroidism (hot/dry skin, bulging eyes [exophthalmos], frequent urination, eyelid edema, weight loss, difficulty breathing). Monitor serum ALT, AST, alkaline phosphatase for evidence of hepatic toxicity. Assess skin, cornea for bluish discoloration in pts who have been on drug therapy longer than 2 mos. Monitor thyroid function test results. If elevated hepatic enzymes occur, dosage reduction or discontinuation is necessary. Monitor for therapeutic serum level (0.5–2.5 mcg/ml). Toxic serum level not established.

PATIENT/FAMILY TEACHING

• Protect against photosensitivity reaction on skin exposed to sunlight. • Bluish skin discoloration gradually disappears when drug is discontinued. • Report shortness of breath, cough. • Outpatients should monitor pulse before taking medication. • Do not abruptly discontinue medication. • Compliance with therapy regimen is essential to control arrhythmias. • Restrict salt, alcohol intake. • Avoid grapefruit products. • Recommend ophthalmic exams q6mos. • Report any vision changes, signs/symptoms of cardiac arrhythmias.

amitriptyline

a-mi-**trip**-ti-leen
(Elavil, Levate, Novo-Tryptyn)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal thinking and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse amitriptyline with aminophylline, imipramine, or nortriptyline, or Elavil with Eldepryl, enalapril, Equanil, or Mellaril.

FIXED-COMBINATION(S)

Limbitrol: amitriptyline/chlordiazepoxide (an antianxiety): 12.5 mg/5 mg, 25 mg/10 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tricyclic.
CLINICAL: Antidepressant, antineuralgic, antibulimic.

USES

Treatment of various forms of depression, exhibited as persistent, prominent dysphoria (occurring nearly every day for at least 2 wks) manifested by 4 of 8 symptoms: appetite change, sleep pattern change, increased fatigue, impaired concentration, feelings of guilt or worthlessness, loss of interest in usual activities, psychomotor agitation or retardation, suicidal tendencies. **OFF-LABEL:** Relief of neuropathic pain, related to diabetic neuropathy or postherpetic neuralgia; treatment of migraine. Treatment of depression in children, post-traumatic stress disorder (PTSD).

PRECAUTIONS

Contraindications: Acute recovery period after MI, use within 14 days of MAOIs. **Cautions:** Prostatic hypertrophy, history of urinary retention or obstruction, narrow-angle glaucoma, diabetes mellitus, seizures, hyperthyroidism, cardiac/hepatic/renal disease, schizophrenia, xerostomia, visual problems, constipation or bowel obstruction, elderly, increased intraocular pressure (IOP), hiatal hernia.

ACTION

Blocks reuptake of neurotransmitters (norepinephrine, serotonin) at presynaptic membranes, increasing availability at postsynaptic receptor sites. Strong anticholinergic activity. **Therapeutic Effect:** Antidepressant effect.

A

long-term therapy, hepatic/renal function tests, blood counts should be performed periodically.

INTERVENTION/EVALUATION

Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Assess appearance, behavior, speech pattern, level of interest, mood. Monitor B/P for hypotension, pulse, arrhythmias. **Therapeutic serum level:** Peak: 120–250 ng/ml; **toxic serum level:** greater than 500 ng/ml.

PATIENT/FAMILY TEACHING

• Change positions slowly to avoid hypotensive effect. • Tolerance to postural hypotension, sedative and anticholinergic effects usually develop during early therapy. • Maximum therapeutic effect may be noted in 2–4 wks. • Sensitivity to sun may occur. • Report visual disturbances. • Do not abruptly discontinue medication. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • Sips of water may relieve dry mouth.

amlodipine

TOP 100

am-**loe**-di-peen
(Apo-Amlodipine, Norvasc)
Do not confuse amlodipine with amiloride, or Norvasc with Navane or Vascor.

FIXED-COMBINATION(S)

Anturnide: amlodipine/aliskiren (a renin inhibitor)/hydrochlorothiazide (a diuretic): 5 mg/150 mg/12.5 mg, 5 mg/300 mg/12.5 mg, 5 mg/300 mg/25 mg, 10 mg/300 mg/12.5 mg, 10 mg/300 mg/25 mg. **Azor:** amlodipine/olmesartan (an angiotensin II receptor antagonist): 5 mg/20 mg, 10 mg/20 mg, 5 mg/40 mg, 10 mg/40 mg. **Caduet:** amlodipine/atorvastatin (hydroxamethylglutaryl-CoA [HMG-CoA] reductase inhibitor): 2.5 mg/10 mg, 2.5 mg/20 mg, 2.5 mg/40 mg, 5 mg/10 mg, 10 mg/10 mg, 5 mg/20 mg, 10 mg/20 mg, 5 mg/40 mg, 10 mg/40 mg, 5 mg/80 mg, 10 mg/80 mg. **Exforge:** amlodipine/valsartan (an angiotensin II receptor antagonist): 5 mg/160 mg, 10 mg/160 mg, 5 mg/320 mg, 10 mg/320 mg. **Exforge HCT:** amlodipine/valsartan/hydrochlorothiazide (a diuretic): 5 mg/160 mg/12.5 mg, 5 mg/160 mg/25 mg, 10 mg/160 mg/12.5 mg, 10 mg/160 mg/25 mg, 10 mg/320 mg/25 mg. **Lotrel:** amlodipine/benazepril (an angiotensin-converting enzyme [ACE] inhibitor): 2.5 mg/10 mg, 5 mg/10 mg, 5 mg/20 mg, 5 mg/40 mg, 10 mg/20 mg, 10 mg/40 mg. **Tekamlo:** amlodipine/aliskiren (a renin inhibitor): 5 mg/150 mg, 5 mg/300 mg, 10 mg/150 mg, 10 mg/300 mg. **Tribenzor:** amlodipine/olmesartan/hydrochlorothiazide: 5 mg/20 mg/12.5 mg, 5 mg/40 mg/12.5 mg, 5 mg/40 mg/25 mg, 10 mg/40 mg/12.5 mg, 10 mg/40 mg/25 mg. **Twynsta:** amlodipine/telmisartan (an angiotensin II receptor antagonist): 5 mg/40 mg, 5 mg/80 mg, 10 mg/40 mg, 10 mg/80 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Calcium channel blocker. **CLINICAL:** Antihypertensive, antianginal.

USES

Management of hypertension, chronic stable angina, vasospastic (Prinzmetal's or variant) angina. May be used alone or with other antihypertensives or antianginals.

PRECAUTIONS

Contraindications: None known. **Cautions:** Hepatic impairment, aortic stenosis, hypertophic cardiomyopathy with outflow tract obstruction.

A

PATIENT/FAMILY TEACHING

• Do not abruptly discontinue medication. • Compliance with therapy regimen is essential to control hypertension. • Avoid tasks that require alertness, motor skills until response to drug is established. • Do not ingest grapefruit products.

amoxicillin

a-**mox**-i-sil-in
(Apo-Amoxi, Moxatag, Novamoxin)
Do not confuse amoxicillin with amoxapine or Atarax.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Penicillin.
CLINICAL: Antibiotic.

USES

Treatment of susceptible infections due to streptococci, *E. coli, E. faecalis, P. mirabilis, H. influenzae, N. gonorrhoeae* including ear, nose, and throat; lower respiratory tract; skin and skin structure; UTIs; acute uncomplicated gonorrhea; *H. pylori*. **OFF-LABEL:** Treatment of Lyme disease and typhoid fever. Postexposure prophylaxis for anthrax exposure.

PRECAUTIONS

Contraindications: Hypersensitivity to any penicillin. **Cautions:** History of allergies (esp. cephalosporins), infectious mononucleosis, renal impairment, asthma.

ACTION

Inhibits bacterial cell wall synthesis. **Therapeutic Effect:** Bactericidal in susceptible microorganisms.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 20%. Partially metabolized in liver. Primarily excreted in urine. Removed by hemodialysis. **Half-life:** 1–1.3 hrs (increased in renal impairment).

skin and skin structure, UTIs, otitis media, sinusitis. **OFF-LABEL:** Chronic antimicrobial suppression of prosthetic joint infection.

PRECAUTIONS

Contraindications: Hypersensitivity to any penicillins, history of cholestatic jaundice or hepatic impairment with amoxicillin/clavulanate therapy. Augmentin XR: Severe renal impairment, hemodialysis pt. **Cautions:** History of allergies, esp. cephalosporins; renal impairment.

ACTION

Amoxicillin inhibits bacterial cell wall synthesis. Clavulanate inhibits bacterial beta-lactamase. **Therapeutic Effect:** Amoxicillin is bactericidal in susceptible microorganisms. Clavulanate protects amoxicillin from enzymatic degradation.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 20%. Partially metabolized in liver. Primarily excreted in urine. Removed by hemodialysis. **Half-life:** 1–1.3 hrs (increased in renal impairment).

with other nephrotoxic drugs; renal impairment.

ACTION

Generally fungistatic but may become fungicidal with high dosages or very susceptible microorganisms. Binds to sterols in fungal cell membrane. **Therapeutic Effect:** Increases fungal cell membrane permeability, allowing loss of potassium, other cellular components, resulting in cell death.

PHARMACOKINETICS

Protein binding: 90%. Widely distributed. Metabolic fate unknown. Cleared by nonrenal pathways. Minimal removal by hemodialysis. Amphotec and Abelcet are not dialyzable. **Half-life:** Fungizone, 24 hrs (increased in neonates and children); Abelcet, 7.2 days; AmBisome, 100–153 hrs; Amphotec, 26–28 hrs.

orders to reduce adverse reactions during IV therapy (antipyretics, antihistamines, antiemetics, corticosteroids).

INTERVENTION/EVALUATION

Monitor B/P, temperature, pulse, respirations; assess for adverse reactions (fever, tremors, chills, anorexia, nausea, vomiting, abdominal pain) q15min twice, then q30min for 4 hrs of initial infusion. If symptoms occur, slow infusion, administer medication for symptomatic relief. For severe reaction, stop infusion and notify physician. Evaluate IV site for phlebitis. Monitor I&O, renal function tests for nephrotoxicity. Monitor serum potassium and magnesium levels, hematologic and hepatic function test results.

PATIENT/FAMILY TEACHING

• Prolonged therapy (wks or mos) is usually necessary. • Fever reaction may decrease with continued therapy. • Muscle weakness may be noted during therapy (due to hypokalemia).

ampicillin

am-pi-**sil**-in
(Apo-Ampi, Novo-Ampicillin, Nu-Ampi)
Do not confuse ampicillin with aminophylline.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Penicillin.
CLINICAL: Antibiotic.

USES

Treatment of susceptible infections due to streptococci, *S. pneumoniae,* staphylococci (non–penicillinase producing), meningococci, *Listeria*, some *Klebsiella*, *E. coli*, *H. influenzae*, *Salmonella*, *Shigella* including GI, GU, respiratory infections, meningitis, endocarditis prophylaxis. **OFF-LABEL:** Surgical prophylaxis for liver transplantation.

PRECAUTIONS

Contraindications: Hypersensitivity to any penicillin. **Cautions:** History of allergies, esp. cephalosporins, renal impairment, asthmatic pts, infectious mononucleosis.

ACTION

Inhibits cell wall synthesis in susceptible microorganisms. **Therapeutic Effect:** Bactericidal in susceptible microorganisms.

PHARMACOKINETICS

Moderately absorbed from GI tract. Protein binding: 15%–25%. Widely distributed. Partially metabolized in liver. Primarily excreted in urine. Removed by hemodialysis. **Half-life:** 1–1.5 hrs (increased in renal impairment).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of allergies, esp. penicillins, cephalosporins; renal impairment.

INTERVENTION/EVALUATION

Hold medication and promptly report rash (although common with ampicillin, may indicate hypersensitivity) or diarrhea (fever, abdominal pain, mucus and blood in stool may indicate antibiotic-associated colitis). Evaluate IV site for phlebitis. Check IM injection site for pain, induration. Monitor I&O, urinalysis, renal function tests. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

• Continue antibiotic for full length of treatment. • Space doses evenly. • More effective if taken 1 hr before or 2 hrs after food/beverages. • Discomfort may occur with IM injection. • Report rash, diarrhea, or other new symptoms.

ampicillin/ sulbactam

amp-i-**sil**-in/sul-**bak**-tam
(Unasyn)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Penicillin.
CLINICAL: Antibiotic.

USES

Treatment of susceptible infections, including intra-abdominal, skin/skin structure, gynecologic infections, due to beta-lactamase-producing organisms including *H. influenzae, E. coli, Klebsiella, Acinetobacter, Enterobacter, S. aureus,* and *Bacteroides* spp. **OFF-LABEL:** Endocarditis, community-acquired pneumonia, surgical prophylaxis.

PRECAUTIONS

Contraindications: Hypersensitivity to any penicillins or sulbactam. **Cautions:** History of allergies, esp. cephalosporins, renal impairment, infectious mononucleosis, asthmatic pts.

ACTION

Ampicillin inhibits bacterial cell wall synthesis. Sulbactam inhibits bacterial beta-lactamase. **Therapeutic Effect:** Ampicillin is bactericidal in susceptible microorganisms. Sulbactam protects ampicillin from enzymatic degradation.

PHARMACOKINETICS

Protein binding: 28%–38%. Widely distributed. Partially metabolized in liver. Primarily excreted in urine. Removed by hemodialysis. **Half-life:** 1–1.3 hrs (increased in renal impairment).

A

INTERVENTION/EVALUATION

Hold medication and promptly report rash (although common with ampicillin, may indicate hypersensitivity) or diarrhea (fever, abdominal pain, mucus and blood in stool may indicate antibiotic-associated colitis). Evaluate IV site for phlebitis. Check IM injection site for pain, induration. Monitor I&O, urinalysis, renal function tests. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

• Take antibiotic for full length of treatment. • Space doses evenly. • Discomfort may occur with IM injection. • Report rash, diarrhea, or other new symptoms.

anakinra

an-a-**kin**-ra
(Kineret)
Do not confuse anakinra with amikacin or Ampyra.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Interleukin-1 receptor antagonist. **CLINICAL:** Anti-inflammatory.

USES

Treatment of signs and symptoms or to slow progression of structural damage of moderate to severely active rheumatoid arthritis (RA) in pts who have failed treatment with one or more disease-modifying antirheumatic drugs. May use alone or with other disease-modifying antirheumatic drugs (other than tumor necrosis factor blocking medications). Treatment of neonatal-onset multisystem inflammatory disease (NOMID).

PRECAUTIONS

Contraindications: Known hypersensitivity to *Escherichia coli*–derived proteins.

Cautions: Renal impairment (risk of toxic reaction is increased), asthma (higher incidence of serious infection), elderly, history of significant hematologic abnormalities. Avoid use in pts with active infection.

ACTION

Blocks the binding of interleukin-1 (IL-1) receptor, a protein that is a major mediator of joint pathology, including degradation of cartilage, and is present in excess amounts in pts with rheumatoid arthritis. **Therapeutic Effect:** Inhibits inflammatory response.

PHARMACOKINETICS

No accumulation of anakinra in tissues or organs was observed after daily subcutaneous doses. Excreted in urine. **Half-life:** 4–6 hrs.

Steady-state plasma levels reached in about 7 days.

INTERVENTION/EVALUATION

Monitor for evidence of hepatic dysfunction, hypokalemia. Monitor daily pattern of bowel activity, stool consistency. Assess for rash, urticaria.

PATIENT/FAMILY TEACHING

- For esophageal candidiasis, maintain diligent oral hygiene.

antihemophilic factor (factor VIII, AHF)

an-tee-hee-moe-**fil**-ik **fak**-tor
(**Antihemophilic Factor/von Willebrand Factor Complex:** Alphanate, Humate-P, Wilate. **Human:** Hemofil M, Koate-DVI, Monoclate-P. **Recombinant:** Advate, Hexilate FS, Kogenate FS, Recombinate, Xyntha)

CLASSIFICATION

PHARMACOTHERAPEUTIC: Antihemophilic agent. **CLINICAL:** Hemostatic.

USES

Human: Prevention/treatment of hemorrhagic episodes, perioperative management of hemophilia A. **Alphanate, Humate-P, Wilate:** Prevention/treatment of hemorrhagic episodes in pts with hemophilia A. Prophylaxis with surgical/invasive procedures, treatment of bleeding in pts with von Willebrand disease (vWD) when desmopressin is known or suspected to be inadequate. **Recombinant:** Management of hemophilia A, prevention and control of bleeding episodes, perioperative management of hemophilia A, prophylaxis of joint bleeding and reduce risk of joint damage in children with hemophilia A.

PRECAUTIONS

Contraindications: None known. **Cautions:** Hepatic disease, pts with blood types A, B, AB (progressive anemia, intravascular hemolysis may occur).

ACTION

Assists in conversion of prothrombin to thrombin, essential for blood coagulation. Replaces missing clotting factor VIII. **Therapeutic Effect:** Produces hemostasis; corrects or prevents bleeding episodes.

PHARMACOKINETICS

Half-life: 8–27 hrs.

discontinued based on other than pathologic bleeding, coverage with another anticoagulant should be strongly considered.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Factor Xa inhibitor. **CLINICAL:** Anticoagulant.

USES

Reduces risk for stroke, systemic embolism in pts with nonvalvular atrial fibrillation. Prophylaxis of DVT following hip or knee replacement surgery. Treatment of DVT and PE. Reduce risk of recurrent DVT/PE following initial therapy.

PRECAUTIONS

Contraindications: Active pathologic bleeding. **Cautions:** Mild to moderate hepatic impairment, severe renal impairment (may increase bleeding risk). Avoid use in pts with severe hepatic impairment, prosthetic heart valve.

ACTION

Selectively blocks active site of factor Xa, a key factor in the intrinsic and extrinsic pathway of blood coagulation cascade. Prevents new clot formation, secondary thromboembolic complications. **Therapeutic Effect:** Inhibits clot-induced platelet aggregation, fibrin clot formation.

PHARMACOKINETICS

Readily absorbed after PO administration. Peak plasma concentration: 3–4 hrs. Protein binding: 87%. Metabolized in liver. Excreted primarily in urine, feces. **Half-life:** 12 hrs.

and efficacy not established in pt younger than 18 yrs. **Elderly:** No age-related precautions noted.

INTERACTIONS

DRUG: **Strong CYP450 inducers (carbamazepine, phenobarbital, phenytoin, rifampin)** may decrease concentration/effect. **HERBAL:** **St. John's wort** may decrease concentration/effect. **FOOD:** None significant. **LAB VALUES:** None known.

AVAILABILITY (Rx)

A

ADVERSE EFFECTS/ TOXIC REACTIONS

Neutropenia, mucous membrane disorders occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess for dehydration (poor skin turgor, dry mucous membranes, longitudinal furrows in tongue).

INTERVENTION/EVALUATION

Monitor hydration, nutritional status, I&O. Assess bowel sounds for peristalsis. Assist with ambulation if dizziness occurs. Provide supportive measures. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

- Relief from nausea/vomiting generally occurs shortly after drug administration. • Report persistent vomiting, headache. • May decrease effectiveness of oral contraceptives.

argatroban

HIGH ALERT

ar-**gat**-roe-ban

Do not confuse argatroban with Aggrestat.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Thrombin inhibitor. **CLINICAL:** Anticoagulant.

USES

Prophylaxis or treatment of thrombosis in heparin-induced thrombocytopenia (HIT). Prevention of HIT during percutaneous coronary procedures. **OFF-LABEL:** Maintain extracorporeal circuit patency of continuous renal replacement therapy (CRRT) in pts with HIT.

PRECAUTIONS

Contraindications: Active major bleeding. **Cautions:** Severe hypertension, immediately following lumbar puncture, spinal anesthesia, major surgery, pts with congenital or acquired bleeding disorders, ulcerations, hepatic impairment, critically ill pts.

ACTION

Direct thrombin inhibitor that reversibly binds to thrombin-active sites. Inhibits thrombin-catalyzed or thrombin-induced reactions, including fibrin formation, activation of coagulant factors V, VIII, and XIII; inhibits protein C formation, platelet aggregation. **Therapeutic Effect:** Produces anticoagulation.

PHARMACOKINETICS

Distributed primarily in extracellular fluid. Protein binding: 54%. Metabolized in liver. Primarily excreted in the feces, presumably through biliary secretion. **Half-life:** 39–51 min.

aripiprazole

TOP 100

ar-i-**pip**-ra-zole
(Abilify, Abilify Discmelt, Abilify Maintena)

■ **BLACK BOX ALERT** ■ Increased risk of mortality in elderly pts with dementia-related psychosis, mainly due to pneumonia, heart failure. Risk may be increased by dehydration. Increased risk of suicidal thinking and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse Abilify with Ambien, or aripiprazole with esomeprazole, omeprazole, pantoprazole, or rabeprazole (proton pump inhibitors).

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Dopamine agonist. **CLINICAL:** Antipsychotic agent.

USES

PO: Treatment of schizophrenia. Maintains stability in pts with schizophrenia. Treatment of bipolar disorder. Maintenance treatment of bipolar disorder as an adjunct to either lithium or valproate. Adjunct treatment in major depressive disorder. Treatment of irritability associated with autistic disorder in children 6–17 yrs of age. **IM: (Immediate):** Agitation associated with schizophrenia/bipolar disorder. **Abilify Maintenance: (Extended):** Treatment of schizophrenia in adults. **OFF-LABEL:** Schizoaffective disorder, depression with psychotic features, aggression, bipolar disorder (children), conduct disorder (children), Tourette's syndrome (children), psychosis/agitation related to Alzheimer's dementia.

PRECAUTIONS

Contraindications: None known. **Cautions:** Concurrent use of CNS depressants (including alcohol), disorders in which CNS depression is a feature, cardiovascular or cerebrovascular diseases (may induce hypotension), Parkinson's disease (potential for exacerbation), history of seizures or conditions that may lower seizure threshold (Alzheimer's disease), diabetes mellitus. Pts at risk for pneumonia. Elderly with dementia.

ACTION

Provides partial agonist activity at dopamine and serotonin ($5\text{-}HT_{1A}$) receptors and antagonist activity at serotonin ($5\text{-}HT_{2A}$) receptors. **Therapeutic Effect:** Diminishes schizophrenic behavior.

PHARMACOKINETICS

Well absorbed through GI tract. Protein binding: 99% (primarily albumin). Reaches steady levels in 2 wks. Metabolized in liver. Eliminated in feces (55%), urine (25%). Not removed by hemodialysis. **Half-life:** 75 hrs.

A

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess behavior, appearance, emotional status, response to environment, speech pattern, thought content. Correct dehydration, hypovolemia. Assess for suicidal tendencies.

INTERVENTION/EVALUATION

Periodically monitor weight. Monitor for extrapyramidal symptoms (abnormal movement), tardive dyskinesia (protrusion of tongue, puffing of cheeks, chewing/puckering of the mouth). Periodically monitor B/P, pulse (particularly in pts with preexisting cardiovascular disease). Assess for therapeutic response (greater interest in surroundings, improved self-care, increased ability to concentrate, relaxed facial expression).

PATIENT/FAMILY TEACHING

• Avoid alcohol. • Avoid tasks that require alertness, motor skills until response to drug is established. • Report worsening depression, suicidal ideation, unusual changes in behavior, extrapyramidal effects.

armodafinil

HIGH ALERT

ar-moe-**daf**-i-nil
(Nuvigil)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: $Alpha_1$ agonist. **CLINICAL:** CNS stimulant.

USES

Treatment of excessive daytime sleepiness associated with obstructive sleep apnea–hypopnea syndrome, narcolepsy, shift-work sleep disorder.

PRECAUTIONS

Contraindications: History of sensitivity to modafinil. **Cautions:** History of mitral valve prolapse, left ventricular hypertrophy, hepatic impairment, recent history of MI, unstable angina, cardiac ischemia, drug abuse, psychosis, depression, mania, renal impairment, elderly.

ACTION

Exact mechanism unknown. May bind to dopamine reuptake carrier sites in the brain, increasing alpha activity, decreasing delta, theta, and beta activity. **Therapeutic Effect:** Improves wakefulness.

PHARMACOKINETICS

Well absorbed. Widely distributed. Mainly eliminated by hepatic metabolism with less than 10% excreted by kidneys. Unknown if removed by hemodialysis. **Half-life:** 15 hrs.

Acidification of Urine

PO: ADULTS, ELDERLY: 4–12 g/day in 3–4 divided doses. **CHILDREN:** 500 mg q6–8h.

Scurvy

PO: ADULTS, ELDERLY: 100–250 mg 1–2 times a day for at least 2 wks. **CHILDREN:** 100–300 mg/day in divided doses for at least 2 wks.

Prevention, Reduction of Severity of Colds

PO: ADULTS, ELDERLY: 1–3 g/day in divided doses.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Rare: Abdominal cramps, nausea, vomiting, diarrhea, increased urination with doses exceeding 1 g. **Parenteral:** Flushing, headache, dizziness, sleepiness or insomnia, soreness at injection site.

ADVERSE EFFECTS/ TOXIC REACTIONS

May acidify urine, leading to crystalluria. Large doses of IV ascorbic acid may lead to deep vein thrombosis. Prolonged use of large doses may produce rebound ascorbic acid deficiency when dosage is reduced to normal range.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Assess for clinical improvement (improved sense of well-being and sleep patterns). Observe for reversal of deficiency symptoms (improving gingivitis, bleeding gums, poor wound healing, digestive difficulties, joint pain).

PATIENT/FAMILY TEACHING

• Larger doses may cause diarrhea, nausea, abdominal cramping. • Foods rich in vitamin C include rose hips, guava, black currant jelly, Brussels sprouts, green peppers, spinach, watercress, strawberries, citrus fruits.

asparaginase

as-par-**a**-jin-ace
(Elspar, Erwinaze, Kidrolase)
Do not confuse asparaginase with pegaspargase.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Enzyme.
CLINICAL: Antineoplastic.

USES

(Elspar): Treatment of acute lymphoblastic leukemia (ALL). **(Erwinaze):** Treatment of ALL in pts with hypersensitivity to *E. coli*–derived asparaginase. **OFF-LABEL:** Treatment of chronic lymphoblastic leukemia (CLL).

PRECAUTIONS

Contraindications: History of hypersensitivity to asparaginase. History of serious thrombosis, pancreatitis, or hemorrhagic events with prior asparaginase therapy. **Cautions:** Underlying coagulopathy, preexisting hepatic impairment.

ACTION

Inhibits DNA, RNA, protein synthesis by breaking down asparagine, depriving tumor cells of this essential amino acid. Cell cycle–specific for G_1 phase of cell division. **Therapeutic Effect:** Toxic to leukemic cells.

PHARMACOKINETICS

Metabolized by reticuloendothelial system through slow sequestration. **Half-life: IM:** 39–49 hrs; **IV:** 8–30 hrs.

medication, agents for adequate airway and allergic reaction (antihistamine, epinephrine, O_2, IV corticosteroid) should be readily available. Assess baseline CNS functions.

INTERVENTION/EVALUATION

Monitor vital signs, CBC, urinalysis, serum amylase, hepatic enzymes, coagulation profile, glucose, uric acid. Discontinue medication at first sign of renal dysfunction (oliguria, anuria), pancreatitis. Monitor for hematologic toxicity (fever, sore throat, signs of local infection, unusual bruising/bleeding), symptoms of anemia, hypersensitivity reaction.

PATIENT/FAMILY TEACHING

• Increase fluid intake (protects against renal impairment). • Nausea may decrease during therapy. • Do not have immunizations without physician's approval (drug lowers body's resistance). • Avoid contact with those who have recently received a live virus vaccine. • Notify physician if abdominal pain, rash, nausea, vomiting occurs.

aspirin (acetylsalicylic acid, ASA)

TOP 100 HIGH ALERT

as-pir-in
(Asaphen E.C., Ascriptin, Bayer, Bufferin, Ecotrin, Entrophen, Halfprin, Novasen)
Do not confuse aspirin or Ascriptin with Afrin, Aricept, or Ecotrin with Epogen.

FIXED-COMBINATION(S)

Aggrenox: aspirin/dipyridamole (an antiplatelet agent): 25 mg/200 mg. **Fiorinal:** aspirin/butalbital/caffeine (a barbiturate): 325 mg/50 mg/40 mg. **Lortab/ASA:** aspirin/hydrocodone (an analgesic): 325 mg/5 mg. **Percodan:** aspirin/oxycodone (an analgesic): 325 mg/2.25 mg, 325 mg/4.5 mg. **Pravigard:** aspirin/pravastatin (a cholesterol-lowering agent): 81 mg/20 mg, 81 mg/40 mg, 81 mg/80 mg, 325 mg/20 mg, 325 mg/40 mg, 325 mg/80 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Nonsteroidal salicylate. **CLINICAL:** Anti-inflammatory, antipyretic, anticoagulant.

USES

Treatment of mild to moderate pain, fever. Reduces inflammation related to rheumatoid arthritis (RA), juvenile arthritis, osteoarthritis, rheumatic fever. Used as platelet aggregation inhibitor in the prevention of transient ischemic attacks (TIAs), cerebral thromboembolism, MI or reinfarction. **OFF-LABEL:** Prevention of pre-eclampsia; alternative therapy for preventing thromboembolism associated with atrial fibrillation when warfarin cannot be used; pericarditis associated with MI; prosthetic valve thromboprophylaxis. Adjunctive treatment of Kawasaki's disease. Complications associated with autoimmune disorders; colorectal cancer.

PRECAUTIONS

Contraindications: Hypersensitivity to salicylates, NSAIDs. Asthma, rhinitis, nasal polyps; inherited or acquired bleeding disorders; use in children (younger than 16 yrs) for viral infections. **Cautions:** Platelet/bleeding disorders, severe renal/hepatic impairment, dehydration, erosive gastritis, peptic ulcer disease, sensitivity to tartrazine dyes, elderly (chronic use of doses 325 mg or greater). Avoid use in pregnancy, especially third trimester.

ACTION

Inhibits cyclo-oxygenase enzyme via acetylation. Inhibits formation of prostaglandin derivative thromboxane A. **Therapeutic Effect:** Reduces inflammatory

mild nausea); allergic reaction (including bronchospasm, pruritus, urticaria).

ADVERSE EFFECTS/ TOXIC REACTIONS

High doses of aspirin may produce GI bleeding and/or gastric mucosal lesions. Dehydrated, febrile children may experience aspirin toxicity quickly. Reye's syndrome, characterized by persistent vomiting, signs of brain dysfunction, may occur in children taking aspirin with recent viral infection (chickenpox, common cold, or flu). Low-grade aspirin toxicity characterized by tinnitus, generalized pruritus (may be severe), headache, dizziness, flushing, tachycardia, hyperventilation, diaphoresis, thirst. Marked toxicity characterized by hyperthermia, restlessness, seizures, abnormal breathing patterns, respiratory failure, coma.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Do not give to children or teenagers who have or recently had viral infections (increases risk of Reye's syndrome). Do not use if vinegar-like odor is noted (indicates chemical breakdown). Assess type, location, duration of pain, inflammation. Inspect appearance of affected joints for immobility, deformities, skin condition. **Therapeutic serum level for antiarthritic effect:** 20–30 mg/dL (toxicity occurs if level is greater than 30 mg/dL).

INTERVENTION/EVALUATION

Monitor urinary pH (sudden acidification, pH from 6.5 to 5.5, may result in toxicity). Assess skin for evidence of ecchymosis. If given as antipyretic, assess temperature directly before and 1 hr after giving medication. Evaluate for therapeutic response: relief of pain, stiffness, swelling; increased joint mobility; reduced joint tenderness; improved grip strength.

PATIENT/FAMILY TEACHING

• Do not, chew, crush, dissolve, or divide enteric-coated tablets. • Avoid alcohol. • Report tinnitus or persistent abdominal GI pain, bleeding. • Therapeutic anti-inflammatory effect noted in 1–3 wks. • Behavioral changes, persistent vomiting may be early signs of Reye's syndrome; contact physician.

atazanavir

TOP 100

a-ta-**zan**-a-veer
(Reyataz)
Do not confuse Reyataz with Retavase.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antiretroviral. **CLINICAL:** Protease inhibitor.

USES

Treatment of HIV-1 infection in combination with at least two other antiretroviral agents.

PRECAUTIONS

Contraindications: Concurrent use with alfuzosin, ergot derivatives, indinavir, lovastatin, midazolam (oral), pimozide, rifampin, sildenafil (for pulmonary arterial hypertension), St. John's wort, simvastatin, triazolam. **Cautions:** Preexisting conduction system defects (first-, second-, or third-degree AV block), diabetes mellitus, elderly, renal impairment, hemophilia A or B, hepatitis B or C. Do not use in pts younger than 3 mos (potential for kernicterus).

ACTION

Binds to HIV-1 protease, inhibiting cleavage of viral precursors into functional proteins. **Therapeutic Effect:** Prevents formation of mature HIV viral cells.

PHARMACOKINETICS

Rapidly absorbed after PO administration. Protein binding: 86%. Extensively metabolized in liver. Eliminated in feces (79%), urine (13%). **Half-life:** 5–8 hrs.

Dosage in Renal Impairment
HD (Naive): 300 mg with ritonavir. (Experienced): Not recommended.

SIDE EFFECTS

Frequent (16%–14%): Nausea, headache. **Occasional (9%–4%):** Rash, vomiting, depression, diarrhea, abdominal pain, fever. **Rare (3% or less):** Dizziness, insomnia, cough, fatigue, back pain.

ADVERSE EFFECTS/ TOXIC REACTIONS

Severe hypersensitivity reaction (angioedema, chest pain), jaundice may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, serum chemistries, LFT before beginning therapy and at periodic intervals during therapy. Offer emotional support.

INTERVENTION/EVALUATION

Monitor lab results. Assess for nausea, vomiting; assess eating pattern. Monitor daily pattern of bowel activity, stool consistency. Assess skin for rash. Question for evidence of headache. Assess mood for evidence of depression.

PATIENT/FAMILY TEACHING

• Take with food. • Small, frequent meals may offset nausea, vomiting. • Swallow whole; do not break or open capsules. • Pt must continue practices to prevent HIV transmission. • Atazanavir is not a cure for HIV infection, nor does it reduce risk of transmission to others. • Report dizziness, light-headedness, yellowing of skin or whites of eyes, flank pain or when urinating, blood in urine, skin rash.

atenolol

HIGH ALERT

a-**ten**-oh-lol
(Apo-Atenol, Tenormin)

■ **BLACK BOX ALERT** ■ Do not abruptly discontinue; taper gradually to avoid acute tachycardia, hypertension, ischemia.

Do not confuse atenolol with albuterol, timolol, or Tylenol, or Tenormin with Imuran, Norpramin, or thiamine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: $Beta_1$-adrenergic blocker. **CLINICAL:** Antihypertensive, antianginal, antiarrhythmic.

USES

Treatment of hypertension, alone or in combination with other agents; management of angina; secondary prevention of post-MI. **OFF-LABEL:** Acute alcohol withdrawal, arrhythmia (esp. supraventricular and ventricular tachycardia), prevention of migraine.

PRECAUTIONS

Contraindications: Cardiogenic shock, uncompensated heart failure, second- or third-degree heart block (except with functioning pacemaker), sinus bradycardia, sinus node dysfunction, pulmonary edema, pregnancy. **Cautions:** Renal impairment; peripheral vascular disease; diabetes; thyroid disease; bronchospastic disease; compensated HF; concurrent use with digoxin, verapamil, or diltiazem; myasthenia gravis; psychiatric disease. History of anaphylaxis to allergens.

ACTION

Blocks $beta_1$-adrenergic receptors in cardiac tissue. **Therapeutic Effect:** Slows sinus node heart rate, decreasing cardiac output, B/P. Decreases myocardial oxygen demand.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1 hr	2–4 hrs	24 hrs

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess B/P, apical pulse immediately before drug is administered (if pulse is 60/min or less, or systolic B/P is less than 90 mm Hg, withhold medication, contact physician). **Antianginal:** Record onset, quality (sharp, dull, squeezing), radiation, location, intensity, duration of anginal pain, precipitating factors (exertion, emotional stress). Assess baseline renal/hepatic function tests.

INTERVENTION/EVALUATION

Monitor B/P for hypotension, pulse for bradycardia, respiration for difficulty in breathing, EKG. Monitor daily pattern of bowel activity, stool consistency. Assess for evidence of HF: dyspnea (particularly on exertion or lying down), nocturnal cough, peripheral edema, distended neck veins. Monitor I&O (increased weight, decreased urinary output may indicate HF). Assess extremities for pulse quality, changes in temperature (may indicate worsening peripheral vascular disease). Assist with ambulation if dizziness occurs.

PATIENT/FAMILY TEACHING

• Do not abruptly discontinue medication. • Compliance with therapy essential to control hypertension, angina. • To reduce hypotensive effect, go from lying to standing slowly. • Avoid tasks that require alertness, motor skills until response to drug is established. • Advise diabetic pts to monitor blood glucose carefully (may mask signs of hypoglycemia). • Report dizziness, depression, confusion, rash, unusual bruising/bleeding. • Outpatients should monitor B/P, pulse before taking medication, following correct technique. • Restrict salt, alcohol intake. • Therapeutic antihypertensive effect noted in 1–2 wks.

atomoxetine

at-oh-**mox**-e-teen

Apo-Atomoxetine* (Strattera)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal thinking and behavior in children and adolescents with attention-deficit hyperactivity disorder (ADHD).

Do not confuse atomoxetine with atorvastatin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Norepinephrine reuptake inhibitor. **CLINICAL:** Psychotherapeutic agent.

USES

Treatment of ADHD.

PRECAUTIONS

Contraindications: Narrow-angle glaucoma, use within 14 days of MAOIs. Pheochromocytoma or history of pheochromocytoma. Severe cardiovascular disease. **Cautions:** Hypertension, tachycardia, cardiovascular disease (e.g., structural abnormalities, cardiomyopathy), urinary retention, moderate or severe hepatic impairment, suicidal ideation, emergent psychotic or manic symptoms, comorbid bipolar disorder, renal impairment, poor metabolizers of CYP2D6 metabolized drugs (e.g., fluoxetine, paroxetine).

ACTION

Enhances noradrenergic function by selective inhibition of the presynaptic norepinephrine transporter. **Therapeutic Effect:** Improves symptoms of ADHD.

PHARMACOKINETICS

Rapidly absorbed after PO administration. Protein binding: 98% (primarily to albumin). Eliminated in urine (80%), feces (17%). Not removed by hemodialysis. **Half-life:** 4–5 hrs (increased in moderate to severe hepatic insufficiency).

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Take last dose early in evening to avoid insomnia. • Report palpitations, fever, vomiting, irritability. • Monitor growth rate, weight. • Report changes in behavior, suicidal ideation, chest pain, palpitations, dyspnea.

atorvastatin

TOP 100

a-**tor**-va-sta-tin
(Apo-Atorvastatin, Lipitor, Novo-Atorvastatin)
Do not confuse atorvastatin with atomoxetine, lovastatin, nystatin, pitavastatin, pravastatin, or simvastatin, or Lipitor with labetalol, Levatol, lisinopril, or Zocor.

FIXED-COMBINATION(S)

Caduet: atorvastatin/amlodipine (calcium channel blocker): 10 mg/2.5 mg, 10 mg/5 mg, 10 mg/10 mg, 20 mg/2.5 mg, 20 mg/5 mg, 20 mg/10 mg, 40 mg/2.5 mg, 40 mg/5 mg, 40 mg/10 mg, 80 mg/5 mg, 80 mg/10 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Hydroxymethylglutaryl CoA (HMG-CoA) reductase inhibitor. **CLINICAL:** Antihyperlipidemic.

USES

Primary prevention of cardiovascular disease in high-risk pts. Reduces risk of stroke and heart attack in pts with type 2 diabetes with or without evidence of heart disease. Reduces risk of stroke in pts with or without evidence of heart disease with multiple risk factors other than diabetes. Adjunct to diet therapy in management of hyperlipidemias (reduces elevations in total cholesterol, LDL-C, apolipoprotein B triglycerides in pts with primary hypercholesterolemia), homozygous familial hypercholesterolemia, heterozygous familial hypercholesterolemia in pts 10–17 yrs of age, females more than 1 yr postmenarche. **OFF-LABEL:** Secondary prevention in pts who have experienced a noncardioembolic stroke/TIA or following an acute coronary syndrome (ACS) event.

PRECAUTIONS

Contraindications: Active hepatic disease, breastfeeding, pregnancy, unexplained elevated LFT results. **Cautions:** Anticoagulant therapy; history of hepatic disease; substantial alcohol consumption; pts with prior stroke/TIA; concomitant use of potent CYP3A4 inhibitors; elderly (predisposed to myopathy).

ACTION

Inhibits HMG-CoA reductase, the enzyme that catalyzes the early step in cholesterol synthesis. **Therapeutic Effect:** Decreases LDL and VLDL, plasma triglyceride levels; increases HDL concentration.

PHARMACOKINETICS

Poorly absorbed from GI tract. Protein binding: greater than 98%. Metabolized in liver. Primarily eliminated in feces (biliary). **Half-life:** 14 hrs.

A

with severe PCP, chronic diarrhea, malabsorption syndromes, severe hepatic impairment. **Pregnancy Category C.**

ACTION

Inhibits mitochondrial electron transport system at the cytochrome bc1 complex (Complex III) interrupting nucleic acid, adenosine triphosphate synthesis. **Therapeutic Effect:** Antiprotozoal, antipneumocystic activity.

INTERACTIONS

DRUG: **Rifabutin, rifampin** may decrease concentration. May increase **rifampin** concentration. **HERBAL:** **Bilberry, fenugreek, garlic, ginger, ginseng** may enhance risk of hypoglycemia. **FOOD:** **High-fat meals** increase absorption. **LAB VALUES:** May elevate serum ALT, AST, alkaline phosphatase, amylase. May decrease serum sodium.

AVAILABILITY (Rx)

Suspension, Oral: 750 mg/5 ml.

ADMINISTRATION/HANDLING

PO

• Must give with food or high-fat meals. Shake gently prior to using.

INDICATIONS/ROUTES/DOSAGE

***Pneumocystis Jiroveci* Pneumonia (PCP)**

PO: ADULTS, CHILDREN OLDER THAN 12 YRS: 750 mg twice a day with food for 21 days. **CHILDREN 4–24 MOS:** 45 mg/kg/day in 2 divided doses with food. **Maximum:** 1,500 mg/day. **CHILDREN 1–3 MOS OR OLDER THAN 24 MOS:** 30–40 mg/kg/day in 2 divided doses with food. **Maximum:** 1,500 mg/day.

Prevention of PCP

PO: ADULTS, CHILDREN OLDER THAN 12 YRS: 1,500 mg once a day with food. **CHILDREN 4–24 MOS:** 45 mg/kg/day as single dose. **Maximum:** 1,500 mg/day. **CHILDREN 1–3 MOS OR OLDER THAN 24 MOS:** 30 mg/kg/day as single dose. **Maximum:** 1,500 mg/day. **NEONATES:** 30–40 mg/kg/day in 2 divided doses.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (greater than 10%): Rash, nausea, diarrhea, headache, vomiting, fever, insomnia, cough. **Occasional (less than 10%):** Abdominal discomfort, thrush, asthenia (loss of strength, energy), anemia, neutropenia.

ADVERSE EFFECTS/ TOXIC REACTIONS

None known.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline lab studies, esp. hepatic function tests.

INTERVENTION/EVALUATION

Monitor renal function tests, CBC, LFT, serum chemisteries, amylase. Assess for GI discomfort, nausea, vomiting. Monitor daily pattern of bowel activity, stool consistency. Assess skin for rash. Monitor elderly closely for decreased hepatic, renal, cardiac function. Monitor I&O.

PATIENT/FAMILY TEACHING

• Continue therapy for full length of treatment. • Do not take any other medications unless approved by physician. • Report rash, diarrhea, or other new symptoms. • Must be taken with high-fat meal or food.

atropine

at-roe-peen
(AtroPen Auto Injector, Atropine-Care, Isopto Atropine, Sal-Tropine)

FIXED-COMBINATION(S)

Donnatal: atropine/hyoscyamine (anticholinergic)/phenobarbital (sedative)/scopolamine (anticholinergic): 0.0194 mg/0.1037 mg/16.2

squeezed out of the sac). • For solution, apply digital pressure to lacrimal sac at inner canthus for 1 min to minimize systemic absorption. • For ointment, instruct pt to roll eyeball to increase contact area of drug to eye.

IV INCOMPATIBILITIES

None known.

IV COMPATIBILITIES

Diphenhydramine (Benadryl), droperidol (Inapsine), fentanyl (Sublimaze), glycopyrrolate (Robinul), heparin, hydromorphone (Dilaudid), midazolam (Versed), morphine, potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Preanesthetic

IV, IM, Subcutaneous: ADULTS, ELDERLY: 0.4–0.6 mg 30–60 min preop. **CHILDREN WEIGHING 5 KG OR MORE:** 0.01–0.02 mg/kg/dose to maximum of 0.4 mg/dose. Minimum dose: 0.1 mg. **CHILDREN WEIGHING LESS THAN 5 KG:** 0.02 mg/kg/dose 30–60 min preop.

Bradycardia

IV: ADULTS, ELDERLY: 0.5–1 mg q5min, not to exceed total of 3 mg or 0.04 mg/kg. **CHILDREN:** 0.02 mg/kg with a minimum of 0.1 mg to a maximum of 0.5 mg as a single dose. May repeat in 5 min. **Maximum total dose:** 1 mg.

Cycloplegic Refraction, Postop Mydriasis, Uveitis

Ophthalmic Solution: ADULTS, ELDERLY: Instill 1 drop in affected eye(s) up to 4 times a day.

Ophthalmic Ointment: ADULTS, ELDERLY: Apply ointment several hours prior to examination when used for refraction.

Antidote for Organophosphate or Carbamate Poisoning

IM: ADULTS, CHILDREN WEIGHING MORE THAN 90 LB: AtroPen 2 mg (green). May repeat in 10 min. **Maximum:** 3 doses. **CHILDREN WEIGHING 40–90 LB:** AtroPen 1 mg (dark red). **CHILDREN WEIGHING 15–39 LB:** AtroPen 0.5 mg (blue). **INFANTS WEIGHING LESS THAN 15 LB:** 0.05 mg/kg. Do not use AtroPen.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Dry mouth, nose, throat (may be severe); decreased sweating; constipation; irritation at subcutaneous or IM injection site. **Occasional:** Dysphagia, blurred vision, bloated feeling, impotence, urinary hesitancy. **Ophthalmic:** Mydriasis, blurred vision, photophobia, decreased visual acuity, tearing, dry eyes or dry conjunctiva, eye irritation, crusting of eyelid. **Rare:** Allergic reaction, including rash, urticaria; mental confusion or excitement, particularly in children; fatigue.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may produce tachycardia, palpitations, hot/dry/flushed skin, absence of bowel sounds, increased respiratory rate, nausea, vomiting, confusion, drowsiness, slurred speech, dizziness, CNS stimulation. Overdose may also produce psychosis as evidenced by agitation, restlessness, rambling speech, visual hallucinations, paranoid behavior, delusions, followed by depression. Ophthalmic form may rarely produce increased IOP.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Determine if pt is sensitive to atropine, homatropine, scopolamine. Treatment with AtroPen autoinjector may be instituted without waiting for lab results.

INTERVENTION/EVALUATION

Monitor changes in B/P, pulse, temperature. Observe for tachycardia if pt has cardiac abnormalities. Assess skin turgor, mucous membranes to evaluate hydration status (encourage adequate fluid intake unless NPO for surgery), bowel

Dosage with Concurrent Alpha Blocker (e.g., Alfuzosin, Doxazosin, Prazosin, Terazosin)

PO: ADULTS, ELDERLY: Initially, 50 mg. **Maximum dosing frequency:** Once daily.

Dosage with Concurrent Moderate CYP3A4 Inhibitors (e.g., Amprenavir, Aprepitant, Diltiazem, Fluconazole, Fosamprenavir, Verapamil)

PO: ADULTS, ELDERLY: Initially, 50 mg. **Maximum dosing frequency:** Once daily.

Dosage in Renal/Hepatic Impairment

Use not recommended.

SIDE EFFECTS

Occasional (6%–4%): Headache, flushing. **Rare (3%–2%):** Nasal congestion, nasopharyngitis, back pain. **Less than 2%:** Dizziness, arthralgia, diarrhea, insomnia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Sudden hearing decrease, sudden loss of vision in one or both eyes noted rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess cardiovascular status before initiating treatment for erectile dysfunction.

PATIENT/FAMILY TEACHING

• Medication has no effect in absence of sexual stimulation. • Seek treatment immediately if erection lasts longer than 4 hrs. • Avoid nitrate drugs while taking avanafil. • Report sudden decrease or loss of hearing or vision.

axitinib

ax-**i**-ti-nib
(Inlyta)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tyrosine kinase inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of advanced renal cell carcinoma after failure of one prior systemic chemotherapy.

PRECAUTIONS

Contraindications: None known. Do not use in pts with untreated brain metastasis or recent active GI bleeding. **Cautions:** Pts with increased risk or history of thrombotic events, GI perforation or fistula formation, renal/hepatic impairment, hypertension.

ACTION

Inhibits vascular endothilial growth factor receptors. **Therapeutic Effect:** Blocks tumor growth, inhibits angiogenesis.

PHARMACOKINETICS

Undergoes extensive hepatic metabolism. Protein binding: greater than 99%. Eliminated primarily in feces with a lesser amount excreted in urine. **Half-life:** 2.5–6 hrs.

azacitidine

a-za-**sye**-ti-deen
(Vidaza)
Do not confuse azacitidine with azathioprine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: DNA demethylation agent. **CLINICAL:** Antineoplastic.

USES

Treatment of myelodysplastic syndromes (MDS). **OFF-LABEL:** Treatment of acute myelogenous leukemia.

PRECAUTIONS

Contraindications: Advanced malignant hepatic tumors, hypersensitivity to mannitol. **Cautions:** Hepatic disease, renal impairment.

ACTION

Promotes hypomethylation of DNA. **Therapeutic Effect:** Toxic to abnormal hematopoietic cells in bone marrow.

PHARMACOKINETICS

Rapidly absorbed after subcutaneous administration. Metabolized by liver. Eliminated in urine. **Half-life:** 4 hrs.

Maintenance, remission, or reduction of steroid use in Crohn's disease, erythema multiforme, pemphigus vulgaris, lupus nephritis, chronic refractory immune thrombocytopenic purpura, relapsing/remitting multiple sclerosis.

PRECAUTIONS

Contraindications: Pregnant women with RA, pts previously treated for RA with alkylating agents (cyclophosphamide, chlorambucil, melphalan). **Cautions:** Immunosuppressed pts, pts with hepatic/renal impairment, active infection. Testing for genetic deficiency of thiopurine methyltransferase should be obtained. (Absence or reduced levels increase risk of myelosuppression.)

ACTION

Antagonizes purine metabolism, inhibits DNA, protein, and RNA synthesis. **Therapeutic Effect:** Suppresses cell-mediated hypersensitivities; alters antibody production, immune response in transplant recipients. Reduces symptoms of arthritis severity.

PRECAUTIONS

Contraindications: Concomitant use with aliskiren in pts with diabetes mellitus. **Cautions:** Renal/hepatic impairment, unstented renal artery stenosis, significant aortic/mitral stenosis, severe HF, volume depletion/salt-depleted pts.

ACTION

Inhibits vasoconstriction, aldosterone-secreting effects of angiotension II, blocking the binding of angiotension II to AT_1 receptors. **Therapeutic Effect:** Produces vasodilation, decreases peripheral resistance, decreases B/P.

PHARMACOKINETICS

Hydrolyzed to active metabolite in GI tract. Moderately absorbed (60%). Peak plasma concentration: 1.5–3 hrs. Metabolized in liver. Protein binding: greater than 99%. Eliminated in feces (55%), urine (42%). **Half-life:** 11 hrs.

QT-prolonging medications, thioridazine, toremifene, ziprasidone. Quetiapine may increase concentration. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase serum creatine phosphokinase (CPK), ALT, AST, bilirubin, LDH, potassium.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution (Zithromax): 500 mg. **Ophthalmic Solution (AzaSite):** 1%. **Suspension, Oral (Zithromax):** 100 mg/5 ml, 200 mg/5 ml, 1-g single dose packet. **Suspension, Oral (Extended-Release [Zmax]):** 2-g single-dose packet. **Tablets:** 250 mg, 500 mg, 600 mg (Zithromax). Tri-Pak: 3 × 500 mg (Zithromax TRI-PAK). Z-PAK: 6 × 250 mg (Zithromax Z-PAK).

ADMINISTRATION/HANDLING

PRECAUTIONS

Contraindications: None known. **Cautions:** History of allergy, esp. cephalosporins, penicillins; renal impairment; bone marrow transplant pts with risk factors for toxic epidermal necrolysis (TEN).

ACTION

Binds to penicillin-binding proteins, which inhibits bacterial cell wall synthesis. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Completely absorbed after IM administration. Protein binding: 56%–60%. Partially metabolized by hydrolysis. Primarily excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 1.4–2.2 hrs (increased in renal/hepatic impairment).

Generic Drugs B

baclofen	beractant	bortezomib
basiliximab	betamethasone	bosentan
beclomethasone	bethanechol	bosutinib
bedaquiline	bevacizumab	brentuximab vedotin
belatacept	bexarotene	bromocriptine
belimumab	bicalutamide	budesonide
belinostat	bisacodyl	bumetanide
benazepril	bisoprolol	buprenorphine
bendamustine	bivalirudin	buPROPion
benzonatate	bleomycin	busPIRone
benztropine	boceprevir	busulfan

baclofen

bak-loe-fen
(Apo-Baclofen, Gablofen, Lioresal, Novo-Baclofen, Nu-Baclo)

■ **BLACK BOX ALERT** ■ Abrupt withdrawal of intrathecal form has resulted in severe hyperpyrexia, obtundation, rebound or exaggerated spasticity, muscle rigidity, leading to organ failure, death.

Do not confuse baclofen with Bactroban or Beclovent, or Lioresal with lisinopril or Lotensin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Skeletal muscle relaxant. **CLINICAL:** Antispastic, analgesic in trigeminal neuralgia.

USES

Treatment of cerebral spasticity, reversible spasticity associated with multiple sclerosis, spinal cord lesions. **Intrathecal:** For pts unresponsive to oral therapy or exhibiting intolerable side effects. **OFF-LABEL:** Treatment of bladder spasms, cerebral palsy, intractable hiccups or pain, Huntington's chorea, trigeminal neuralgia.

PRECAUTIONS

Contraindications: None known. **Cautions:** Renal impairment, seizure disorder, elderly.

ACTION

Inhibits transmission of reflexes at spinal cord level. **Therapeutic Effect:** Relieves muscle spasticity.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 30%. Partially metabolized in liver. Primarily excreted in urine. **Half-life:** 2.5–4 hrs.

Canadian trade name

rejection. **Therapeutic Effect:** Impairs response of immune system to antigens, prevents acute renal transplant rejection.

PHARMACOKINETICS

Half-life: 4–10 days (adults); 5–17 days (children).

Canadian trade name

B

between lips, inhale, hold breath as long as possible before exhaling. • Allow at least 1 min between inhalations. • Rinsing mouth after each use (decreases dry mouth, hoarseness, thrush).

Intranasal

• Instruct pt to clear nasal passages as much as possible before use. • Tilt pt's head slightly forward. • Insert spray tip into nostril, pointing toward nasal passages, away from nasal septum. • Spray into one nostril while pt holds the other nostril closed, concurrently inhaling through nose to permit medication as high into nasal passages as possible.

INDICATIONS/ROUTES/DOSAGE

Long-Term Control of Bronchial Asthma

Oral Inhalation *(QVAR):* ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 40–160 mcg twice a day. **Maximum:** 320 mcg twice a day. **CHILDREN 5–11 YRS:** 40 mcg twice a day. **Maximum:** 80 mcg twice a day.

Rhinitis, Prevention of Recurrence of Nasal Polyps

Nasal Inhalation *(QNASL):* ADULTS, ELDERLY, CHILDREN 6 YRS AND OLDER: 1–2 sprays in each nostril twice a day.

Allergic Rhinitis

Nasal Inhalation *(QNASL):* ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 2 sprays in each nostril daily.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Inhalation (14%–4%): Throat irritation, dry mouth, hoarseness, cough. **Intranasal:** Nasal burning, mucosal dryness. **Occasional: Inhalation (3%–2%):** Localized fungal infection (thrush). **Intranasal:** Nasal-crusting epistaxis, sore throat, ulceration of nasal mucosa. **Rare: Inhalation:** Transient bronchospasm, esophageal candidiasis. **Intranasal:** Nasal and pharyngeal candidiasis, eye pain.

ADVERSE EFFECTS/ TOXIC REACTIONS

Acute hypersensitivity reaction (urticaria, angioedema, severe bronchospasm) occurs rarely. Change from systemic to local steroid therapy may unmask previously suppressed bronchial asthma condition.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Establish baseline history for asthma, rhinitis. Question for hypersensitivity to corticosteroids.

INTERVENTION/EVALUATION

Monitor respiratory status, lung sounds; observe for signs of oral candidiasis. In pts receiving bronchodilators by inhalation concomitantly with inhaled steroid therapy, advise to use bronchodilator several minutes before corticosteroid aerosol (enhances penetration of steroid into bronchial tree).

PATIENT/FAMILY TEACHING

• Do not change dose schedule or stop taking drug; must taper off gradually under medical supervision. • **Inhalation:** Maintain diligent oral hygiene. • Rinse mouth with water immediately after inhalation (prevents mouth/throat dryness, fungal infection of mouth). • Report sore throat or mouth. • **Intranasal:** Report symptoms that do not improve; or if sneezing, nasal irritation occurs. • Clear nasal passages prior to use. • Improvement noted after several days.

bedaquiline

bed-**ak**-wi-leen
(Sirturo)

Do not confuse bedaquiline with quinidine or quetiapine.

■ **BLACK BOX ALERT** ■ QT prolongation may occur. Concurrent use with other drugs that prolong QT

Canadian trade name

B

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline LFT; BMP, ionized calcium, magnesium. Correct abnormal electrolyte levels prior to starting therapy (QT prolongation may occur). Obtain EKG and assess for prolonged QT. Screen for viral hepatitis.

INTERVENTION/EVALUATION

Monitor serum chemistries monthly, or more frequently if QT prolongation occurs. If follow up EKG detects QT prolongation, monitor EKG frequently to confirm QT interval has returned to baseline (monitor for syncope). LFT 3 × ULN or greater should be followed by repeat testing within 48 hrs. Diligently monitor bleeding, fatigue, anorexia, nausea, jaundice, melanuria, hepatic tenderness.

PATIENT/FAMILY TEACHING

• Avoid alcohol. • Report fatigue, loss of appetite, nausea, yellowing of skin or eyes, dark colored urine, abdominal tenderness; dizziness or fainting. • Strict compliance with drug regimen is essential. • Swallow tablets whole with water.

belatacept

bel-**at**-a-sept
(Nulojix)

■ **BLACK BOX ALERT** ■ Must be administered by personnel trained in administration/handling of therapy at appropriate medical facility. Increased risk of malignancies, tuberculosis, other opportunistic infection. Test for tuberculosis prior to and during treatment, regardless of initial result. Increased risk of post-transplant lymphoproliferative disorder (PTLD), mainly in central nervous system. JC virus-associated progressive multifocal leukoencephalopathy (PML) and polyoma virus nephropathy may lead to graft loss, deteriorated renal function, or death. Pts who are Epstein-Barr virus (EBV) antibody negative are at increased risk of developing PTLD. Cytomegalovirus and pneumocystitis prophylaxis are recommended after transplantation. Not recommended for hepatic transplants due to increased risk of graft loss, death.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Selective T-cell costimulation blocker. **CLINICAL:** Immunosuppressive agent.

USES

Prevention of acute organ rejection in pts receiving renal transplants (in combination with basiliximab induction, mycophenolate mofetil, corticosteroids). For use in Epstein-Barr virus (EBV) seropositive renal transplant recipients.

PRECAUTIONS

Contraindications: Transplant pts who are Epstein-Barr virus (EBV) seronegative or unknown sero-status. **Cautions:** History of opportunistic infections: bacterial, mycobacterial, invasive fungal, viral, protozoal, (histoplasmosis, aspergillosis, candidiasis, coccidioidomycosis, listeriosis, HIV, tuberculosis, pneumocystosis). Recent open wounds, ulcerations. Not recommended in liver transplants. Avoid use of live vaccines.

ACTION

Inhibits T-lymphocyte proliferation and production of cytokines including interleukin-2 (IL-2), interferon-γ, interleukin-4 (IL-4), TNF-α; a critical pathway in cellular immune response involved in allograft rejection. **Therapeutic Effect:** Prevents renal transplant rejection. Decreases production of antidonor antibodies.

PHARMACOKINETICS

Half-life: 8–10 days.

Canadian trade name

back pain, dyspnea, influenza, dysuria, bronchitis, stomatitis, anxiety, dizziness, abdominal pain, muscle tremor, acne, alopecia, hyperhidrosis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Serious conditions including malignancies (esp. skin cancer), progressive multifocal leukoencephalopathy (caused by JC virus), cytomegalovirus, polyoma virus nephropathy, viral reactivation (herpes zoster, hepatitis) may occur. Other opportunistic infections (bacterial, fungal, viral, protozoal) may cause tuberculosis, cryptococcal meningitis, Chagas' disease, West Nile encephalitis, Guillain-Barré syndrome, cerebral aspergillosis. Additional complications including chronic allograft nephropathy, renal tubular necrosis, renal artery necrosis, atrial fibrillation, hematoma at incision site, wound dehiscence, lymphocele, arteriovenous fistula thrombosis, hydronephrosis, urinary incontinence, anti-belatacept antibody formation were reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, serum chemistries, renal function, glomerular filtration rate (GFR), magnesium, ionized calcium, phosphate, lipid panel, urinalysis. Evaluate pt for active tuberculosis or latent infection prior to initiating treatment and periodically during therapy. Induration of 5 mm or greater with tuberculin skin test should be considered a positive result when assessing whether treatment for latent tuberculosis is necessary. Assess baseline mental status to compare any worsening cognitive symptoms. Obtain Epstein-Barr virus (EBV) serology prior to treatment (contraindicated in pts who are EBV seronegative). Note any skin discoloration, ulcers, excoriation, lesions. Question history of hypertension/hypotension, arrhythmia, diabetes, HIV. Receive full medication history. Question possibility of pregnancy.

INTERVENTION/EVALUATION

Monitor B/P, vital signs, I&O, weight. Diligently monitor CBC, renal function, serum electrolytes (hypokalemia may result in changes in muscle strength, muscle cramps, altered mental status, cardiac arrhythmias). Routinely monitor serum glucose levels for new-onset diabetes after transplantation, corticosteroid use. Monitor for fever, tenderness over transplantation site, skin lesions, changing characteristics of moles, neurologic deterioration related to PTLD or PML.

PATIENT/FAMILY TEACHING

• Therapy may increase risk of malignancies and life-threatening infections. • Detail concomitant immunosuppressive therapy with basiliximab induction, corticosteroids. • Report history of HIV, opportunistic infections, hepatitis, coughing of blood, or close relatives with active tuberculosis. • Avoid sunlight, sunlamps. • Seek immediate attention if adverse reactions occur. • Do not receive live vaccines. • Report pregnancy or plans of becoming pregnant. • Adhere to strict dosing schedule. • Report chest pain, palpitations, edema, fever, night sweats, weight loss, swollen glands, flu-like symptoms, stomach pain, vomiting, diarrhea, weakness, or urinary changes (color, frequency, odor, concentration, burning, blood).

belimumab

be-**lim**-oo-mab
(Benlysta)
Do not confuse belimumab with bevacizumab.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Monoclonal antibody. **CLINICAL:** Immunosuppressant, anti-lupus agent.

Canadian trade name

B

include urticaria, pruritus, erythema, dyspnea, angioedema, hypotension (13% of pts). Infusion reactions such as nausea, headaches, flushing occur more frequently. Serious infections related to immunosuppression including respiratory tract infection, pneumonia, nasopharyngitis, sinusitis, influenza, UTI, cellulitis, bronchitis, viral reactivation may occur. Mental health issues including psychiatric events (16%) and depression (6%) have been noted. Life-threatening psychiatric events and depression (including suicide) reported in less than 1%. Pts who experienced life-threatening episodes had prior psychiatric history.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC with differential, serum chemistries, IgG level, vital signs. Assess history of recent immunizations, malignancies, open sores, ulcerations, weight loss, HIV, chronic infection. Assess psychiatric history including insomnia, anxiety, depression, impulsiveness, suicidal ideations, mood changes. Question possibility of pregnancy, current breastfeeding.

INTERVENTION/EVALUATION

Monitor vital signs, CBC. If hypersensitivity reaction occurs, immediately notify physician. Premedication with antihistamines, antipyretics, and/or corticosteroids may prevent subsequent reactions. Discontinue treatment if anaphylactic reaction occurs; initiate appropriate medical treatment. Routinely inspect skin, paying close attention to areas that are discolored, irregular, or have ill-defined borders (may indicate malignancies). Obtain anti-belimumab antibody titer if immunogenicity suspected. Consider interrupting therapy if acute infection occurs.

PATIENT/FAMILY TEACHING

- Report any signs of allergic reaction (see Adverse Effects/Toxic Reactions).
- If anaphylactic reaction occurs, pt may require rapid sequence intubation.
- Allergic reactions include itching, hives, dizziness, or difficulty breathing.
- Notify physician if pregnant or plan on becoming pregnant.
- Contraception recommended during treatment and at least 4 mos after treatment.
- Report suicidal ideation, mood changes, or worsening depression.
- Do not receive live vaccines 30 days before or during treatment.
- Report any fever, cough, night sweats, flu-like symptoms, skin changes, or painful/burning urination.

belinostat

beh-**lih**-noh-**stat**
(Beleodaq)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Histone deacetylase inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of relapsed or refractory peripheral T-cell lymphoma (PTCL).

PRECAUTIONS

Contraindications: None known. **Cautions:** Avoid use in pts with active infection. Monitor pts with high tumor burden. Pts with hx of hepatic/renal impairment, thrombocytopenia, peripheral edema.

ACTION

Inhibits enzymatic activity of histone deacetylases by catalyzing removal of acetyl groups from lysine residues of histones and nonhistone proteins. **Therapeutic Effect:** Inhibits tumor cell growth and metastasis; causes tumor cellular death (apoptosis).

PHARMACOKINETICS

Limited tissue distribution. Metabolized in liver. Protein binding: 93%–95%. Eliminated primarily in urine as metabolites. **Half-life:** 1.1 hrs.

Canadian trade name

Occasional (23%–10%): Constipation, diarrhea, dyspepsia, rash, peripheral edema, cough, pruritus, chills, decreased appetite, headache, infusion site pain, abdominal pain, hypotension, phlebitis, dizziness.

ADVERSE EFFECTS/TOXIC REACTIONS

Anemia, lymphopenia, neutropenia, thrombocytopenia are expected responses to therapy. Serious and sometimes fatal infections including pneumonia, sepsis have occurred. May cause hepatotoxicity, LFT abnormalities, tumor lysis syndrome. GI toxicities including severe diarrhea, nausea, vomiting may require use of antiemetic and antidiarrheal medication or result in dosage reduction. Nineteen percent of pts required treatment discontinuation related to toxic anemia, febrile neutropenia, multiorgan failure, ventricular fibrillation (rare).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline ANC, CBC, BMP, LFT, vital signs; urine pregnancy in women of reproductive potential. Question history of anemia, arrhythmias, hepatic impairment, peripheral edema, or if pt homozygous for UGT1A1 allele (may require reduced starting dose). Question possibility of pregnancy, current breastfeeding status. Receive full medication history including herbal products.

INTERVENTION/EVALUATION

Diligently monitor blood counts (esp. ANC, Hgb/Hct, WBC, platelet count) weekly; hepatic/renal function prior to start of first dose of each cycle, vital signs. Monitor for symptoms of hypokalemia. Screen for tumor lysis syndrome (electrolyte imbalance, uric acid nephropathy, acute renal failure). Obtain EKG if arrhythmia, palpitations occur. Notify physician if any CTCAE toxicities occur (see Appendix N). Offer antiemetics if nausea vomiting occurs.

PATIENT/FAMILY TEACHING

• Blood levels will be routinely monitored. • Avoid pregnancy; treatment may cause birth defects or miscarriage. Do not breastfeed. • Report any abdominal pain, black/tarry stools, bruising, yellowing of skin or eyes; dark urine, decreased urine output. • Severe diarrhea may lead to dehydration. • Body aches, burning with urination, chills, cough, difficulty breathing, fever may indicate an acute infection.

benazepril

ben-**ay**-ze-pril
(Lotensin)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

Do not confuse benazepril with Benadryl, or Lotensin with Lioresal.

FIXED-COMBINATION(S)

Lotensin HCT: benazepril/hydrochlorothiazide (a diuretic): 5 mg/625 mg, 10 mg/12.5 mg, 20 mg/12.5 mg, 20 mg/25 mg. **Lotrel:** benazepril/amlodipine (a calcium blocker): 2.5 mg/10 mg, 5 mg/10 mg, 5 mg/20 mg, 5 mg/40 mg, 10 mg/20 mg, 10 mg/40 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Angiotensin-converting enzyme (ACE) inhibitor. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension. Used alone or in combination with other antihypertensives.

PRECAUTIONS

Contraindications: History of angioedema with or without previous treatment with ACE inhibitors. Use with aliskiren in pts with diabetes. **Cautions:** Renal impairment; hypertrophic cardiomyopathy without flow tract obstruction; severe

Canadian trade name

B

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC before therapy begins and q2wks for 3 mos, then periodically thereafter. Obtain B/P immediately before each dose, in addition to regular monitoring (be alert to fluctuations). If excessive reduction in B/P occurs, place pt in supine position with legs elevated. Monitor pt with renal impairment, autoimmune disease, or taking drugs that affect leukocytes or immune response.

INTERVENTION/EVALUATION

Assist with ambulation if dizziness occurs. Monitor B/P, renal function, urinary protein, serum potassium. Monitor CBC with differential if pt has collagen vascular disease or renal impairment.

PATIENT/FAMILY TEACHING

• To reduce hypotensive effect, go from lying to standing slowly. • Full therapeutic effect may take 2–4 wks. • Skipping doses or noncompliance with drug therapy may produce severe, rebound hypertension. • Report dizziness, persistent cough.

bendamustine

ben-da-**mus**-teen
(Treanda)
Do not confuse bendamustine with carmustine or lomustine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Alkylating agent. **CLINICAL:** Antineoplastic.

USES

Treatment of chronic lymphocytic leukemia (CLL). Treatment of indolent B-cell non-Hodgkin's lymphoma (NHL) that has progressed during or within 6 mos of treatment with rituximab or a rituximab-containing regimen. **OFF-LABEL:** Treatment of mantle cell lymphoma, relapsed multiple myeloma. First-line treatment for follicular lymphoma. Treatment of Waldenström's macroglobulinemia.

PRECAUTIONS

Contraindications: Known hypersensitivity to bendamustine or mannitol. **Cautions:** Myelosuppression (may increase risk of infection), renal/hepatic impairment, dehydration, HF.

ACTION

Alkylates and cross-links macromolecules, resulting in DNA, RNA, and protein synthesis inhibition. **Therapeutic Effect:** Inhibits tumor cell growth, causes cell death.

PHARMACOKINETICS

Metabolized via hydrolysis to metabolites. Protein binding: 64%–95%. Eliminated primarily in feces. **Half-life:** 40 min.

Canadian trade name

B

PATIENT/FAMILY TEACHING

• Avoid crowds, those with known infection. • Avoid contact with anyone who recently received live virus vaccine. • Do not have immunizations without physician's approval (drug lowers body resistance). • Promptly report fever, chills, flu-like symptoms, sore throat, unusual bruising/bleeding from any site. • Male pts should be warned of potential risk to their reproductive capacities.

benzonatate

ben-**zoe**-na-tate
(Tessalon Perles, Zonatuss)
Do not confuse benzonatate with benazepril, benzocaine, benztropine, or Tessalon with Tussionex.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Nonnarcotic antitussive. **CLINICAL:** Cough suppressant.

USES

Relief of nonproductive cough, including acute cough of minor throat/bronchial irritation.

PRECAUTIONS

Contraindications: Allergy to topical anesthetic medicines (tetracaine, procaine). **Cautions:** Productive cough.

ACTION

Anesthetizes stretch or cough receptors in alveoli of lungs, bronchi, and pleura, suppressing the cough reflex. **Therapeutic Effect:** Reduces cough production.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	15–20 min	—	3–8 hrs

Metabolized in liver. Primarily excreted in urine. **Half-life:** Unknown.

Canadian trade name

or twice a day. Titrate by 0.5 mg at 5–6 day intervals. **Maximum:** 4 mg/day.

Drug-Induced Extrapyramidal Symptoms
PO, IM, IV: ADULTS: 1–4 mg once or twice a day or 1–2 mg 2–3 times/day. **CHILDREN OLDER THAN 3 YRS:** 0.02–0.05 mg/kg/dose once or twice a day.

Acute Dystonic Reactions
IV, IM: ADULTS: Initially, 1–2 mg as a single dose.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent: Drowsiness, dry mouth, blurred vision, constipation, urinary retention, GI upset, photosensitivity. **Occasional:** Headache, memory loss, muscle cramps, anxiety, peripheral paresthesia, orthostatic hypotension, abdominal cramps. **Rare:** Rash, confusion, eye pain.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may produce severe anticholinergic effects (drowsiness, tachycardia, paralytic ileus, malignant hyperthermia, urinary retention, dyspnea, skin flushing, dryness of mouth/nose/throat). Severe paradoxical reactions (hallucinations, tremor, seizures, toxic psychosis) may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess mental status for confusion, disorientation, agitation, psychotic-like symptoms (medication frequently produces such side effects in pts older than 60 yrs). Note severity of baseline rigidity, tremors.

INTERVENTION/EVALUATION

Be alert to neurologic effects: headache, drowsiness, mental confusion, agitation. Assess for clinical reversal of symptoms (improvement of tremor of head and hands at rest, mask-like facial expression, shuffling gait, muscular rigidity). Monitor daily pattern of bowel activity, stool consistency, esp. constipation. Monitor I/O. Assess for urinary retention.

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Dry mouth, drowsiness, dizziness may be an expected response to drug. • Drowsiness tends to diminish or disappear with continued therapy. • Avoid alcohol. • Report sudden muscle weakness or stiffness.

beractant

ber-**ak**-tant
(Survanta)
Do not confuse Survanta with Sufenta.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Natural bovine lung extract. **CLINICAL:** Pulmonary surfactant.

USES

Prevention and treatment (rescue therapy) of respiratory distress syndrome (RDS—hyaline membrane disease) in premature infants. **Prevention:** Body weight less than 1,250 g in infants at risk for developing or with evidence of surfactant deficiency (give within 15 min of birth). **Rescue Therapy:** Treatment of infants with RDS confirmed by X-ray, requiring mechanical ventilation (give within 8 hrs of birth).

PRECAUTIONS

Contraindications: None known. **Cautions:** Pts at risk for circulatory overload. This drug is for use only in neonates. **Pregnancy Category:** Not indicated for use in pregnant women.

Canadian trade name

B

Taclonex: betamethasone/calcipotriene (an antipsoriatic): 0.064%/.005%.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Adrenocorticosteroid. **CLINICAL:** Anti-inflammatory, immunosuppressant.

USES

Systemic: Inflammatory dermatoses (e.g., atopic dermatitis, psoriasis. **Topical:** Relief of inflammatory and pruritic dermatoses. **Foam:** Relief of inflammation, itching associated with dermatosis. **OFF-LABEL:** Accelerate fetal lung maturation in pts with preterm labor.

PRECAUTIONS

Contraindications: Systemic fungal infections; IM administration in idiopathic thrombocytopenia purpura. **Cautions:** Hypothyroidism, hepatic/renal impairment, cardiovascular disease, diabetes, glaucoma, cataracts, myasthenia gravis, pts at risk for osteoporosis/seizures/GI disease, following acute MI, elderly.

ACTION

Controls rate of protein synthesis, depresses migration of polymorphonuclear leukocytes/fibroblasts, reverses capillary permeability, prevents or controls inflammation. **Therapeutic Effect:** Decreases tissue response to inflammatory process.

PHARMACOKINETICS

Rapidly absorbed following PO administration. Protein binding: 64%. After topical application, limited absorption systemically. Metabolized in liver. Excreted in urine. **Half-life:** 6.5 hrs.

Canadian trade name

B

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	30–90 min	60 min	6 hrs

Poorly absorbed following PO administration. Does not cross blood-brain barrier. **Half-life:** Unknown.

Canadian trade name

B

Dose Adjustment for Toxicity

Temporary suspension: Mild to moderate proteinuria, severe hypertension not controlled with medical management. **Permanent discontinuation:** Wound dehiscence requiring intervention, GI perforation, hypertensive crises, serious bleeding, nephrotic syndrome.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (73%–25%): Asthenia (loss of strength, energy), vomiting, anorexia, hypertension, epistaxis, stomatitis, constipation, headache, dyspnea. **Occasional (21%–15%):** Altered taste, dry skin, exfoliative dermatitis, dizziness, flatulence, excessive lacrimation, skin discoloration, weight loss, myalgia. **Rare (8%–6%):** Nail disorder, skin ulcer, alopecia, confusion, abnormal gait, dry mouth.

ADVERSE EFFECTS/ TOXIC REACTIONS

UTI, manifested as urinary frequency/urgency, proteinuria, occurs frequently. Most serious adverse effects include HF, deep vein thrombosis, GI perforation, wound dehiscence, hypertensive crisis, nephrotic syndrome, severe hemorrhage. Anemia, neutropenia, thrombocytopenia occur occasionally. Hypersensitivity reactions occur rarely. May increase risk of tracheoesophageal fistula development.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, serum potassium, sodium levels and at regular intervals during therapy. Assess for proteinuria with urinalysis. For pts with 2+ or greater urine dipstick reading, a 24-hr urine collection is advised.

INTERVENTION/EVALUATION

Monitor B/P regularly for hypertension. Assess for asthenia. Assist with ambulation if asthenia occurs. Monitor for fever, chills, abdominal pain, epistaxis. Offer antiemetic if nausea, vomiting occurs. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

• Report abdominal pain, vomiting, constipation, headache. • Do not receive immunizations without physician's approval (lowers body's resistance). • Avoid contact with anyone who recently received a live virus vaccine. • Avoid crowds, those with infection. • Female pts should take measures to avoid pregnancy during treatment.

bexarotene

HIGH ALERT

beks-**ar**-oh-teen
(Targretin)

■ **BLACK BOX ALERT** ■ Do not administer to pregnant women (high risk of birth defects).

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Retinoid.
CLINICAL: Antineoplastic.

USES

PO: Treatment of cutaneous T-cell lymphoma (CTCL) in pts refractory to at least one prior systemic therapy. **Topical:** Treatment of cutaneous lesions in pts with refractory CTCL (stage 1A and 1B) or not tolerant of other therapies.

PRECAUTIONS

Contraindications: Pregnancy. **Cautions:** Hepatic impairment, diabetes mellitus, lipid abnormalities, excessive alcohol consumption, biliary tract disease.

ACTION

Binds to and activates retinoid X receptor subtypes that regulate the genes controlling cellular differentiation and proliferation. **Therapeutic Effect:** Inhibits growth of tumor cell lines of hematopoietic and squamous cell origin, induces tumor regression.

Canadian trade name

Category X). • Warn women of childbearing age about potential fetal risk if pregnancy occurs. • Instruct on need for use of 2 reliable forms of contraceptives concurrently during therapy and for 1 mo after discontinuation of therapy, even in infertile, premenopausal women.

bicalutamide

HIGH ALERT

bye-ka-**loo**-ta-mide
(Apo-Bicalutamide, Casodex, Novo-Bicalutamide)

CLASSIFICATION

PHARMACOTHERAPEUTIC: Antiandrogen hormone. **CLINICAL:** Antineoplastic.

USES

Treatment of advanced metastatic prostatic carcinoma (in combination with luteinizing hormone-releasing hormone [LHRH] agonist analogues, e.g., leuprolide). Treatment with both drugs must be started at same time. **OFF-LABEL:** Monotherapy for locally advanced prostate cancer.

PRECAUTIONS

Contraindications: Women, esp. those who are or may become pregnant. **Cautions:** Moderate to severe hepatic impairment, diabetes.

ACTION

Competitively inhibits androgen action by binding to androgen receptors in target tissue. **Therapeutic Effect:** Decreases growth of prostatic carcinoma.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 96%. Metabolized in liver. Excreted in urine and feces. Not removed by hemodialysis. **Half-life:** 5.8–7 days.

Canadian trade name

B

Rectal, Enema

• Shake bottle, and remove orange protective shield from tip. • Position pt on left side with left knee slightly bent and right leg drawn up, or in knee-chest position. • Insert tip into rectum, aiming at pt's umbilicus.

Rectal, Suppository

• If suppository is too soft, chill for 30 min in refrigerator or run cold water over foil wrapper. • Moisten suppository with cold water before inserting well into rectum.

Storage • Store rectal enema, suppositories at room temperature.

INDICATIONS/ROUTES/DOSAGE

Treatment of Constipation

PO: ADULTS, CHILDREN OLDER THAN 12 YRS: 5–15 mg as needed. **Maximum:** 30 mg. **CHILDREN 3–12 YRS:** 5–10 mg or 0.3 mg/kg at bedtime or after breakfast. **ELDERLY:** Initially, 5 mg/day.

Rectal, Enema: ADULTS, CHILDREN OLDER THAN 12 YRS: One 1.25-oz bottle as a single daily dose.

Rectal, Suppository: ADULTS, CHILDREN OLDER THAN 12 YRS: 10 mg to induce bowel movement. **CHILDREN 2–12 YRS:** 5–10 mg as a single dose. **CHILDREN YOUNGER THAN 2 YRS:** 5 mg. **ELDERLY:** 5–10 mg/day.

SIDE EFFECTS

Frequent: Some degree of abdominal discomfort, nausea, mild cramps, faintness.
Occasional: Rectal administration: burning of rectal mucosa, mild proctitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Long-term use may result in laxative dependence, chronic constipation, loss of normal bowel function. Overdose may result in electrolyte or metabolic disturbances (hypokalemia, hypocalcemia, metabolic acidosis, alkalosis), persistent diarrhea, vomiting, muscle weakness, malabsorption, weight loss.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Observe for evidence of constipation. Assess pattern of bowel activity, stool consistency.

INTERVENTION/EVALUATION

Encourage adequate fluid intake. Assess bowel sounds for peristalsis. Monitor daily pattern of bowel activity, stool consistency; record time of evacuation. Assess for abdominal disturbances. Monitor serum electrolytes in those exposed to prolonged, frequent, or excessive use of medication.

PATIENT/FAMILY TEACHING

• Institute measures to promote defecation: increase fluid intake, exercise, high-fiber diet. • Do not take antacids, milk, or other medication within 1 hr of taking medication (decreased effectiveness). • Report unrelieved constipation, rectal bleeding, muscle pain or cramps, dizziness, weakness. • Do not chew, crush, dissolve, or divide tablets.

bisoprolol

HIGH ALERT

bi-**soe**-proe-lol
(Apo-Bisoprolol, Novo-Bisoprolol, Zebeta)
Do not confuse Zebeta with DiaBeta or Zetia.

FIXED-COMBINATION(S)

Ziac: bisoprolol/hydrochlorothiazide (a diuretic): 2.5 mg/6.25 mg, 5 mg/6.25 mg, 10 mg/6.25 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Beta-adrenergic blocker. **CLINICAL:** Antihypertensive.

USES

Management of hypertension, alone or in combination with other medications.

Canadian trade name

B

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess baseline renal/hepatic function tests. Assess B/P, apical pulse immediately before drug is administered (if pulse is 60/min or less or systolic B/P is less than 90 mm Hg, withhold medication, contact physician).

INTERVENTION/EVALUATION

Monitor B/P, pulse for quality, irregular rate, bradycardia. Assist with ambulation if dizziness occurs. Assess for peripheral edema (usually, first area of lower extremity swelling is behind medial malleolus in ambulatory, sacral area in bedridden). Monitor daily pattern of bowel activity, stool consistency. Assess neurologic status.

PATIENT/FAMILY TEACHING

• Do not abruptly discontinue medication. • Compliance with therapy regimen is essential to control hypertension. • If dizziness occurs, sit or lie down immediately. • Avoid tasks that require alertness, motor skills until response to drug is established. • Take pulse properly before each dose and report excessively slow pulse rate (less than 60 beats/min). Report numbness of extremities, dizziness. • Do not use nasal decongestants, OTC cold preparations (stimulants) without physician's approval. • Restrict salt, alcohol intake.

bivalirudin

HIGH ALERT

bye-**val**-i-rue-din
(Angiomax)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Thrombin inhibitor. **CLINICAL:** Anticoagulant.

USES

Anticoagulant in pts with unstable angina undergoing percutaneous transluminal coronary angioplasty (PTCA) in conjunction with aspirin. Pts with heparin-induced thrombocytopenia (HIT) and thrombosis syndrome (HITTS) while undergoing percutaneous coronary intervention (PCI) (in conjunction with aspirin). **OFF-LABEL:** HIT; ST-segment elevation MI (STEMI) undergoing PCI.

PRECAUTIONS

Contraindications: Active major bleeding. **Cautions:** Renal impairment, conditions associated with increased risk of bleeding (e.g., bacterial endocarditis, recent major bleeding, CVA, stroke, intracerebral surgery, hemorrhagic diathesis, severe hypertension, severe renal/hepatic impairment, recent major surgery).

ACTION

Specifically and reversibly inhibits thrombin by binding to its receptor sites. **Therapeutic Effect:** Decreases acute myocardial ischemic complications in pts with unstable angina pectoris.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	Immediate	N/A	1 hr

Primarily eliminated by kidneys. Twenty-five percent removed by hemodialysis. **Half-life:** 25 min (increased in moderate to severe renal impairment).

Canadian trade name

■ **BLACK BOX ALERT** ■ Pulmonary fibrosis (commonly presenting as pneumonitis) occurs more often in elderly, pts receiving more than 400 units total lifetime dose or single dose more than 30 units, smokers, prior radiation treatment, or receiving concurrent oxygen. Severe reactions (hypotension, mental confusion, fever, chills, wheezing) is reported rarely.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Glycopeptide antibiotic. **CLINICAL:** Antineoplastic, sclerosing agent.

USES

Treatment of Hodgkin's and non-Hodgkin's lymphoma, sclerosing agent for malignant pleural effusions, squamous cell carcinoma (e.g., head, neck, penis, cervix, vulva), testicular carcinoma. **OFF-LABEL:** Ovarian tumors, germ cell tumors.

PRECAUTIONS

Contraindications: Previous allergic reaction to bleomycin. **Cautions:** Severe renal or pulmonary impairment.

ACTION

Binds to portions of DNA, producing DNA single-strand and double-strand breaks. Inhibits RNA, protein synthesis. **Therapeutic Effect:** Inhibits cell replication.

PHARMACOKINETICS

Protein binding: Low (1%). Metabolism varies. Excreted in urine as unchanged drug. **Half-life:** 115 min.

Canadian trade name

have failed previous interferon and ribavirin therapy.

PRECAUTIONS

◀ALERT▶ Safety and efficacy not established in decompensated cirrhosis, organ transplant, coinfection with HIV, hepatitis B, previous failed therapies with protease inhibitors.

Contraindications: Pregnancy, breastfeeding, male partners of pregnant women, drugs utilizing CYP3A4/5 for clearance, concomitant use of CYP3A4/5 inducers (e.g., rifampin, carbamazepine), contraindications to peginterferon alfa or ribavirin. **Cautions:** Anemia, neutropenia, thrombocytopenia, HIV.

ACTION

Inhibits hepatitis C virus (HCV) protease needed for cleavage of HCV-encoded polyproteins by binding to active serine protease sites. **Therapeutic Effect:** Inhibits viral replication of hepatitis C virus.

PHARMACOKINETICS

Well absorbed after PO administration. Protein binding: 75%. Metabolized in liver. Excreted primarily in feces. Minimal removal by hemodialysis. **Half-life:** 3.4 hrs.

Canadian trade name

B

three-medication regimen. • Blood levels will be drawn routinely. • Immediately report any newly prescribed medications. • Women of childbearing age must use two different forms of birth control: intrauterine device including barrier methods during treatment and for at least 6 mos after treatment. • Hormonal birth control (oral, vaginal rings, injections) may be ineffective. • Immediately notify physician if partner becomes pregnant. • May alter taste of food or decrease appetite. • Report bloody stool/urine, bruising, difficulty breathing, weakness, dizziness, palpitations, weight loss. • Avoid alcohol. • Take with meals.

bortezomib

HIGH ALERT

bor-**tez**-oh-mib
(Velcade)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Protease inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of relapsed or refractory mantle cell lymphoma. Initial treatment of multiple myeloma. **OFF-LABEL:** Treatment of Waldenström's macroglobulinemia; peripheral or cutaneous T-cell lymphoma; systemic light-chain amyloidosis.

PRECAUTIONS

Contraindications: Hypersensitivity to boron or mannitol, intrathecal administration. **Cautions:** Strong CYP3A4 inhibitors may increase concentration/toxicity. History of syncope, pts receiving medication known to be associated with hypotension; dehydration, diabetes, hepatic impairment, preexisting cardiac disease.

ACTION

Inhibits proteasomes (enzyme complexes regulating protein homeostasis within the cell). **Therapeutic Effect:** Produces cell-cycle arrest, apoptosis.

PHARMACOKINETICS

Widely distributed. Protein binding: 83%. Primarily metabolized by enzymatic action. Significant biliary excretion, with lesser amount excreted in urine. **Half-life:** 9–15 hrs.

Canadian trade name

B

bosentan

boe-sen-tan
(Tracleer)

■ **BLACK BOX ALERT** ■ Do not use in pregnancy (may cause birth defects) or in moderate to severe hepatic impairment (may cause hepatotoxicity).

Do not confuse Tracleer with Tricor.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Endothelin receptor antagonist. **CLINICAL:** Vasodilator, neurohormonal blocker.

USES

Treatment of PAH World Health Organization group I in pts with NYHA class II, III, or IV symptoms to improve exercise ability and to decrease clinical worsening.

PRECAUTIONS

Contraindications: Administration with cyclosporine or glyburide, pregnancy. **Extreme Caution:** Moderate to severe hepatic impairment. **Cautions:** Mild hepatic impairment, anemia.

ACTION

Blocks endothelin receptors on vascular endothelium and smooth muscle that constrict pulmonary arteries. **Therapeutic Effect:** Improves exercise ability, slows clinical worsening of pulmonary arterial hypertension (PAH).

PHARMACOKINETICS

Protein binding: greater than 98%. Metabolized in liver. Eliminated by biliary excretion. **Half-life:** Approximately 5 hrs (increased in HF).

Canadian trade name

Canadian trade name

if distributed in breast milk. **Pregnancy Category D. Children:** Safety and efficacy not established. **Elderly:** Safety and efficacy not established.

INTERACTIONS

DRUG: **Strong CYP3A4 inhibitors (e.g., atazanavir, clarithromycin, ketoconazole)** increase concentration/effect. **CYP3A4 inducers (e.g., rifampin)** may reduce concentration/effect. **FOOD:** None known. **HERBAL:** **Echinacea** may decrease effect. **LAB VALUES:** May decrease Hgb, Hct, WBC, RBC, platelets. May increase serum bicarbonate, lactate dehydrogenase, glucose, albumin, magnesium, sodium.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution: 50-mg single-use vial.

ADMINISTRATION/HANDLING

Canadian trade name

Canadian trade name

concentration. **HERBAL:** **Echinacea** may decrease effects. **FOOD:** **Grapefruit products** may increase systemic exposure of budesonide. **LAB VALUES:** May decrease serum potassium.

AVAILABILITY (Rx)

Oral Inhalation Powder (Pulmicort Flexhaler): 90 mcg per inhalation; 180 mcg per inhalation. **Inhalation Suspension for Nebulization (Pulmicort Respules):** 0.25 mg/2 ml; 0.5 mg/2 ml; 1 mg/2 ml. **Nasal Spray (Rhinocort Aqua):** 32 mcg/spray.

Canadian trade name

B

through Y tube or 3-way stopcock. • May give as continuous infusion.
Storage • Store at room temperature. • Stable for 24 hrs if diluted.

PO
• Give with food to avoid GI upset, preferably with breakfast (may prevent nocturia).

IV INCOMPATIBILITY
Midazolam (Versed).

IV COMPATIBILITIES
Aztreonam (Azactam), cefepime (Maxipime), dexmedetomidine (Precedex), diltiazem (Cardizem), dobutamine (Dobutrex), furosemide (Lasix), lorazepam (Ativan), milrinone (Primacor), morphine, piperacillin and tazobactam (Zosyn), propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE
Edema
PO: ADULTS: 0.5–2 mg as a single dose in the morning. May repeat q4–5h. **Maximum:** 10 mg/day. **ELDERLY:** 0.5 mg/day, increased as needed.
IV, IM: ADULTS, ELDERLY: 0.5–1 mg/dose; may repeat in 2–3 hrs (**maximum:** 10 mg/day) or 0.5–2 mg/hr by continuous IV infusion.

Hypertension
PO: ADULTS, ELDERLY: Initially, 0.5 mg/day. Range: 0.5–2 mg/day in 2 divided doses. **Maximum:** 5 mg/day. Larger doses may be given 2–3 doses/day.

Usual Pediatric Dosage
IV, IM, PO: CHILDREN: 0.015–0.1 mg/kg/dose q6–24h. **Maximum:** 10 mg/day. **NEONATES:** 0.01–0.05 mg/kg/dose q12–48h.

SIDE EFFECTS
Expected: Increased urinary frequency and urine volume. **Frequent (5%):** Muscle cramps, dizziness, hypotension, headache, nausea. **Occasional (3%–1%):** Impaired hearing, pruritus, EKG changes, weakness, hives, abdominal pain, dyspepsia, musculoskeletal pain, rash, nausea, vomiting. **Rare (less than 1%):** Chest pain, ear pain, fatigue, dry mouth, premature ejaculation, impotence, nipple tenderness.

ADVERSE EFFECTS/ TOXIC REACTIONS
Vigorous diuresis may lead to profound water and electrolyte depletion, resulting in hypokalemia, hyponatremia, dehydration, coma, circulatory collapse. Ototoxicity manifested as deafness, vertigo, tinnitus may occur, esp. in pts with severe renal impairment or those taking other ototoxic drugs. Blood dyscrasias, acute hypotensive episodes have been reported.

NURSING CONSIDERATIONS
BASELINE ASSESSMENT
Obtain baseline vital signs, esp. B/P for hypotension, before administration. Assess baseline electrolytes, particularly for hypokalemia, hyponatremia. Assess for edema. Observe skin turgor, mucous membranes for hydration status. Initiate I&O, obtain baseline weight.

INTERVENTION/EVALUATION
Continue to monitor B/P, vital signs, electrolytes, I&O, weight. Note extent of diuresis. Watch for changes from initial assessment (hypokalemia may result in muscle weakness, tremor, muscle cramps, altered mental status, cardiac arrhythmias; hyponatremia may result in confusion, thirst, cold/clammy skin).

PATIENT/FAMILY TEACHING
• Expect increased urinary frequency/volume. • Report auditory abnormalities (e.g., sense of fullness in ears, tinnitus). • Eat foods high in potassium such as whole grains (cereals), legumes, meat, bananas, apricots, orange juice, potatoes (white, sweet), raisins. • Rise slowly from sitting/lying position.

Canadian trade name

B

antibiotics, protease inhibitors) may increase plasma concentration. **CYP3A4 inducers (e.g., carbamazepine, phenytoin, rifampin)** may cause increased clearance of buprenorphine. May decrease effects of **other opioid analgesics.** **HERBAL:** **St. John's wort, kava kava, gotu kola, valerian** may increase CNS depression. **FOOD:** None known. **LAB VALUES:** May increase serum amylase, lipase.

AVAILABILITY (Rx)

Injection Solution (Buprenex): 0.3 mg/1 ml. **Tablets, Sublingual (Fixed-Combination [Suboxone]):** 2 mg/0.5 mg, 8 mg/2 mg. **Transdermal (Butrans):** 5 mcg/hr, 10 mcg/hr, 15 mcg/hr, 20 mcg/hr.

ADMINISTRATION/HANDLING

B

PHARMACOKINETICS

Rapidly absorbed from GI tract. Protein binding: 84%. Crosses the blood-brain barrier. Metabolized in liver. Primarily excreted in urine. **Half-life:** 14 hrs.

*“Tall Man” lettering Canadian trade name

B

erythromycin, ketoconazole) may increase concentration/effect. **CYP3A4 inducers (e.g., rifampin)** may decrease concentration/effect. May increase effects of **MAOIs.** **HERBAL:** **Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depression. **FOOD:** **Grapefruit products** may increase concentration, risk of toxicity. **LAB VALUES:** May produce false positive urine metanephrine/catecholamine assay test.

AVAILABILITY (Rx)

Tablets: 5 mg, 7.5 mg, 10 mg, 15 mg, 30 mg.

ADMINISTRATION/HANDLING

PO

- Give without regard to food.

INDICATIONS/ROUTES/DOSAGE

Short-Term Management (up to 4 wks) of Anxiety Disorders

PO: ADULTS, ELDERLY: 7.5 mg twice a day. May increase by 5 mg/day every 2–4 days. **Maintenance:** 15–30 mg/day in 2–3 divided doses. **Maximum:** 60 mg/day.

SIDE EFFECTS

Frequent (12%–6%): Dizziness, drowsiness, nausea, headache. **Occasional (5%–2%):** Nervousness, fatigue, insomnia, dry mouth, light-headedness, mood swings, blurred vision, poor concentration, diarrhea, paresthesia. **Rare:** Muscle pain/stiffness, nightmares, chest pain, involuntary movements.

ADVERSE EFFECTS/ TOXIC REACTIONS

No evidence of drug tolerance, psychological or physical dependence, withdrawal syndrome. Overdose may produce severe nausea, vomiting, dizziness, drowsiness, abdominal distention, excessive pupil constriction.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess degree/manifestations of anxiety. Offer emotional support. Assess motor responses (agitation, trembling, tension), autonomic responses (cold, clammy hands; diaphoresis).

INTERVENTION/EVALUATION

For pts on long-term therapy, CBC, hepatic/renal function tests should be performed periodically. Assist with ambulation if drowsiness, dizziness occur. Evaluate for therapeutic response: calm facial expression, decreased restlessness, lessened insomnia, mental status.

PATIENT/FAMILY TEACHING

• Improvement may be noted in 7–10 days, but optimum therapeutic effect generally takes 3–4 wks. • Drowsiness usually disappears during continued therapy. • If dizziness occurs, go from lying to standing slowly. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol, grapefruit products.

busulfan

HIGH ALERT

bue-**sul**-fan
(Busulfex, Myleran)

■ **BLACK BOX ALERT** ■ Must be administered by certified chemotherapy personnel. Major effect characterized by severe bone marrow suppression.

Do not confuse Myleran with Alkeran, Leukeran, or Mylicon.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Alkylating agent. **CLINICAL:** Antineoplastic.

Canadian trade name

B

Marrow Ablative Conditioning and Bone Marrow Transplantation

IV: ADULTS, ELDERLY, CHILDREN WEIGHING MORE THAN 12 KG: 0.8 mg/kg/dose q6h for total of 16 doses. (Use ideal body weight [IBW] or actual body weight [ABW], whichever is lower.) **CHILDREN WEIGHING 12 KG OR LESS:** 1.1 mg/kg/dose (IBW) q6h for 16 doses.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Expected (98%–72%): Nausea, stomatitis, vomiting, anorexia, insomnia, diarrhea, fever, abdominal pain, anxiety. **Frequent (69%–44%):** Headache, rash, asthenia (loss of strength, energy), infection, chills, tachycardia, dyspepsia. **Occasional (38%–16%):** Constipation, dizziness, edema, pruritus, cough, dry mouth, depression, abdominal enlargement, pharyngitis, hiccups, back pain, alopecia, myalgia. **Rare (13%–5%):** Injection site pain, arthralgia, confusion, hypotension, lethargy.

ADVERSE EFFECTS/ TOXIC REACTIONS

Major adverse effect is myelosuppression resulting in hematologic toxicity (anemia, leukopenia, thrombocytopenia). Very high dosages may produce blurred vision, muscle twitching, tonic-clonic seizures. Long-term therapy (more than 4 yrs) may produce pulmonary syndrome ("busulfan lung"), characterized by persistent cough, congestion, adventitious breath sounds (rales, crackles), dyspnea. Hyperuricemia may produce uric acid nephropathy, renal calculi, acute renal failure.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

CBC with differential, hepatic/renal function studies should be performed weekly (dosage based on hematologic values).

INTERVENTION/EVALUATION

Monitor lab values diligently for evidence of bone marrow depression. Assess oral cavity for onset of stomatitis. Initiate antiemetics to prevent nausea/vomiting. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

• Educate pt/family regarding expected effects of therapy. • Maintain adequate daily fluid intake (may protect against renal impairment). • Report persistent cough, congestion, difficulty breathing. • Promptly report fever, sore throat, signs of local infection, unusual bruising/bleeding from any site. • Report signs of abrupt weakness, fatigue, weight loss, nausea, vomiting. • Do not have immunizations without physician's approval (drug lowers body's resistance). • Avoid contact with those who have recently received live virus vaccine. • Take medication at same time each day. • Contraception is recommended during therapy.

Generic Drugs C

cabazitaxel
cabozantinib
caffeine citrate
calcitonin
calcium acetate
calcium carbonate
calcium chloride
calcium citrate
calcium glubionate
calcium gluconate
calfactant
canagliflozin
candesartan
capecitabine
captopril
carbamazepine
carbidopa/levodopa
carboplatin
carfilzomib
carisoprodol
carmustine
carvedilol
caspofungin
cefaclor
cefadroxil
cefazolin
cefdinir
cefepime
cefixime
cefotaxime
cefoxitin
cefpodoxime
cefprozil
ceftaroline
ceftazidime
ceftibuten
ceftriaxone
cefuroxime
celecoxib
cephalexin
ceritinib
certolizumab
cetirizine
cetuximab
chlorambucil
chlordiazepoxide
chlorproMAZINE
cholestyramine
ciclesonide
cidofovir
cilostazol
cimetidine
cinacalcet
ciprofloxacin
cisplatin
citalopram
cladribine
clarithromycin
clindamycin
clobazam
clofarabine
clomiPRAMINE
clonazepam
clonidine
clopidogrel
clorazepate
clozapine
cobicistat
codeine
colchicine
colesevelam
conjugated estrogens
cortisone
cosyntropin
crizotinib
cyanocobalamin (vitamin B_{12})
cyclobenzaprine
cyclophosphamide
cycloSPORINE
cytarabine

cabazitaxel

ka-**baz**-i-**tax**-el
(Jevtana)

■ **BLACK BOX ALERT** ■ All pts should be premedicated with a corticosteroid, an antihistamine, and an H_2 antagonist prior to infusion. Severe hypersensitivity reaction has occurred. Immediately discontinue infusion and give appropriate treatment if hypersensitivity reaction occurs. Neutropenic deaths reported. CBC, particularly ANC, should be obtained prior to and during treatment. Do not administer with neutrophil count 1,500 cells/mm^3 or less.

Do not confuse cabazitaxel with paclitaxel or Paxil, or Jevtana with Januvia, Levitra, or Sentra.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Microtubule inhibitor. **CLINICAL:** Antineoplastic.

USES

Used in combination with prednisone for treatment of hormone-refractory metastatic prostate cancer previously treated with a docetaxel-containing regimen.

PRECAUTIONS

Contraindications: Those with neutrophil count of 1,500/mm^3 or less, history of hypersensitivity to polysorbate 80. **Caution:** Severe hepatic impairment (bilirubin equal to or greater than ULN or ALT and/or AST over 1.5 times ULN), elderly, pregnancy, renal impairment (creatinine clearance less than 50 ml/min). Avoid concurrent use of strong CYP3A4 inhibitors (e.g., atazanavir, clarithromycin, indinavir, itraconazole, ketoconazole, nelfinavir, ritonavir, saquinavir, voriconazole). Concurrent use of moderate CYP3A4 inhibitors (e.g., diltiazem, erythromycin, fluconazole, fosamprenavir, verapamil), or strong CYP3A4 inducers (e.g., carbamazepine, phenytoin, rifampin).

ACTION

Binds to tubulin to promote assembly into microtubules and inhibits disassembly, which inhibits microtubules depolymerization/cell division. **Therapeutic Effect:** Blocks cells in mitotic phase of cell cycle, inhibiting tumor proliferation.

PHARMACOKINETICS

Widely distributed. Metabolized in liver. Protein binding: 89%–92%. Excreted in feces (76%), urine (3.7%). **Half-life:** 95 hrs.

C

ADMINISTRATION/HANDLING

◀ALERT▶ Wear gloves during preparation, handling. Two-step dilution process must be performed under aseptic conditions to prepare second (final) infusion solution. Medication undergoes two dilutions. After second dilution, administration should be initiated within 30 min.

Reconstitution

Step 1, First Dilution: • Each vial of cabazitaxel contains 60 mg/1.5 ml; must first be mixed with entire contents of supplied diluent. • Once reconstituted, resultant solution contains 10 mg/ml of cabazitaxel. • When transferring diluent, direct needle onto inside vial wall and inject slowly to limit foaming. • Remove syringe and needle, then gently mix initial diluted solution by repeated inversions for at least 45 sec to ensure full mixing of drug and diluent. • Do not shake. • Allow any foam to dissipate.

Step 2, Final Dilution: • Withdraw recommended dose and further dilute with 250 ml 0.9% NaCl or D_5W. • If dose greater than 65 mg is required, use larger volume of 0.9% NaCl or D_5W so that concentration of 0.26 mg/ml is not exceeded. • Concentration of final infusion should be between 0.10 and 0.26 mg/ml.

Rate of Administration • Infuse over 1 hr using in-line 0.22 micron filter.

Storage • Store vials at room temperature. • First dilution solution stable for 30 min. • Final dilution solution stable for 8 hrs at room temperature or 24 hrs if refrigerated.

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Antihistamine (dexchlorpheniramine 5 mg, diphenhydramine 25 mg, or equivalent antihistamine), corticosteroid (dexamethasone 8 mg or equivalent steroid), and H_2 antagonist (ranitidine 50 mg or equivalent H_2 antagonist) should be given at least 30 min prior to each dose to reduce risk/severity of hypersensitivity.

Hormone-Refractory Metastatic Prostate Cancer

◀ALERT▶ Monitoring of CBC is essential on weekly basis during cycle 1 and before each treatment cycle thereafter so that the dose can be adjusted.

IV Infusion: ADULTS, ELDERLY: 25 mg/m^2 given as 1-hr infusion every 3 wks in combination with 10 mg prednisone daily throughout treatment. **Dose Modification: grade 3 neutropenia, febrile neutropenia, grade 3 or persistent diarrhea, neuropathy:** Reduce dosage to 20 mg/m^2 after treatment interruption.

Dosage in Renal Impairment

CrCl less than 30 ml/min: Use with caution.

Dosage in Hepatic Impairment

Total bilirubin greater than or equal to ULN or ALT and/or AST greater than or equal to 1.5 times ULN: Not recommended.

SIDE EFFECTS

Frequent (47%–16%): Diarrhea, fatigue, nausea, vomiting, constipation, esthesia (decreased sensitivity to touch), abdominal pain, anorexia, back pain. **Occasional (13%–5%):** Peripheral neuropathy, fever, dyspnea, cough, arthralgia, dysgeusia, dyspepsia, alopecia, peripheral edema, weight decrease, urinary tract infection, dizziness, headache, muscle spasm, dysuria, hematuria, mucosal inflammation, dehydration.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reaction may include generalized rash, erythema, hypotension, bronchospasm. 94% of pts develop grade 1–4 neutropenia and associated complications including anemia, thrombocytopenia, sepsis. GI abnormalities, hypertension, arrhythmias, renal failure may occur.

increase concentration. **High-fat meals** may increase absorption/exposure. **LAB VALUES:** May decrease lymphocytes, neutrophils, platelets; serum calcium, magnesium, phosphorus, potassium, sodium. May increase serum ALT, AST, alkaline phosphatase, bilirubin, lipase, TSH, urine protein.

AVAILABILITY (Rx)

after loading dose. Dosage adjusted based on pt response.

C

SIDE EFFECTS

Frequent (10%–5%): Feeding intolerance, rash.

ADVERSE EFFECTS/ TOXIC REACTIONS

Sepsis, necrotizing enterocolitis may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Baseline serum caffeine levels should be measured in infants previously treated with theophylline (preterm infants metabolize theophylline to caffeine).

INTERVENTION/EVALUATION

Diligently monitor respirations. Assess skin for rash. Monitor heart rate, number/ severity of apnea spells, serum caffeine levels.

calcitonin

kal-si-**toe**-nin
(Apo-Calcitonin, Calcimar, Caltine, Fortical, Miacalcin)
Do not confuse calcitonin with calcitriol, or Miacalcin with Micatin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Synthetic hormone. **CLINICAL:** Calcium regulator, bone resorption inhibitor.

USES

Parenteral: Treatment of Paget's disease, hypercalcemia, postmenopausal osteoporosis. **Intranasal**: Postmenopausal osteoporosis.

PRECAUTIONS

Contraindications: Hypersensitivity to salmon protein. **Cautions:** None known.

ACTION

Antagonizes effects of parathyroid hormone. Increases jejunal secretion of water, sodium, potassium, chloride. Inhibits osteoclast bone resorption, increases excretion of calcium, phosphate, sodium, magnesium, potassium. **Therapeutic Effect:** Regulates serum calcium concentrations.

PHARMACOKINETICS

Nasal form rapidly absorbed. Injection form rapidly metabolized primarily in kidneys. Primarily excreted in urine. **Half-life: Nasal:** 43 min; **Injection:** 70–90 min.

Canadian trade name

C

calcium carbonate

(Apo-Cal, Caltrate 600, OsCal, Titralac, Tums)

calcium chloride

calcium citrate

(Cal-Citrate, Citracal, Osteocit)

calcium glubionate

calcium gluconate

kal-si-um

Do not confuse Citracal with Citrucel, OsCal with Asacol, or PhosLo with ProSom.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Electrolyte replenisher. **CLINICAL:** Antacid, antihypocalcemic, antihyperkalemic, antihypermagnesemic, antihyperphosphatemic.

USES

Parenteral (calcium chloride, calcium gluconate): Acute hypocalcemia (e.g., neonatal hypocalcemic tetany, alkalosis), electrolyte depletion, cardiac arrest (strengthens myocardial contractions), hyperkalemia (reverses cardiac depression), hypermagnesemia (aids in reversing CNS depression). **Calcium carbonate:** Antacid, treatment/prevention of calcium deficiency, hyperphosphatemia. **Calcium citrate:** Antacid, treatment/prevention of calcium deficiency, hyperphosphatemia. **Calcium acetate:** Controls hyperphosphatemia in end-stage renal disease. **OFF-LABEL (Calcium chloride):** Calcium channel blocker overdose, severe hyperkalemia, malignant arrhythmias associated with hypermagnesemia.

PRECAUTIONS

Contraindications: All preparations: Calcium-based renal calculi, hypercalcemia, ventricular fibrillation. **Calcium chloride:** Digoxin toxicity. **Calcium gluconate: Neonates:** Concurrent IV use with ceftriaxone. **Cautions:** Chronic renal impairment, hypokalemia, concurrent use with digoxin.

ACTION

Essential for function, integrity of nervous, muscular, skeletal systems. Plays an important role in normal cardiac/renal function, respiration, blood coagulation, cell membrane and capillary permeability. Assists in regulating release/storage of hormones/neurotransmitters. Neutralizes/reduces gastric acid (increases pH). **Calcium acetate:** Binds with dietary phosphate, forming insoluble calcium phosphate. **Therapeutic Effect:** Replaces calcium in deficiency states; controls hyperphosphatemia in end-stage renal disease; relieves heartburn, indigestion.

PHARMACOKINETICS

Moderately absorbed from small intestine (absorption depends on presence of vitamin D metabolites, pH). Primarily eliminated in feces.

Canadian trade name

C

INDICATIONS/ROUTES/DOSAGE

Hyperphosphatemia

PO ***(Calcium Acetate)*****: ADULTS, ELDERLY:** 2 tablets 3 times a day with meals. May increase gradually up to 4 tablets 3 times a day to decrease serum phosphate level to less than 6 mg/dL as long as hypercalcemia does not develop.

PO ***(Calcium Carbonate)*****: ADULTS, ELDERLY, CHILDREN:** 1 g with each meal. **Maximum:** 4–7 g/day.

Hypocalcemia

PO ***(Calcium Carbonate)*****: ADULTS, ELDERLY:** 1–2 g/day in 3–4 divided doses. **CHILDREN:** 45–65 mg/kg/day in 3–4 divided doses. **NEONATES:** 50–150 mg/kg/day in 4–6 divided doses. **Maximum:** 1 g/day.

PO ***(Calcium Glubionate)*****: ADULTS, ELDERLY:** 6–18 g/day in 4–6 divided doses. **CHILDREN, INFANTS:** 0.6–2 g/kg/day in 4 divided doses. **NEONATES:** 1.2 g/kg/day in 4–6 divided doses.

IV ***(Calcium Gluconate)*****: ADULTS, ELDERLY:** 1–2 g over 2 hrs. May repeat q60 min until level resolved. **CHILDREN:** 200–500 mg/kg/day in 4 divided doses. **NEONATES:** 200–800 mg/kg/day in 4 divided doses.

Antacid

PO ***(Calcium Carbonate)*****: ADULTS, ELDERLY:** 1–2 tabs (5–10 ml) q2h as needed. **CHILDREN 6–11 YRS:** 2 tabs (800 mg). **Maximum:** 6 tabs/day. **CHILDREN 2–5 YRS:** 1 tab (400 mg). **Maximum:** 3 tabs/day.

Osteoporosis

PO ***(Calcium Carbonate)*****: ADULTS, ELDERLY:** 1,200 mg/day.

Cardiac Arrest

IV ***(Calcium Chloride)*****: ADULTS, ELDERLY:** 500–1,000 mg over 2–5 min. May repeat as necessary. **CHILDREN, NEONATES:** 20 mg/kg. May repeat in 10 min as necessary.

Hypocalcemia Tetany

IV ***(Calcium Chloride)*****: CHILDREN, NEONATES:** 10 mg/kg over 5–10 min. May repeat q6–8h. **Maximum:** 200 mg/kg/day.

IV ***(Calcium Gluconate)*****: ADULTS, ELDERLY:** 1–3 g over 10–30 min; may repeat after 6 hrs. **CHILDREN, NEONATES:** 100–200 mg/kg/dose over 5–10 min. May repeat after 6 hrs. **Maximum:** 500 mg/kg/day.

Supplement

PO ***(Calcium Citrate)*****: ADULTS, ELDERLY:** 0.5–2 g 2–4 times a day. **CHILDREN:** 45–65 mg/kg/day in 4 divided doses.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: PO: Chalky taste. **Parenteral:** Pain, rash, redness, burning at injection site; flushing, nausea, vomiting, diaphoresis, hypotension. **Occasional: PO:** Mild constipation, fecal impaction, peripheral edema, metabolic alkalosis (muscle pain, restlessness, slow respirations, altered taste). **Calcium carbonate:** Milk-alkali syndrome (headache, decreased appetite, nausea, vomiting, unusual fatigue). **Rare:** Urinary urgency, painful urination.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypercalcemia: Early signs: Constipation, headache, dry mouth, increased thirst, irritability, decreased appetite, metallic taste, fatigue, weakness, depression. **Later signs:** Confusion, drowsiness, hypertension, photosensitivity, arrhythmias, nausea, vomiting, painful urination.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess B/P, EKG and cardiac rhythm, renal function, serum magnesium, phosphate, potassium.

C

INTERVENTION/EVALUATION

Monitor infant with arterial or transcutaneous measurement of systemic O_2, CO_2. Auscultate lungs for adventitious breath sounds (baseline serum BMP, calcium, ionized calcium, magnesium, phosphate; B/P, cardiac rhythm, renal function). Frequent ABG sampling necessary to prevent post-dosing hyperoxia and hypocarbia.

canagliflozin

kan-a-gli-**floe**-zin
(Invokana)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Sodium-glucose co-transporter 2 (SGLT2) inhibitor. **CLINICAL:** Antidiabetic.

FIXED-COMBINATION(S)

Invokamet: canagliflozin/metformin (an antidiabetic): 50 mg/500 mg, 50 mg/1,000 mg, 150 mg/500 mg, 150 mg/1,000 mg.

USES

Adjunctive treatment to diet and exercise to improve glycemic controls in pts with type 2 diabetes mellitus.

PRECAUTIONS

Contraindications: History of hypersensitivity to SGLT2 inhibitors, severe renal impairment, end-stage renal disease, dialysis. **Cautions:** Not recommended in type 1 diabetes, diabetic ketoacidosis. Concurrent use of diuretics, ACE inhibitors, angiotensin receptor blockers (ARB), other hypoglycemic or nephrotoxic medications; mild to moderate renal impairment, hypovolemia (dehydration/anemia), elderly, episodic hypotension, hyperkalemia, genital mycotic infection.

ACTION

Increases excretion of urinary glucose by inhibiting reabsorption of filtered glucose in kidney. Inhibits SGLT2 in proximal renal tubule. **Therapeutic Effect:** Lowers serum glucose levels.

PHARMACOKINETICS

Readily absorbed following PO administration. Metabolized in liver. Peak plasma concentration: 1–2 hrs. Protein binding: 99%. Excreted in feces (42%), urine (33%). **Half-life:** 11–13 hrs.

C

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Angiotensin II receptor antagonist. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension alone or in combination with other antihypertensives, HF: NYHA class II–IV.

PRECAUTIONS

Contraindications: Concomitant use with aliskiren in pts with diabetes mellitus. **Cautions:** Significant aortic/mitral stenosis, renal/hepatic impairment, unstented (unilateral/bilateral) renal artery stenosis.

ACTION

Blocks vasoconstriction, aldosterone-secreting effects of angiotensin II, inhibiting binding of angiotensin II to AT_1 receptors. **Therapeutic Effect:** Produces vasodilation; decreases peripheral resistance, B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	2–3 hrs	6–8 hrs	Greater than 24 hrs

Rapidly, completely absorbed. Protein binding: greater than 99%. Undergoes minor hepatic metabolism to inactive metabolite. Excreted unchanged in urine and in feces through biliary system. Not removed by hemodialysis. **Half-life:** 9 hrs.

response to vaccine. **HERBAL:** **Echinacea** may decrease level/effects. **FOOD:** None known. **LAB VALUES:** May increase serum alkaline phosphatase, bilirubin, ALT, AST. May decrease Hgb, Hct, WBC count. May increase PT/INR.

AVAILABILITY (Rx)

Tablets: 150 mg, 500 mg.

ADMINISTRATION/HANDLING

• Give within 30 min after meals with water. • Swallow whole; do not cut, crush.

INDICATIONS/ROUTES/DOSAGE

Metastatic Breast Cancer, Colorectal Cancer, Adjuvant (Postsurgery) Treatment of Dukes C Colon Cancer

PO: ADULTS, ELDERLY: Initially, 2,500 mg/m^2/day in 2 equally divided doses approximately q12h apart for 2 wks. Follow with a 1-wk rest period; given in 3-wk cycles.

Dosage in Renal Impairment

Creatinine clearance 50–80 ml/min: No adjustment. **Creatinine clearance 30–49 ml/min:** 75% of normal dose. **Creatinine clearance less than 30 ml/min:** Contraindicated.

Dosage in Hepatic Impairment

No dose adjustment at start of therapy; interrupt therapy for grade 3 or 4 hyperbilirubinemia until bilirubin is 3 × or less ULN.

SIDE EFFECTS

Frequent (55%–25%): Diarrhea, nausea, vomiting, stomatitis, palmar-plantar erythrodysesthesia syndrome (PPES) presenting as redness, swelling, numbness, skin sloughing of hands and feet; fatigue, anorexia, dermatitis. **Occasional (24%–10%):** Constipation, dyspepsia, headache, dizziness, insomnia, edema, myalgia, pyrexia, dehydration, dyspnea, back pain. **Rare (less than 10%):** Mood changes, depression, sore throat, epistaxis, cough, visual abnormalities.

ADVERSE EFFECTS/ TOXIC REACTIONS

Serious reactions include myelosuppression (neutropenia, thrombocytopenia, anemia), cardiovascular toxicity (angina, cardiomyopathy, deep vein thrombosis), respiratory toxicity (dyspnea, epistaxis, pneumonia), lymphedema.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess sensitivity to capecitabine or 5-fluorouracil. Obtain baseline Hgb, Hct, serum chemistries, renal function.

INTERVENTION/EVALUATION

Monitor for severe diarrhea, nausea, vomiting; if dehydration occurs, fluid and electrolyte replacement therapy should be initiated. Assess hands/feet for PPES. Monitor CBC for evidence of bone marrow depression. Monitor renal/hepatic function. Monitor for blood dyscrasias (fever, sore throat, signs of local infection, unusual bruising/bleeding from any site), symptoms of anemia (excessive fatigue, weakness).

PATIENT/FAMILY TEACHING

• Report nausea, vomiting, diarrhea, hand-and-foot syndrome, stomatitis. • Do not have immunizations without physician's approval (drug lowers body's resistance). • Avoid contact with those who have recently received live virus vaccine. • Promptly report fever higher than 100.5°F, sore throat, signs of local infection, unusual bruising/bleeding from any site.

captopril

kap-toe-pril
(Apo-Capto, Capoten)

■ **BLACK BOX ALERT** ■ May cause injury/death to developing fetus. Discontinue as soon as possible once pregnancy is detected.

Do not confuse captopril with calcitriol, Capitrol, or carvedilol.

C

INDICATIONS/ROUTES/DOSAGE

Hypertension

PO: ADULTS, ELDERLY: Initially, 12.5–25 mg 2–3 times a day. May increase by 12.5–25 mg/dose at 1–2 wk intervals up to 50 mg 3 times/day. Add diuretic before further increase in dose. **Maximum:** 450 mg/day in 3 divided doses. **CHILDREN:** 0.3–0.5 mg 3 times a day. **Maximum:** 6 mg/kg/day in 2–4 divided doses. **INFANTS:** 0.15–0.3 mg/kg/dose. May titrate up to maximum of 6 mg/kg/day in 1–4 divided doses. Usual range: 2.5–6 mg/kg/day. **NEONATES:** 0.01–0.1 mg/kg/dose q8–24h. **Maximum:** 0.5 mg/kg/dose q6–24h.

HF

PO: ADULTS, ELDERLY: Initially, 6.25–25 mg 3 times a day. **Target dose:** 50 mg 3 times/day.

Post-MI

PO: ADULTS, ELDERLY: Initially, 6.25 mg, then 12.5 mg 3 times a day. Increase to 25 mg 3 times a day over several days, up to 50 mg 3 times a day over several wks.

Diabetic Nephropathy, Prevention of Renal Failure

PO: ADULTS, ELDERLY: 25 mg 3 times a day.

Dosage in Renal Impairment

Creatinine clearance 10–50 ml/min: 75% of normal dosage. **Creatinine clearance less than 10 ml/min:** 50% of normal dosage.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (7%–4%): Rash. **Occasional (4%–2%):** Pruritus, dysgeusia (altered taste). **Rare (less than 2%):** Headache, cough, insomnia, dizziness, fatigue, paresthesia, malaise, nausea, diarrhea or constipation, dry mouth, tachycardia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypotension ("first-dose syncope") may occur in pts with HF and in those who are severely sodium/volume depleted. Angioedema (swelling of face/tongue/lips), hyperkalemia occur rarely. Agranulocytosis, neutropenia noted in those with collagen vascular disease (scleroderma, systemic lupus erythematosus), renal impairment. Nephrotic syndrome noted in those with history of renal disease.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain B/P immediately before each dose, in addition to regular monitoring (be alert to fluctuations). If hypotension occurs, place pt in supine position with legs elevated. In pts with prior renal disease or receiving dosages greater than 150 mg/day, test urine for protein by dipstick method with first urine of day before therapy begins and periodically thereafter. In pts with renal impairment, autoimmune disease, or taking drugs that affect leukocytes or immune response, obtain CBC before beginning therapy, q2wks for 3 mos, then periodically thereafter.

INTERVENTION/EVALUATION

Assess skin for rash, pruritus. Assist with ambulation if dizziness occurs. Monitor urinalysis for proteinuria. Monitor serum potassium levels in those on concurrent diuretic therapy. Monitor B/P, serum BUN, creatinine, CBC. Discontinue medication, contact physician if angioedema occurs.

PATIENT/FAMILY TEACHING

• Full therapeutic effect of B/P reduction may take several wks. • Skipping doses or voluntarily discontinuing drug may produce severe rebound hypertension. • Limit alcohol intake. • Immediately report if swelling of face, lips, or tongue; difficulty breathing, vomiting, diarrhea, excessive perspiration, dehydration, persistent cough, sore throat, fever occur. • Inform physician if pregnant or planning to become

PHARMACOKINETICS

Rapidly and completely absorbed from GI tract. Widely distributed. Excreted primarily in urine. Levodopa is converted to dopamine. Excreted primarily in urine. **Half-life:** 1–2 hrs (carbidopa); 1–3 hrs (levodopa).

increased, myelotoxicity may be more severe. Age-related renal impairment may require decreased dosage, careful monitoring of blood counts.

INTERACTIONS

DRUG: **Bone marrow depressants** may increase myelosuppression. **Live virus vaccines** may potentiate virus replication, increase vaccine side effects, decrease pt's antibody response to vaccine. **Nephrotoxic, ototoxic medications** may increase risk of toxicity. **HERBAL:** Avoid **black cohosh, dong quai** in estrogen-dependent tumors. **Echinacea** may decrease level/effects. **FOOD:** None known. **LAB VALUES:** May decrease serum calcium, magnesium, potassium, sodium. May increase serum BUN, alkaline phosphatase, bilirubin, creatinine, AST.

AVAILABILITY (Rx)

Injection Solution: 10 mg/ml.

ADMINISTRATION/HANDLING

◄ALERT► May be carcinogenic, mutagenic, teratogenic. Handle with extreme care during preparation/administration.

C

1 min or until completely dissolved. • Do not shake. • If foaming occurs, rest vial for 2–5 min until subsided. • Withdraw calculated dose from vial and dilute into 50 ml D_5W. • Final concentration of reconstituted solution: 2 mg/ml.

Rate of administration • Infuse over 2–10 min. Flush line before and after with NaCl or D_5W. • Do not administer as a bolus.

Storage • Refrigerate undiluted vial. • Reconstituted solution may be refrigerated up to 24 hrs. • At room temperature, use diluted solution within 4 hrs.

IV INCOMPATIBILITIES

Do not mix with other IV medications or additives. Infuse via dedicated line. Flush IV administration line with NaCl or D_5W immediately before and after carfilzomib administration.

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Dose is calculated using pts' actual body surface area at baseline. Pts with a body surface area greater than 2.2 m^2 should receive dose based on a body surface area of 2.2 m^2. No dose adjustment needed for weight changes of less than or equal to 20%.

◀ALERT▶ Prior to each dose in cycle 1, give 250 ml to 500 ml NaCl bolus. Give an additional 250 ml to 500 ml IV fluid following administration. Continue IV hydration in subsequent cycles (reduces risk of renal toxicity, tumor lysis syndrome).

Premedicate with dexamethasone 4 mg PO or IV prior to all doses during cycle 1 and prior to all doses during first cycle of dose escalation to 27 mg/m^2 (reduces incidence, severity of infusion reactions). Reinstate dexamethasone premedication (4 mg PO or IV) if symptoms develop or reappear during subsequent cycles.

Multiple Myeloma

IV Infusion: ADULTS, ELDERLY: 20 mg/m^2, given on 2 consecutive days, each wk for 3 wks (days 1, 2, 8, 9, 15, and 16), followed by a 12-day rest period (days 17 to 28). Each 28-day period is considered one treatment cycle. If tolerated in cycle 1, escalate dose to 27 mg/m^2 beginning in cycle 2 and continue at 27 mg/m^2 in subsequent cycles. Treatment may be continued until disease progression or unacceptable toxicity occurs.

Dosage Modification for Toxicity

Hematologic

Grade 3 or 4 Neutropenia: Withhold dose. Continue at same dose if fully recovered prior to next scheduled dose. If recovered to grade 2, reduce dose by one dose level. If dose tolerated, may escalate to previous dose.

Grade 4 Thrombocytopenia: Withhold dose. Continue at same dose if fully recovered prior to next scheduled dose. If recovered to grade 3, reduce dose by one dose level. If dose tolerated, may escalate to previous dose.

Cardiac

Grade 3 or 4, New Onset or Worsening of HF, Decreased LVF, Myocardial Ischemia: Withhold dose until resolved or at baseline. After resolution, restart at reduced dose level. If dose tolerated, may escalate to previous dose.

Hepatic

Grade 3 or 4 Elevation of Bilirubin, transaminases: Withhold dose until resolved or at baseline. After resolution, restart at reduced dose level. If dose tolerated, may escalate to previous dose.

Peripheral Neuropathy

Grade 3 or 4: Withhold dose until resolved or at baseline. After resolution, restart at reduced dose level. If dose tolerated, may escalate to previous dose.

Pulmonary Toxicity

Pulmonary Hypertension: Withhold dose until resolved or at baseline. After resolution, restart at reduced dose level. If dose tolerated, may escalate to previous dose. **Grade 3 or 4 Pulmonary Complications:** Withhold dose until resolved or at baseline. After resolution, restart at reduced dose level. If dose tolerated, may escalate to previous dose.

C

CLASSIFICATION

PHARMACOTHERAPEUTIC: Carbamic acid ester. **CLINICAL:** Skeletal muscle relaxant.

USES

Short-term (2–3 wks) treatment of acute musculoskeletal pain.

PRECAUTIONS

Contraindications: Acute intermittent porphyria, hypersensitivity to meprobamate. **Cautions:** History of seizures, addiction-prone pts, elderly, debilitated pts, pts who are poor CYP2C19 metabolizers, renal/hepatic impairment.

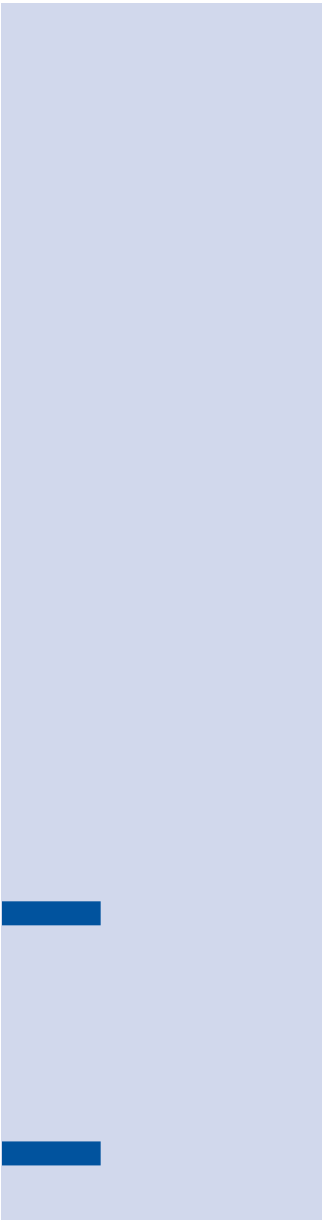
ACTION

Skeletal muscle relaxant action may be related to its central depressant properties. May produce muscle relaxation by altering interneuronal activity in the descending reticular formation of the brain and spinal cord. Does not directly affect skeletal muscle. **Therapeutic Effect:** Relieves musculoskeletal pain.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	30 min	—	4–6 hrs

Readily absorbed from GI tract. Distributed throughout CNS. Protein binding: 60%. Metabolized in liver; excreted in urine. Removed by hemodialysis, peritoneal dialysis. **Half-life:** 2 hrs.



antihypertensives may potentiate hypotensive effects. **Cimetidine** may increase concentration. May increase concentration of **cyclosporine, digoxin. CYP2D6 inhibitors (e.g., fluoxetine, paroxetine)** may increase concentration/side effects; may enhance slowing of HR or cardiac conduction. May increase effects of **insulin, oral hypoglycemics. Rifampin** decreases concentration. **HERBAL:** **Ephedra, ginseng, yohimbe** may worsen hypertension. **Garlic** may increase antihypertensive effect. **FOOD:** None known. **LAB VALUE:** May increase serum creatinine, bilirubin, ALT, AST, PT.

AVAILABILITY (Rx)

Tablets (Immediate-Release): 3.125 mg, 6.25 mg, 12.5 mg, 25 mg.

C

diluent. • Reconstituted solution, prior to preparation of pt infusion solution, may be stored at room temperature for 1 hr before infusion. • Final infusion solution can be stored at room temperature for 24 hrs or 48 hrs if refrigerated. • Discard if solution contains particulate or is discolored.

IV COMPATIBILITIES

Aztreonam (Azactam), daptomycin (Cubicin), fluconazole (Diflucan), linezolid (Zyvox), meropenem (Merrem IV), piperacillin/tazobactam (Zosyn), vancomycin.

IV INCOMPATIBILITIES

Cefepime (Maxipime), ceftaroline (Teflaro), ceftazidime (Fortaz), ceftriaxone (Rocephin), furosemide (Lasix).

INDICATIONS/ROUTES/DOSAGE

Aspergillosis

IV: ADULTS, ELDERLY: Give single 70-mg loading dose on day 1, followed by 50 mg/day thereafter. For pts with moderate hepatic insufficiency, reduce daily dose to 35 mg. **CHILDREN 3 MOS–17 YRS:** 70 mg/m^2 on day 1, then 50 mg/m^2 daily. **Maximum:** 70-mg loading dose, 50-mg daily dose.

Invasive Candidiasis

IV: ADULTS, ELDERLY: Initially, 70 mg followed by 50 mg daily. **CHILDREN 3 MOS–17 YRS:** 70 mg/m^2 on day 1, then 50 mg/m^2 daily. **Maximum:** 70-mg loading dose, 50-mg daily dose.

Esophageal Candidiasis

IV: ADULTS, ELDERLY: 50 mg a day. **CHILDREN 3 MOS–17 YRS:** 50 mg/m^2 daily. **Maximum:** 50 mg.

Empiric Therapy

IV: ADULTS, ELDERLY: Initially, 70 mg then 50 mg/day. May increase to 70 mg/day. **CHILDREN 3 MOS–17 YRS:** 70 mg/m^2 on day 1, then 50 mg/m^2 daily. **Maximum:** 70 mg.

Usual Dosage Neonatal—Less Than 3 mos

IV: 25 mg/mm^2/dose once daily.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Mild: No adjustment. **Moderate: Child-Pugh score 7–9:** 35 mg/day. **Severe:** No clinical experience.

SIDE EFFECTS

Frequent (26%): Fever. **Occasional (11%–4%):** Headache, nausea, phlebitis. **Rare (3% or less):** Paresthesia, vomiting, diarrhea, abdominal pain, myalgia, chills, tremor, insomnia.

ADVERSE EFFECTS/TOXIC REACTIONS

Hypersensitivity reaction (rash, facial edema, pruritus, sensation of warmth) including anaphylaxis may occur. May cause hepatic dysfunction, hepatitis (drug-induced), or hepatic failure.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, BMP, LFT, magnesium. Determine baseline temperature. Assess for allergic or hypersensitivity reactions.

INTERVENTION/EVALUATION

Assess for signs/symptoms of hepatic dysfunction. Monitor LFT in pts with preexisting hepatic impairment. Monitor CBC, serum potassium. Monitor for fever, chills, hypersensitivity reaction.

PATIENT/FAMILY TEACHING

• Report rash, facial swelling, itching, difficulty breathing, abdominal pain, yellowing of skin or eyes, dark colored urine, nausea.

cefaclor

sef-a-klor
(Apo-Cefaclor, Ceclor, Novo-Cefaclor)
Do not confuse Cefaclor with cephalexin.

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ADVERSE EFFECTS/ TOXIC REACTIONS

Antibiotic-associated colitis, other (abdominal cramps, severe watery diarrhea, fever) superinfections may result from altered bacterial balance. Nephrotoxicity may occur, esp. in pts with preexisting renal disease. Pts with history of penicillin allergy are at increased risk for developing a severe hypersensitivity reaction (severe pruritus, angioedema, bronchospasm, anaphylaxis).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, renal function tests. Question for history of allergies, particularly cephalosporins, penicillins.

INTERVENTION/EVALUATION

Assess oral cavity for white patches on mucous membranes, tongue (thrush). Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable (increasing severity may indicate onset of antibiotic-associated colitis). Monitor I&O, renal function tests for nephrotoxicity. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

• Continue therapy for full length of treatment. • Doses should be evenly spaced. • May cause GI upset (may take with food, milk). • Chewable tablets must be chewed; do not swallow whole. • Refrigerate oral suspension. • Report persistent diarrhea.

cefadroxil

sef-a-**drox**-il
(Apo-Cefadroxil)

CLASSIFICATION

PHARMACOTHERAPEUTIC: First-generation cephalosporin. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to group A streptococci, staphylococci, *S. pneumoniae, H. influenzae, Klebsiella* spp., *E. coli, P. mirabilis,* including impetigo, pharyngitis/tonsillitis, skin/skin structure, UTIs. **OFF-LABEL:** Chronic suppression of prosthetic joint infection.

PRECAUTIONS

Contraindications: History of hypersensitivity/anaphylactic reaction to cephalosporins. **Cautions:** Severe renal impairment, history of penicillin allergy. History of GI disease (colitis).

ACTION

Binds to bacterial cell membranes, inhibits cell wall synthesis. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 15%–20%. Widely distributed. Primarily excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 1.2–1.5 hrs (increased in renal impairment).

PRECAUTIONS

Contraindications: History of hypersensitivity/anaphylactic reaction to cephalosporins. **Cautions:** Severe renal impairment, history of penicillin allergy, history of seizures.

ACTION

Binds to bacterial cell membranes, inhibits cell wall synthesis. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Widely distributed. Protein binding: 85%. Primarily excreted unchanged in urine. Moderately removed by hemodialysis. **Half-life:** 1.4–1.8 hrs (increased in renal impairment).

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may have lower renal clearance. **Elderly:** Age-related renal impairment may require decreased dosage or increased dosing interval.

INTERACTIONS

DRUG: Antacids, iron preparations may interfere with absorption. **Probenecid** increases concentration. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May produce false-positive reaction for urine ketones. May increase serum alkaline phosphatase, bilirubin, LDH, ALT, AST.

AVAILABILITY (Rx)

Capsules: 300 mg. **Powder for Oral Suspension:** 125 mg/5 ml, 250 mg/5 ml.

ADMINISTRATION/HANDLING

PO

• Give without regard to food. Give at least 2 hrs before or after antacids or iron supplements. • Twice daily doses should be given 12 hrs apart. • Shake oral suspension well before administering. • Store mixed suspension at room temperature for 10 days.

INDICATIONS/ROUTES/DOSAGE

Usual Dosage Range

PO: ADULTS, ELDERLY: 300 mg q12h or 600 mg once daily. **CHILDREN 6 MOS–12 YRS:** 7 mg/kg q12h or 14 mg/kg once daily. **Maximum:** 600 mg/day.

Dosage in Renal Impairment

Creatinine clearance less than 30 ml/min: 300 mg/day or 7 mg/kg as single daily dose. **Hemodialysis pts:** 300 mg or 7 mg/kg/dose every other day.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Oral candidiasis, mild diarrhea, mild abdominal cramping, vaginal candidiasis. **Occasional:** Nausea, serum sickness-like reaction (fever, joint pain; usually occurs after second course of therapy and resolves after drug is discontinued). **Rare:** Allergic reaction (rash, pruritus, urticaria).

ADVERSE EFFECTS/ TOXIC REACTIONS

Antibiotic-associated colitis, other superinfections (abdominal cramps, severe watery diarrhea, fever) may result from altered bacterial balance. Nephrotoxicity may occur, esp. in pts with preexisting renal disease. Pts with history of penicillin allergy are at increased risk for developing a severe hypersensitivity reaction (severe pruritus, angioedema, bronchospasm, anaphylaxis).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, renal function tests. Question for hypersensitivity to cefdinir or other cephalosporins, penicillins.

INTERVENTION/EVALUATION

Observe for rash. Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable (increasing severity may indicate onset of antibiotic-associated colitis). Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema). Monitor hematology reports.

PATIENT/FAMILY TEACHING

• Take antacids 2 hrs before or following medication. • Continue medication for full length of treatment; do not skip doses. • Doses should be evenly spaced. • Report persistent severe diarrhea, rash, muscle aches, fever, enlarged lymph nodes, joint pain.

cefepime

sef-e-**peem**
(Maxipime)
Do not confuse cefepime with cefixime or ceftazidime.

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INDICATIONS/ROUTES/DOSAGE

Usual Dosage Range

IV: ADULTS, ELDERLY: 1–2 g q8–12h. **CHILDREN:** 50 mg/kg q8–12h not to exceed adult dosing. **NEONATES:** 30 mg/kg/dose q12h.

IM: ADULTS, ELDERLY: 0.5–1 g q12h. **CHILDREN:** 50 mg/kg/dose q8–12h not to exceed adult dosing. **NEONATES:** 30 mg/kg/dose q12h.

Dosage in Renal Impairment

Dosage and frequency are modified based on creatinine clearance and severity of infection.

Creatinine Clearance	Dosage
30–60 ml/min	500 mg q24h–2 g q12h
11–29 ml/min	500 mg–2 g q24h
10 ml/min or less	250 mg–1 g q24h
Hemodialysis	Initially, 1 g, then 0.5–1 g q24h or 1–2 g q48–72h.
Peritoneal dialysis	Normal dose q48h
Continuous renal replacement therapy	Initially, 2 g, then 1 g q8h or 2 g q12h

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Discomfort with IM administration, oral candidiasis (thrush), mild diarrhea, mild abdominal cramping, vaginal candidiasis. **Occasional:** Nausea, serum sickness-like reaction (fever, joint pain; usually occurs after second course of therapy and resolves after drug is discontinued). **Rare:** Allergic reaction (rash, pruritus, urticaria), thrombophlebitis (pain, redness, swelling at injection site).

ADVERSE EFFECTS/ TOXIC REACTIONS

Antibiotic-associated colitis, other superinfections (abdominal cramps, severe watery diarrhea, fever) may result from altered bacterial balance. Nephrotoxicity may occur, esp. in pts with preexisting renal disease. Pts with history of penicillin allergy are at increased risk for developing a severe hypersensitivity reaction (severe pruritus, angioedema, bronchospasm, anaphylaxis).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, renal function tests. Question for history of allergies, particularly cephalosporins, penicillins.

INTERVENTION/EVALUATION

Evaluate IM site for induration and tenderness. Assess oral cavity for white patches on mucous membranes, tongue (thrush). Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable (increasing severity may indicate onset of antibiotic-associated colitis). Monitor I&O, CBC, renal function tests for nephrotoxicity. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

• Discomfort may occur with IM injection. • Continue therapy for full length of treatment. • Doses should be evenly spaced. • Report persistent diarrhea.

cefixime

sef-**ix**-eem
(Suprax)
Do not confuse cefixime with cefepime, or Suprax with Sporanox or Surbex.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Third-generation cephalosporin. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to *S. pneumoniae, S. pyogenes, M. catarrhalis, H. influenzae, E. coli, P. mirabilis* including otitis media, acute bronchitis,

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NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, renal function tests. Question for hypersensitivity to cefixime or other cephalosporins, penicillins.

INTERVENTION/EVALUATION

Assess oral cavity for white patches on mucous membranes, tongue (thrush). Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable (increasing severity may indicate onset of antibiotic-associated colitis). Monitor renal function tests for evidence of nephrotoxicity. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

• Continue medication for full length of treatment; do not skip doses. • Doses should be evenly spaced. • May cause GI upset (may take with food or milk). • Report persistent diarrhea.

cefotaxime

sef-oh-**tax**-eem
(Claforan)
Do not confuse cefotaxime with cefoxitin, ceftizoxime, or cefuroxime, or Claforan with Claritin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Third-generation cephalosporin. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections (active vs. most gram-negative [not *Pseudomonas*] and gram-positive cocci [not *Enterococcus*]) including bone, joint, GU, gynecologic, intra-abdominal, lower respiratory tract, skin/skin structure infections; septicemia, meningitis, perioperative prophylaxis. **OFF-LABEL:** Surgical prophylaxis.

PRECAUTIONS

Contraindications: History of hypersensitivity/anaphylactic reaction to cephalosporins. **Cautions:** History of penicillin allergy, renal impairment with creatinine clearance less than 30 ml/min.

ACTION

Binds to bacterial cell membranes, inhibits cell wall synthesis. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Widely distributed to CSF. Protein binding: 30%–50%. Partially metabolized in liver to active metabolite. Primarily excreted in urine. Moderately removed by hemodialysis. **Half-life:** 1 hr (increased in renal impairment).

cefoxitin

sef-**ox**-i-tin
(Mefoxin)
Do not confuse cefoxitin with cefazolin, cefotaxime, ceftazidime, ceftriaxone, or Cytoxan, or Mefoxin with Lanoxin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Second-generation cephalosporin. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to *S. pneumoniae, S. aureus,* gram-negative enteric bacilli, anaerobes (e.g., *Bacteroides* spp.) including bone, joint, gynecologic, intra-abdominal, lower respiratory, skin/skin structure infections; UTIs, perioperative prophylaxis.

PRECAUTIONS

Contraindications: History of hypersensitivity/anaphylactic reaction to cephalosporins. **Cautions:** Renal impairment, history of penicillin allergy.

ACTION

Binds to bacterial cell membranes, inhibits cell wall synthesis. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Well distributed. Protein binding: 65%–79%. Primarily excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 0.8–1 hr.

community-acquired pneumonia, gonorrhea, otitis media, pharyngitis, tonsillitis, skin/skin structure infections, UTIs.

PRECAUTIONS

Contraindications: History of hypersensitivity/anaphylactic reaction to cephalosporins. **Cautions:** Renal impairment, history of penicillin allergy.

ACTION

Binds to bacterial cell membranes, inhibits cell wall synthesis. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Well absorbed from GI tract (food increases absorption). Protein binding: 18%–23%. Widely distributed. Primarily excreted unchanged in urine. Partially removed by hemodialysis. **Half-life:** 2.3 hrs (increased in renal impairment, elderly pts).

C

INDICATIONS/ROUTES/DOSAGE

Usual Dosage Range

PO: ADULTS, ELDERLY, CHILDREN OLDER THAN 12 YRS: 250–500 mg q12h or 500 mg q24h. **CHILDREN OLDER THAN 6 MOS–12 YRS:** 7.5–15 mg/kg/day in 2 divided doses. Do not exceed adult dose.

Dosage in Renal Impairment

Creatinine clearance less than 30 ml/min: 50% of usual dose at usual interval. **Hemodialysis:** Administer dose after completion of dialysis.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Oral candidiasis (thrush), mild diarrhea, mild abdominal cramping, vaginal candidiasis. **Occasional:** Nausea, serum sickness reaction (fever, joint pain; usually occurs after second course of therapy and resolves after drug is discontinued). **Rare:** Allergic reaction (pruritus, rash, urticaria).

ADVERSE EFFECTS/ TOXIC REACTIONS

Antibiotic-associated colitis, other superinfections (abdominal cramps, severe watery diarrhea, fever) may result from altered bacterial balance. Nephrotoxicity may occur, esp. in pts with preexisting renal disease. Pts with history of penicillin allergy are at increased risk for developing a severe hypersensitivity reaction (severe pruritus, angioedema, bronchospasm, anaphylaxis).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, renal function tests. Question for history of allergies, particularly cephalosporins, penicillins.

INTERVENTION/EVALUATION

Assess oral cavity for evidence of stomatitis. Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable (but increasing severity may indicate onset of antibiotic-associated colitis). Monitor I&O, renal function tests for nephrotoxicity. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

• Doses should be evenly spaced. • Continue antibiotic therapy for full length of treatment. • May cause GI upset (may take with food or milk). • Report persistent diarrhea.

ceftaroline

sef-**tar**-o-leen
(Teflaro)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Fifth-generation cephalosporin. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to gram-positive and gram-negative organisms including *S. pneumoniae, S. aureus* (methicillin susceptible only), *H. influenzae, Klebsiella pneumoniae, E. coli* including acute bacterial skin and skin structure infections, community-acquired bacterial pneumonia.

PRECAUTIONS

Contraindications: History of hypersensitivity/anaphylactic reaction to cephalosporins. **Cautions:** History of allergy to penicillin, severe renal impairment with creatinine clearance less than 50 ml/min.

ACTION

Binds to bacterial cell membranes, inhibits cell wall synthesis. **Therapeutic Effect:** Bactericidal.

INTERVENTION/EVALUATION

Assess oral cavity for white patches on mucous membranes, tongue (thrush). Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable, but increasing severity may indicate onset of antibiotic-associated colitis. Monitor I&O, renal function tests for evidence of nephrotoxicity. Be alert for superinfection: fever, vomiting, severe genital/anal pruritus, moderate to severe diarrhea, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

• Continue medication for full length of treatment. • Doses should be evenly spaced.

ceftazidime

sef-**taz**-i-deem
(Fortaz, Tazicef)
Do not confuse ceftazidime with cefazolin, cefepime, or ceftriaxone.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Third-generation cephalosporin. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to gram-negative organisms (including *Pseudomonas* and *Enterobacteriaceae*) including bone, joint, CNS (including meningitis), gynecologic, intra-abdominal, lower respiratory tract, skin/skin structure infections; UTI, septicemia. Treatment of CNS infections due to *H. influenzae, N. meningitidis,* including meningitis. **OFF-LABEL:** Bacterial endophthalmitis.

PRECAUTIONS

Contraindications: History of hypersensitivity/anaphylactic reaction to cephalosporins.

Cautions: Severe renal impairment, history of penicillin allergy, seizure disorder.

ACTION

Binds to bacterial cell membranes, inhibits cell wall synthesis. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Widely distributed including to CSF. Protein binding: 5%–17%. Primarily excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 2 hrs (increased in renal impairment).

INTERVENTION/EVALUATION

Evaluate IV site for phlebitis (heat, pain, red streaking over vein). Assess IM injection sites for induration, tenderness. Check oral cavity for white patches on mucous membranes, tongue (thrush). Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable (increasing severity may indicate onset of antibiotic-associated colitis). Monitor I&O, renal function tests for nephrotoxicity. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

• Discomfort may occur with IM injection. • Doses should be evenly spaced. • Continue antibiotic therapy for full length of treatment.

ceftibuten

sef-tye-**bue**-ten
(Cedax)
Do not confuse Cedax with Cidex.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Third-generation cephalosporin. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to *S. pneumoniae, S. pyogenes, H. influenzae, M. catarrhalis* including chronic bronchitis, acute bacterial otitis media, pharyngitis, tonsillitis.

PRECAUTIONS

Contraindications: History of hypersensitivity/anaphylactic reaction to cephalosporins. **Cautions:** History of penicillin allergy, moderate to severe renal impairment, history of GI diseases, colitis.

ACTION

Binds to bacterial cell membranes, inhibits cell wall synthesis. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Rapidly absorbed from GI tract. Protein binding: 65%–77%. Excreted primarily unchanged in urine. **Half-life:** 2–3 hrs.

with calcium-containing IV solutions, including continuous calcium-containing infusion such as parenteral nutrition (in neonates) due to the risk of precipitation of ceftriaxone-calcium salt. **Cautions:** Hepatic impairment, history of GI disease (esp. ulcerative colitis, antibiotic-associated colitis). Severe renal impairment, history of penicillin allergy.

ACTION

Binds to bacterial cell membranes, inhibits cell wall synthesis. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Widely distributed including to CSF. Protein binding: 83%–96%. Primarily excreted unchanged in urine. Not removed by hemodialysis. **Half-life: IV:** 4.3–4.6 hrs; **IM:** 5.8–8.7 hrs (increased in renal impairment).

C

Dosage in Renal Impairment
After usual initial dose, dosing frequency is modified based on creatinine clearance and severity of infection.

Creatinine Clearance	Dosage
10–50 ml/min	500 mg q8–12h
Less than 10 ml/min	250–500 mg q12–24h
Hemodialysis	250 mg q12–24h

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent: Oral candidiasis, mild diarrhea, mild abdominal cramping, vaginal candidiasis. **Occasional:** Nausea, serum sickness–like reaction (fever, joint pain; usually occurs after second course of therapy and resolves after drug is discontinued). **Rare:** Allergic reaction (rash, pruritus, urticaria).

ADVERSE EFFECTS/ TOXIC REACTIONS

Antibiotic-associated colitis, other superinfections (abdominal cramps, severe watery diarrhea, fever) may result from altered bacterial balance. Nephrotoxicity may occur, esp. in pts with preexisting renal disease. Pts with history of penicillin allergy are at increased risk for developing a severe hypersensitivity reaction (severe pruritus, angioedema, bronchospasm, anaphylaxis).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, renal function tests. Question for history of allergies, particularly cephalosporins, penicillins.

INTERVENTION/EVALUATION

Assess oral cavity for white patches on mucous membranes, tongue (thrush). Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable (increasing severity may indicate onset of antibiotic-associated colitis). Monitor I&O, renal function tests for nephrotoxicity. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema). With prolonged therapy, monitor renal/hepatic function tests.

PATIENT/FAMILY TEACHING

• Doses should be evenly spaced. • Continue therapy for full length of treatment. • May cause GI upset (may take with food, milk). • Refrigerate oral suspension. • Report persistent diarrhea.

ceritinib

se-**ri**-ti-nib
(Zykadia)
Do not confuse ceritinib with crizotinib, gefitinib, imatinib, or lapatinib.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Kinase inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of pts with anaplastic lymphoma kinase (ALK)–positive metastatic non–small cell lung cancer (NSCLC) who have progressed or are intolerant to crizotinib.

PRECAUTIONS

Contraindications: None known. **Cautions:** Anemia, bradyarrhythmias/ventricular arrhythmias, diabetes, dehydration, electrolyte imbalance (e.g., hypomagnesemia, hypokalemia), hepatic impairment, HF, ocular disease, pulmonary disease. Concurrent use of CYP3A inducers or inhibitors, medications that prolong QT interval. Not recommended in pts with congenital long QT syndrome.

ACTION

Inhibits tyrosine kinase activity and tumor cell proliferation. Inhibits autophosphorylation of ALK and ALK-dependent signaling proteins. **Therapeutic Effect:** Inhibits lung cancer growth and metastasis.

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Concomitant Use of Strong CYP3A Inhibitors: If concomitant use unavoidable, reduce ceritinib dose by one third, rounded to the nearest 150-mg dose strength. After discontinuation of a strong CYP3A inhibitor, resume ceritinib dose that was taken prior to initiating strong CYP3A inhibitor.

Endocrine

Persistent Hyperglycemia Greater Than 250 ml/dL Despite Optimal Antihyperglycemic Therapy: Withhold until hyperglycemia is adequately controlled, then resume with a 150-mg dose reduction. If adequate control cannot be achieved with optimal medical management, then permanently discontinue.

Hepatic

ALT, AST Greater Than 5 Times Upper Limit Normal (ULN) with Total Bilirubin Elevation Less Than or Equal to 2 Times ULN: Withhold until recovery to baseline or less than or equal to 2 times ULN, then resume with a 150-mg dose reduction.

ALT, AST Greater Than 3 Times ULN with Total Bilirubin Elevation Greater Than or Equal to 2 Times ULN in the Absence of Cholestasis or Hemolysis: Permanently discontinue.

Pulmonary

Any Grade Treatment Related to Interstitial Lung Disease/Pneumonitis: Permanently discontinue.

Intolerability/Toxicity

If Unable to Tolerate 300-mg Dose: Permanently discontinue.

SIDE EFFECTS

Frequent (86%–52%): Diarrhea, nausea, vomiting, abdominal pain, fatigue, asthenia.
Occasional (34%–9%): Decreased appetite, constipation, paresthesia, muscular weakness, gait disturbance, peripheral motor/sensory neuropathy, hypotonia, polyneuropathy, dyspepsia, gastric reflux disease, dysphagia, rash, maculopapular rash, acneiform dermatitis, vision impairment, blurred vision, photopsia, presbyopia, reduced visual acuity.

ADVERSE EFFECTS/TOXIC REACTIONS

Approximately 60% of pts required at least one dose reduction. Median time to first dose reduction was approximately 7 wks. Decreased Hgb levels reported in 84% of pts. Severe or persistent GI toxicity including nausea, vomiting, diarrhea occurred in 96% of pts; severe cases reported in 14% of pts. Drug-induced hepatotoxicity with elevation of ALT 5 times ULN occurred in 27% of pts. Bradycardia, severe interstitial lung disease (ILD), QT interval prolongation, ILD reported in 3% of pts. Common Terminology Criteria for Adverse Events (CTCAE) grade 3–4 hyperglycemia reported in 13% of pts; diabetics have a sixfold increase in risk; pts receiving corticosteroids have twofold increase in risk. Fatal adverse reactions including pneumonia, respiratory failure, ILD/pneumonitis, pneumothorax, gastric hemorrhage, general physical health deterioration, tuberculosis, cardiac tamponade, sepsis occurred in 5% of pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, BMP, LFT; serum ionized calcium, magnesium, phosphate; capillary blood glucose, O_2 saturation, urine pregnancy, vital signs. Obtain baseline EKG in pts with history of arrhythmias, HF, electrolyte imbalance, or concurrent use of medications known to prolong QTc interval. Question possibility of pregnancy or plans of breastfeeding. Assess hydration status. Screen for history/co-morbidities. Receive full medication history including herbal products; esp. CYP3A inhibitors or inducers, medications that prolong QT interval. Assess visual acuity. Verify ALK-positive NSCLC test prior to initiation.

INTERVENTION/EVALUATION

Monitor CBC routinely; LFT monthly (or more frequently in pts with elevated

C

INTERACTIONS

DRUG: **Anakinra, other TNF antagonists (e.g., adalimumab, etanercept, infliximab)** may increase risk of infection**. Live virus vaccines** may decrease immune response. **HERBAL:** **Echinacea** may decrease effect. **FOOD:** None known. **LAB VALUES:** May increase serum alkaline phosphatase, ALT, AST, bilirubin; aPTT.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution: 200 mg. **Injection, Solution:** 200 mg/ml in a single-use prefilled syringe.

ADMINISTRATION/HANDLING

Subcutaneous

Reconstitution • Bring to room temperature before reconstitution. • Reconstitute with 1 ml Sterile Water for Injection. • Gently swirl without shaking, using syringe with 20-gauge needle. • Leave undisturbed to fully reconstitute (may take as long as 30 min). • Using a new 20-gauge needle, withdraw reconstituted solution into syringe for final concentration of 1 ml (200 mg). Use separate syringes for multiple vials. • Switch each 20-gauge needle to a 23-gauge needle and inject full contents of each syringe subcutaneously into separate sites on the abdomen or thigh.

Storage • Store vial in refrigerator. • Once powder reconstituted, solution should appear clear to opalescent, colorless to pale yellow. • Discard if solution is discolored or contains precipitate. • Reconstituted solution is stable for up to 2 hrs at room temperature or 24 hrs if refrigerated.

INDICATIONS/ROUTES/DOSAGE

Note: Each 400-mg dose is given as two injections of 200 mg each.

Crohn's Disease

Subcutaneous: Initially, 400 mg (given as 2 subcutaneous injections of 200 mg) and at weeks 2 and 4. **Maintenance:** In pts who obtain a therapeutic response, 400 mg every 4 wks.

Rheumatoid Arthritis, Ankylosing Spondylitis, Psoriatic Arthritis

Subcutaneous: ADULTS, ELDERLY: Initially, 400 mg and at weeks 2 and 4. **Maintenance:** 200 mg q2wks or 400 mg q4wks.

Dosage Modification

Discontinue for hypersensitivity reaction, lupus-like syndrome, serious infection, sepsis, hepatitis B reactivation.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (6%): Arthralgia. **Rare (less than 1%):** Abdominal pain, diarrhea.

ADVERSE EFFECTS/ TOXIC REACTIONS

Upper respiratory tract infection occurs in 20% of pts. UTI occurs in 7% of pts. Serious infections such as pneumonia, pyelonephritis occur in 3% of pts. Hypersensitivity reaction (rash, urticaria, hypotension, dyspnea) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Do not initiate treatment in pts with active infections, including chronic or localized infection. TB test should be obtained before initiation. Obtain baseline WBC count, urinalysis, C-reactive protein.

INTERVENTION/EVALUATION

Monitor pts for infection during and after treatment. Monitor temperature. If pt develops an infection, treatment should be discontinued. Monitor lab results, especially WBC count, urinalysis, C-reactive protein for evidence of infection.

PATIENT/FAMILY TEACHING

• Report cough, fever, flu-like symptoms. • Do not receive live virus vaccine during treatment or within 3 months of its discontinuation.

C

(creatinine clearance less than 7 ml/min), pts with hepatic impairment: Dosage is decreased to 5 mg once a day. **CHILDREN 6–11 YRS:** Less than 2.5 mg once daily. **CHILDREN YOUNGER THAN 6 YRS:** Not recommended.

SIDE EFFECTS

Occasional (10%–2%): Pharyngitis, dry mucous membranes, nausea, vomiting, abdominal pain, headache, dizziness, fatigue, thickening of mucus, drowsiness, photosensitivity, urinary retention.

ADVERSE EFFECTS/ TOXIC REACTIONS

Children may experience paradoxical reaction (restlessness, insomnia, euphoria, nervousness, tremor). Dizziness, sedation, confusion more likely to occur in elderly.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess lung sounds. Assess severity of rhinitis, urticaria, other symptoms.

INTERVENTION/EVALUATION

For upper respiratory allergies, increase fluids to maintain thin secretions and offset thirst. Monitor symptoms for therapeutic response.

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol.

cetuximab

HIGH ALERT

se-**tux**-i-mab
(Erbitux)

■ **BLACK BOX ALERT** ■ Severe infusion reactions (bronchospasm, stridor, urticaria, hypotension, cardiac arrest) have occurred, especially with first infusion in pts with head and neck cancer, cardiopulmonary arrest reported in pts receiving radiation in combination with cetuximab.

Do not confuse cetuximab with bevacizumab.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Monoclonal antibody. **CLINICAL:** Antineoplastic.

USES

As a single agent or in combination with irinotecan for treatment of EGFR-expressing, metastatic colorectal carcinoma in pts who are refractory or intolerant to irinotecan-based chemotherapy. Treatment of advanced squamous cell cancer of head/neck (with radiation). Treatment of recurrent or metastasized squamous cell carcinoma of head/neck progressing after platinum-based therapy. First-line treatment of squamous cell carcinoma of head and neck in combination with platinum-based therapy with 5-FU. **OFF-LABEL:** EGFR-expressing advanced non–small-cell lung cancer (NSCLC). Treatment of unresectable squamous cell skin cancer.

PRECAUTIONS

Contraindications: None known. **Cautions:** Preexisting IgE antibodies to cetuximab, coronary artery disease, HF, arrythmias, pulmonary disease.

ACTION

Binds to the epidermal growth factor receptor (EGFR), a glycoprotein on normal and tumor cells. **Therapeutic Effect:** Inhibits tumor cell growth, inducing apoptosis (cell death).

PHARMACOKINETICS

Reaches steady-state levels by the third weekly infusion. Clearance decreases as dose increases. **Half-life:** 114 hrs (range: 75–188 hrs).

C

chlorambucil

HIGH ALERT

klor-**am**-bue-sil
(Leukeran)

■ **BLACK BOX ALERT** ■ May cause myelosuppression. Affects fertility; potential for carcinogenic, mutagenic, teratogenic effects. May cause azoospermia.

Do not confuse Leukeran with Alkeran, Leukine, or Myleran.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Alkylating agent, nitrogen mustard. **CLINICAL:** Antineoplastic.

USES

Treatment of chronic lymphocytic leukemia (CLL), Hodgkin's and non-Hodgkin's lymphomas (NHL). **OFF-LABEL:** Nephrotic syndrome in children, Waldenström's macroglobulinemia.

PRECAUTIONS

Contraindications: Previous allergic reaction to other alkylating agents, prior resistance to chlorambucil, pregnancy. **Extreme Cautions:** Treatment within 4 wks after full-course radiation therapy or myelosuppressive drug regimen. **Cautions:** History of bone marrow suppression, head trauma, hepatic impairment, nephrotic syndrome, seizure disorder; administration of live vaccines to immunocompromised pts.

ACTION

Inhibits DNA, RNA synthesis by cross-linking with DNA, RNA strands. **Therapeutic Effect:** Interferes with nucleic acid function.

PHARMACOKINETICS

Rapidly, completely absorbed from GI tract. Protein binding: 99%. Metabolized in liver to active metabolite. Not removed by hemodialysis. **Half-life:** 1.5 hrs; metabolite, 2.5 hrs.

■ **BLACK BOX ALERT** ■ Increased risk of mortality in elderly pts with dementia-related psychosis.
Do not confuse chlorpromazine with clomipramine, prochlorperazine, or promethazine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Phenothiazine. **CLINICAL:** Antipsychotic, antiemetic, antianxiety, antineuralgia adjunct.

USES

Management of psychotic disorders (control of mania, treatment of schizophrenia), severe nausea/vomiting, severe behavioral disturbances in children. Relief of intractable hiccups, acute intermittent porphyria. **OFF-LABEL:** Management of psychotic disorders, behavioral symptoms associated with dementia, agitation related to Alzheimer's dementia.

PRECAUTIONS

Contraindications: Comatose states, severe CNS depression, phenothiazine hypersensitivity. **Cautions:** Respiratory/hepatic/renal/cardiac impairment; history of alcohol withdrawal, subcortical brain damage, seizures, urinary retention, prostatic hypertrophy, hypocalcemia (increases susceptibility to dystonias), myasthenia gravis, cerebrovascular disease, pts with prolonged QT interval. Pts with hemodynamic instability, risk for aspiration pneumonia, decreased GI motility, visual problems (e.g., narrow-angle glaucoma).

ACTION

Blocks dopamine neurotransmission at postsynaptic receptor sites. Possesses strong anticholinergic, sedative, antiemetic effects; moderate extrapyramidal effects; slight antihistamine action. **Therapeutic Effect:** Improves psychotic conditions; relieves nausea/vomiting; controls intractable hiccups, porphyria.

PHARMACOKINETICS

Rapidly absorbed from GI tract. Protein binding: 92%–97%. Metabolized in liver. Excreted in urine. **Half-life:** Initial 2 hrs; **terminal:** 30 hrs.

C

IV

• For direct IV injection, dilute with 0.9% NaCl to maximum concentration of 1 mg/ml. • Administer slowly: 0.5 mg/min in children, 1 mg/min in adults. • Protect from light. • A slightly yellow solution does not indicate potency loss. • Discard markedly discolored solutions.

PO

Administer with food or milk to decrease GI effects.

INDICATIONS/ROUTES/DOSAGE

Severe Nausea/Vomiting

PO: ADULTS, ELDERLY: 10–25 mg q4–6h. **CHILDREN:** 0.5–1 mg/kg q4–6h.
IV, IM: ADULTS, ELDERLY: 25–50 mg q––6h. **CHILDREN:** 0.5–1 mg/kg q6–8h. **Maximum:** 40 mg/day for children less than 5 yrs; 75 mg/day for children 5–12 yrs.

Psychotic Disorders

PO: ADULTS, ELDERLY: 30–800 mg/day in 1–4 divided doses (usual dose: 200–600 mg/day). **CHILDREN OLDER THAN 6 MOS:** 0.5–1 mg/kg q4–6h.
IV, IM: ADULTS, ELDERLY: Initially, 25 mg; may repeat in 1–4 hrs. May gradually increase to 400 mg/dose. Usual dose: 300–800 mg/day. **CHILDREN OLDER THAN 6 MOS:** 0.5–1 mg/kg q6–8h. **Maximum:** 75 mg/day for children 5–12 yrs; 40 mg/day for children younger than 5 yrs.

Intractable Hiccups

PO, IM: ADULTS: 25–50 mg 3–4 times a day. **IV:** 25–50 mg by slow IV infusion.

Porphyria

PO, IM: ADULTS, ELDERLY: 25–50 mg 3–4 times a day.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Avoid use in severe impairment.

SIDE EFFECTS

Frequent: Drowsiness, blurred vision, hypotension, color vision or night vision disturbances, dizziness, decreased diaphoresis, constipation, dry mouth, nasal congestion. **Occasional:** Urinary retention, photosensitivity, rash, decreased sexual function, swelling/pain in breasts, weight gain, nausea, vomiting, abdominal pain, tremors.

ADVERSE EFFECTS/ TOXIC REACTIONS

Extrapyramidal symptoms appear to be dose related (particularly high dosage) and may include: akathisia (inability to sit still, tapping of feet), parkinsonian symptoms (mask-like face, tremors, shuffling gait, hypersalivation), acute dystonias (torticollis [neck muscle spasm], opisthotonos [rigidity of back muscles], and oculogyric crisis [rolling back of eyes]). Dystonic reaction may produce diaphoresis, pallor. Tardive dyskinesia (tongue protrusion, puffing of cheeks, puckering of the mouth) occurs rarely (may be irreversible). Abrupt discontinuation after long-term therapy may precipitate nausea, vomiting, gastritis, dizziness, tremors. Blood dyscrasias, particularly agranulocytosis, mild leukopenia, may occur. May decrease seizure threshold.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Avoid skin contact with solution (contact dermatitis). **Antiemetic:** Assess for dehydration (poor skin turgor, dry mucous membranes, longitudinal furrows in tongue). **Antipsychotic:** Assess behavior, appearance, emotional status, response to environment, speech pattern, thought content.

INTERVENTION/EVALUATION

Monitor B/P for hypotension. Assess for EPS. Monitor WBC, differential count for blood dyscrasias, fine tongue movement (may be early sign of tardive dyskinesia).

Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Assess for therapeutic response (interest in surroundings, improvement in self-care, increased ability to concentrate, relaxed facial expression). **Therapeutic serum level:** 50–300 ng/ml; **toxic serum level:** greater than 750 ng/ml.

PATIENT/FAMILY TEACHING

• Full therapeutic response may take up to 6 wks. • Urine may darken. • Do not abruptly withdraw from long-term drug therapy. • Report visual disturbances. • Avoid tasks that require alertness, motor skills until response to drug is established. • Drowsiness generally subsides with continued therapy. • Avoid alcohol, exposure to sunlight.

cholestyramine

koe-lee-**stye**-ra-meen
(Novo-Cholamine, Prevalite, Questran, Questran Lite)

CLASSIFICATION

PHARMACOTHERAPEUTIC: Bile acid sequestrant. **CLINICAL:** Antihyperlipoproteinemic.

USES

Adjunct to diet to decrease elevated serum cholesterol levels in pts with primary hypercholesterolemia. Relief of pruritus associated with elevated levels of bile acids. Regression of arteriosclerosis. **OFF-LABEL:** Treatment of diarrhea (due to bile acids), binding toxicologic agents.

PRECAUTIONS

Contraindications: Complete biliary obstruction. **Cautions:** GI dysfunction (esp. constipation), recent abdominal surgery, renal impairment, dehydration, concurrent spironolactone therapy.

ACTION

Binds with bile acids in intestine, forming insoluble complex. Binding results in partial removal of bile acid from enterohepatic circulation. **Therapeutic Effect:** Removes LDL cholesterol from plasma.

PHARMACOKINETICS

Not absorbed from GI tract. Decreases in serum LDL apparent in 5–7 days and in serum cholesterol in 1 mo. Serum cholesterol returns to baseline about 1 mo after drug discontinuation.

with carbonated beverages reported; use extra large glass, stir slowly. • Administer with meals.

C

INDICATIONS/ROUTES/DOSAGE

Hypercholesterolemia

PO: ADULTS, ELDERLY: Initially, 4 g 1–2 times a day. Gradually increase over at least 1-mo intervals. **Maintenance:** 8–16 g/day in divided doses. **Maximum:** 24 g/day, 6 doses/day. **CHILDREN:** 80 mg/kg 3 times a day. **Maximum:** 8 g/day.

Pruritis

PO: ADULTS, ELDERLY: Initially, 4 g 1–2 times a day. **Maintenance:** 4–16 g/day in divided doses. **Maximum:** 24 g/day.

SIDE EFFECTS

Frequent: Constipation (may lead to fecal impaction), nausea, vomiting, abdominal pain, indigestion. **Occasional:** Diarrhea, belching, bloating, headache, dizziness. **Rare:** Gallstones, peptic ulcer disease, malabsorption syndrome.

ADVERSE EFFECTS/ TOXIC REACTIONS

GI tract obstruction, hyperchloremic acidosis, or osteoporosis secondary to calcium excretion may occur. High dosage may interfere with fat absorption, resulting in steatorrhea.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of hypersensitivity to cholestyramine, tartrazine, aspirin. Obtain baseline serum cholesterol, triglycerides, electrolytes, LFT.

INTERVENTION/EVALUATION

Monitor daily pattern of bowel activity, stool consistency. Evaluate food tolerance, abdominal discomfort, flatulence. Monitor cholesterol, triglycerides, PT, LFT, CBC, serum electrolytes. Encourage several glasses of water between meals.

PATIENT/FAMILY TEACHING

• Complete full course of therapy; do not stop or change doses. • Take other drugs at least 1 hr before or 4–6 hrs after cholestyramine. • Never take in dry form; mix with 3–6 oz water, milk, fruit juice, soup (place powder on surface for 1–2 min to prevent lumping, then mix well). • Use extra-large glass, stir slowly when mixing with carbonated beverages due to foaming. • Take with meals, drink several glasses of water between meals. • Eat high-fiber foods (whole-grain cereals, fruits, vegetables) to reduce potential for constipation.

ciclesonide

sye-**kles**-oh-nide
(Alvesco HFA, Omnaris, Zetonna)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Glucocorticoid. **CLINICAL:** Anti-inflammatory.

USES

Intranasal: Management of seasonal or perennial allergic rhinitis. **Oral Inhalation:** Prophylactic management of bronchial asthma. **OFF-LABEL: Nasal:** Adjunct to antibiotics in empiric treatment of acute bacterial rhinosinusitis.

PRECAUTIONS

Contraindications: Acute asthma or status asthmaticus, moderate to severe bronchiectasis. **Cautions:** Cataracts, severe hepatic impairment, seizures, osteoporosis, glaucoma, thyroid disease, psychiatric disturbance, cardiovascular disease, myasthenia gravis, elderly, chronic wounds.

ACTION

Inhibits accumulation of inflammatory cells, decreases and prevents tissues from responding to inflammatory process. **Therapeutic Effect:** Relieves symptoms of allergic rhinitis, asthma.

PATIENT/FAMILY TEACHING

• Improvement noted in 24–48 hrs, but full effect may take 1–2 wks for seasonal allergic rhinitis, 5 wks for perennial allergic rhinitis. • Improvement in asthma may take 4 wks or longer. • Oral inhalation not indicated for acute asthma attacks. • Report if no improvement in symptoms, sneezing or nasal irritation occurs.

cidofovir

sye-**dof**-o-veer
(Vistide)

■ **BLACK BOX ALERT** ■ Dose-dependent nephrotoxicity requires dose adjustment, discontinuation if changes in renal function occur (renal lab tests, urinalysis). May cause hypospermia. May be embryotoxic, teratogenic. Neutropenia reported: monitor neutrophil count.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Anti-infective. **CLINICAL:** Antiviral.

USES

Treatment of CMV retinitis in those with HIV. Should be given with probenecid.

PRECAUTIONS

Contraindications: Direct intraocular injection, history of clinically severe hypersensitivity to probenecid or other sulfa-containing drugs, renal impairment (serum creatinine level greater than 1.5 mg/dL, creatinine clearance 55 ml/min or less, or urine protein level greater than 100 mg/dL). Use with or within 7 days of nephrotoxic agent. **Caution:** History of hepatic impairment, metabolic acidosis, pancreatitis, dehydration.

ACTION

Inhibits viral DNA synthesis by incorporating itself into viral DNA chain. **Therapeutic Effect:** Suppresses replication of cytomegalovirus (CMV).

PHARMACOKINETICS

Protein binding: less than 6%. Excreted primarily unchanged in urine. Effect of hemodialysis unknown. **Elimination Half-life:** 1.4–3.8 hrs.

thrombosis and restenosis after coronary stent placement.

C

PRECAUTIONS

Contraindications: HF of any severity, hemostatic disorders or active bleeding (bleeding peptic ulcer, intracranial bleeding). **Cautions:** Severe underlying heart disease, thrombocytopenia, pts receiving other platelet aggregation inhibitors, moderate to severe hepatic impairment, severe renal impairment.

ACTION

Inhibits platelet aggregation. Dilates vascular beds with greatest dilation in femoral beds. **Therapeutic Effect:** Improves walking distance in pts with intermittent claudication.

PHARMACOKINETICS

Moderately absorbed from GI tract. Protein binding: 95%–98%. Metabolized in liver. Excreted in urine (74%), feces (20%). Not removed by hemodialysis. **Half-life:** 11–13 hrs.

C

OTC Use

PO: ADULTS, ELDERLY: 200 mg up to 30 min before meals. **Maximum:** 2 doses/day.

Usual Pediatric/Neonatal Dosage

CHILDREN: 20–40 mg/kg/day in divided doses q6h. **INFANTS:** 10–20 mg/kg/day in divided doses q6–12h. **NEONATES:** 5–10 mg/kg/day in divided doses q8–12h.

Dosage in Renal Impairment

Dosage is modified based on creatinine clearance.

Creatinine Clearance	Dosage
Greater than 50 ml/min	No change
10–50 ml/min	50% of normal dose
Less than 10 ml/min	25% of normal dose

Give after hemodialysis and q12h between dialysis sessions.

Dosage in Hepatic Impairment

Caution in severe impairment.

SIDE EFFECTS

Occasional (4%–2%): Headache. **Elderly, pts with renal impairment, severely ill pts:** Confusion, agitation, psychosis, depression, anxiety, disorientation, hallucinations. Effects reverse 3–4 days after discontinuance. **Rare (less than 2%):** Diarrhea, dizziness, drowsiness, nausea, vomiting, gynecomastia, rash, impotence.

ADVERSE EFFECTS/ TOXIC REACTIONS

None known.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, PT, aPTT, BUN, creatinine.

INTERVENTION/EVALUATION

Assess for GI bleeding: hematemesis, blood in stool. Monitor for changes in mental status in elderly, severely ill, those with renal impairment.

PATIENT/FAMILY TEACHING

• Do not take antacids within 1 hr of cimetidine administration. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid smoking, excessive amounts of caffeine. • Report any blood in vomitus/stool, or dark, tarry stool.

cinacalcet

TOP 100

sin-a-**kal**-set
(Sensipar)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Calcium receptor agonist. **CLINICAL:** Calcimimetic.

USES

Treatment of hypercalcemia in pts with parathyroid carcinoma. Treatment of secondary hyperparathyroidism in pts with chronic renal disease on dialysis. Treatment of severe hypercalcemia in pts with hyperparathyroidism unable to undergo parathyroidectomy.

PRECAUTIONS

Contraindications: Hypocalcemia. **Cautions:** Cardiovascular disease, moderate to severe hepatic disorder, seizure disorder.

ACTION

Increases sensitivity of calcium-sensing receptor on parathyroid gland to activation by extracellular calcium, thus lowering parathyroid hormone (PTH) levels. **Therapeutic Effect:** Decreases serum calcium, PTH levels.

PHARMACOKINETICS

Extensively distributed after PO administration. Protein binding: 93%–97%. Metabolized in liver. Excreted in urine (80%), feces (15%). **Half-life:** 30–40 hrs.

C

ciprofloxacin

sip-roe-**flox**-a-sin
(Apo-Ciproflox, Cetraxal, Ciloxan, Cipro, Cipro XR, Novo-Ciprofloxacin)

■ **BLACK BOX ALERT** ■ May increase risk of tendonitis, tendon rupture. May exacerbate myasthenia gravis.

Do not confuse Ciloxan with Cytoxan, or Cipro with Ceftin, or ciprofloxacin with cephalexin.

FIXED-COMBINATION(S)

Cipro HC Otic: ciprofloxacin/hydrocortisone (a steroid): 0.2%/1%. **CiproDex Otic:** ciprofloxacin/dexamethasone (a corticosteroid): 0.3%/0.1%.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Fluoroquinolone. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to *E. coli, K. pneumoniae, E. cloacae, P. mirabilis, P. vulgaris, P. aeruginosa, H. influenzae, M. catarrhalis, S. pneumoniae, S. aureus* (methicillin susceptible), *S. epidermidis, S. pyogenes, C. jejuni, Shigella* spp., *S. typhi* including intra-abdominal, bone, joint, lower respiratory tract, skin/skin structure infections; UTIs, infectious diarrhea, prostatitis, sinusitis, typhoid fever, febrile neutropenia. **Ophthalmic:** Treatment of superficial ocular infections. **OTIC:** Treatment of acute otitis externa due to susceptible strains of *P. aeruginosa* or *S. aureus*. **OFF-LABEL:** Treatment of chancroid. Acute pulmonary exacerbations in cystic fibrosis, disseminated gonococcal infections, prophylaxis to *Neisseria meningitidis* following close contact with infected person. Infectious diarrhea (children); periodontitis.

PRECAUTIONS

Contraindications: Hypersensitivity to any fluoroquinolones, other quinolones. Concurrent use of tizanidine. **Cautions:** Renal impairment, CNS disorders, seizures, rheumatoid arthritis, history of QT prolongation, uncorrected hypokalemia, hypomagnesemia, myasthenia gravis. Suspension not used through feeding or gastric tubes. Use in children (due to adverse events to joints/surrounding tissue).

ACTION

Inhibits enzyme, DNA gyrase, in susceptible bacteria, interfering with bacterial cell replication. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 20%–40%. Widely distributed including to CSF. Metabolized in liver. Primarily excreted in urine. Minimal removal by hemodialysis. **Half-life:** 3–5 hrs (increased in renal impairment, elderly).

C

Creatinine Clearance	Dosage
Less than 30 ml/min	PO (immediate-release): 250–500 mg q18h IV: 200–400 mg q18–24h

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (5%–2%): Nausea, diarrhea, dyspepsia, vomiting, constipation, flatulence, confusion, crystalluria. **Ophthalmic:** Burning, crusting in corner of eye. **Occasional (less than 2%):** Abdominal pain/discomfort, headache, rash. **Ophthalmic:** Altered taste, sensation of foreign body in eye, eyelid redness, itching. **Rare (less than 1%):** Dizziness, confusion, tremors, hallucinations, hypersensitivity reaction, insomnia, dry mouth, paresthesia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Superinfection (esp. enterococcal, fungal), nephropathy, cardiopulmonary arrest, cerebral thrombosis may occur. Hypersensitivity reaction (rash, pruritus, blisters, edema, burning skin), photosensitivity have occurred. Sensitization to ophthalmic form may contraindicate later systemic use of ciprofloxacin.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of hypersensitivity to ciprofloxacin, quinolones.

INTERVENTION/EVALUATION

Obtain urinalysis for microscopic analysis for crystalluria prior to and during treatment. Evaluate food tolerance. Monitor daily pattern of bowel activity, stool consistency. Encourage hydration (reduces risk of crystalluria). Monitor for dizziness, headache, visual changes, tremors. Assess for chest, joint pain. **Ophthalmic:** Observe therapeutic response.

PATIENT/FAMILY TEACHING

• Do not skip doses; take full course of therapy. • Maintain adequate hydration to prevent crystalluria. • Do not take antacids within 2 hrs of ciprofloxacin (reduces/destroys effectiveness). • Shake suspension well before using; do not chew microcapsules in suspension. • Sugarless gum, hard candy may relieve bad taste. • Avoid caffeine. • Report tendon pain or swelling. • Avoid exposure to sunlight/artificial light (may cause photosensitivity reaction). • Report persistent diarrhea. • **Ophthalmic:** Crystal precipitate may form, usual resolution in 1–7 days.

cisplatin

HIGH ALERT

sis-**pla**-tin
(Platinol-AQ)

■ **BLACK BOX ALERT** ■ Cumulative renal toxicity may be severe. Dose-related toxicities include myelosuppression, nausea, vomiting. Ototoxicity, especially pronounced in children, noted by tinnitus, loss of high-frequency hearing, deafness. Must be administered by personnel trained in administration/handling of chemotherapeutic agents. Anaphylactic reaction can occur within minutes of administration. Avoid confusion between cisplatin and carboplatin.

Do not confuse cisplatin with carboplatin or oxaliplatin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Platinum coordination complex. **CLINICAL:** Antineoplastic.

USES

Treatment of metastatic testicular tumors, metastatic ovarian tumors, advanced bladder carcinoma. **OFF-LABEL:** Breast, cervical, endometrial, esophageal, gastric, head and neck, lung (small-cell, non–small-cell) carcinomas; Hodgkin's and non-Hodgkin's lymphomas; malignant

C

Ovarian Tumors

IV: ADULTS, ELDERLY: 75–100 mg/m² q3–4wks (combination therapy) or 100 mg/m² q4wks (single agent).

Testicular Tumors

IV: ADULTS, ELDERLY: 20 mg/m² daily for 5 days repeated q3wks.

Dosage in Renal Impairment

Dosage is modified based on creatinine clearance, BUN.

◄ALERT► Repeated courses of cisplatin should not be given until serum creatinine is less than 1.5 mg/100 ml and/or BUN is less than 25 mg/100 ml.

Creatinine Clearance	Dosage
10–50 ml/min	75% of normal dose
Less than 10 ml/min	50% of normal dose
Hemodialysis	50% of dose post dialysis
Peritoneal dialysis	50% of dose
Continuous renal replacement therapy	75% of dose

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Nausea, vomiting (occurs in more than 90% of pts, generally beginning 1–4 hrs after administration and lasting up to 24 hrs); myelosuppression (affecting 25%–30% of pts, with recovery generally occurring in 18–23 days). **Occasional:** Peripheral neuropathy (with prolonged therapy [4–7 mos]). Pain/redness at injection site, loss of taste, appetite. **Rare:** Hemolytic anemia, blurred vision, stomatitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Anaphylactic reaction (angioedema, wheezing, tachycardia, hypotension) may occur in first few minutes of administration in pt previously exposed to cisplatin. Nephrotoxicity occurs in 28%–36% of pts treated with a single dose, usually during second wk of therapy. Ototoxicity (tinnitus, hearing loss) occurs in 31% of pts treated with a single dose (more severe in children). Symptoms may become more frequent, severe with repeated doses.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, serum chemistry tests, urinalysis prior to initiation. Pts should be well hydrated before and 24 hrs after medication to ensure adequate urinary output (100 ml/hr), decrease risk of nephrotoxicity.

INTERVENTION/EVALUATION

Measure all emesis, urine output (general guideline requiring immediate notification of physician: 750 ml/8 hrs, urinary output less than 100 ml/hr). Monitor I&O q1–2h beginning with pretreatment hydration, continue for 48 hrs after dose. Assess vital signs q1–2h during infusion. Monitor urinalysis, serum electrolytes, LFT, renal function tests, CBC, platelet count for changes from baseline.

PATIENT/FAMILY TEACHING

• Report signs of ototoxicity (tinnitus, hearing loss). • Do not have immunizations without physician's approval (lowers body's resistance). • Avoid contact with those who have recently taken oral polio vaccine. • Report if nausea/vomiting continues at home. • Report signs of peripheral neuropathy.

citalopram

sye-**tal**-o-pram
(Apo-Citalopram, Celexa)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal thinking and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse Celexa with Celebrex, Cerebyx, Ranexa, or Zyprexa.

C

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Hepatic/renal function tests, blood counts should be performed periodically for pts on long-term therapy. Observe, record behavior. Assess psychological status, thought content, sleep pattern, appearance, interest in environment. Screen for bipolar disorder.

INTERVENTION/EVALUATION

Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Assess appearance, behavior, speech pattern, level of interest, mood.

PATIENT/FAMILY TEACHING

• Do not stop taking medication or increase dosage. • Avoid alcohol. • Avoid tasks that require alertness, motor skills until response to drug is established. • Report worsening depression, suicidal ideation, unusual changes in behavior.

cladribine

HIGH ALERT

klad-ree-bine

■ **BLACK BOX ALERT** ■ Must be administered by personnel trained in administration/handling of chemotherapeutic agents. Myelosuppression, neurologic toxicity, acute nephrotoxicity have been reported.

Do not confuse cladribine with clevidipine, clofarabine, or fludarabine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antimetabolite. **CLINICAL:** Antineoplastic.

USES

Treatment of active hairy cell leukemia defined by clinically significant anemia, neutropenia, thrombocytopenia. **OFF-LABEL:** Treatment of chronic lymphocytic leukemia, non-Hodgkin's lymphoma, acute myeloid leukemia.

PRECAUTIONS

Contraindications: None known. **Cautions:** Renal/hepatic impairment. Preexisting hematologic or immunologic abnormalities; those with high tumor burden. Use of live vaccines.

ACTION

Disrupts cellular metabolism by incorporating into DNA of dividing cells. Cytotoxic to both actively dividing and quiescent lymphocytes, monocytes. **Therapeutic Effect:** Prevents DNA synthesis.

PHARMACOKINETICS

Protein binding: 20%. Metabolized in liver. Primarily excreted in urine. **Half-life:** 5.4 hrs.

C

Do not confuse clarithromycin with Claritin, clindamycin, or erythromycin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Macrolide.
CLINICAL: Antibiotic.

USES

Treatment of susceptible infections due to *C. pneumoniae, H. influenzae, H. parainfluenzae, H. pylori, M. catarrhalis, M. avium, M. pneumoniae, S. aureus, S. pneumoniae, S. pyogenes,* including bacterial exacerbation of bronchitis, otitis media, acute maxillary sinusitis, *Mycobacterium avium* complex (MAC), pharyngitis, tonsillitis, *H. pylori* duodenal ulcer, community acquired pneumonia, skin and soft tissue infections. Prevention of MAC disease. **OFF-LABEL:** Prophylaxis of infective endocarditis, pertussis, Lyme disease.

PRECAUTIONS

Contraindications: Hypersensitivity to other macrolide antibiotics. History of QT prolongation or ventricular arrhythmias including torsades de pointes. History of cholestatic jaundice or hepatic impairment with prior clarithromycin use. Concomitant use with colchicine (in pts with renal/hepatic impairment), lovastatin, simvastatin. **Cautions:** Hepatic/renal impairment, elderly with severe renal impairment, myasthenia gravis, coronary artery disease.

ACTION

Binds to ribosomal receptor sites of susceptible organisms, inhibiting protein synthesis of bacterial cell wall. **Therapeutic Effect:** Bacteriostatic; may be bactericidal with high dosages or very susceptible microorganisms.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 65%–75%. Widely distributed (except CNS). Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 3–7 hrs; metabolite, 5–9 hrs (increased in renal impairment).

ACTION

Inhibits protein synthesis of bacterial cell wall by binding to bacterial ribosomal receptor sites. Topically, decreases fatty acid concentration on skin. **Therapeutic Effect:** Bacteriostatic or bacteriocidal.

PHARMACOKINETICS

Rapidly absorbed from GI tract. Protein binding: 92%–94%. Widely distributed. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 1.6–5.3 hrs (increased in renal impairment, premature infants).

C

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Benzodiazepine **(Schedule IV). CLINICAL:** Anticonvulsant.

USES

Adjunctive treatment of seizures associated with Lennox-Gastaut syndrome in pts 2 yrs of age and older. **OFF-LABEL:** Catamenial epilepsy; epilepsy (monotherapy).

PRECAUTIONS

Contraindications: None known. **Cautions:** Elderly, debilitated, mild to moderate hepatic impairment, preexisting muscle weakness or ataxia, concomitant CNS depressants, impaired gag reflex, respiratory disease, sleep apnea, concomitant poor CYP2C19 metabolizers, pts at risk for falls, myasthenia gravis, narrow-angle glaucoma.

ACTION

Potentiates neurotransmission of gamma-aminobutyric acid (GABA) by binding to GABA receptor. Depresses nerve impulse transmission in motor cortex. **Therapeutic Effect:** Decreases seizure activity.

PHARMOCOKINETICS

Rapidly absorbed after PO administration. Peak plasma concentration: 0.5–4 hrs. Protein binding: 80–90%. Metabolized in liver. Primarily excreted in urine. Unknown if removed by dialysis. **Half-life:** 36–42 hrs.

INTERACTIONS

DRUG: **Hepatotoxic, nephrotoxic medications** may increase risk of hepatic/renal toxicity. **HERBAL:** **Echinacea** may decrease effect. **FOOD:** None known. **LAB VALUES:** May increase serum creatinine, uric acid, ALT, AST, bilirubin.

AVAILABILITY (Rx)

Injection, Solution: 1 mg/ml (20-ml vial).

ADMINISTRATION/HANDLING

who recently received a live virus vaccine. • Avoid crowds, those with infection. • Avoid pregnancy; pts of childbearing potential should use effective contraception. • Maintain strict oral hygiene and frequent handwashing. • Report fever, respiratory distress, prolonged nausea, vomiting, diarrhea, easy bruising.

*clomiPRAMINE

kloe-**mip**-rah-meen
(Anafranil, Apo-Clomipramine, Novo-Clomipramine)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal ideation and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse Anafranil with enalapril, or clomipramine with chlorpromazine, clevidipine, clomiphene, or desipramine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tricyclic.
CLINICAL: Antidepressant.

USES

Treatment of obsessive-compulsive disorder. **OFF-LABEL:** Depression, panic attacks.

PRECAUTIONS

Contraindications: Acute recovery period after MI, use within 14 days of MAOIs. Concurrent use with linezolid. **Cautions:** Pts at high risk for suicide, prostatic hypertrophy, history of urinary retention/obstruction, narrow-angle glaucoma, seizures, cardiovascular/hepatic/renal disease, hyperthyroidism, alcoholism, xerostomia, visual problems, elderly, constipation, history of bowel obstruction.

ACTION

Blocks reuptake of neurotransmitters (norepinephrine, serotonin) at CNS presynaptic membranes, increasing availability at postsynaptic receptor sites. **Therapeutic Effect:** Reduces obsessive-compulsive behavior.

PHARMACOKINETICS

Rapidly absorbed. Metabolized in liver. Eliminated in urine (51%–60%), feces (24%–32%). **Half-life:** 20–30 hrs.

C

INDICATIONS/ROUTES/DOSAGE

Obsessive-Compulsive Disorder (OCD)

PO: ADULTS, ELDERLY: Initially, 25 mg/day. May gradually increase to 100 mg/day in the first 2 wks. **Maximum:** 250 mg/day. **CHILDREN 10 YRS AND OLDER:** Initially, 25 mg/day. May gradually increase up to maximum of 3 mg/kg/day or 100 mg, whichever is lowest. **Maintenance:** May further increase to 200 mg/day.

SIDE EFFECTS

Frequent (30%–15%): Ejaculatory failure, dry mouth, somnolence, tremors, dizziness, headache, constipation, fatigue, nausea. **Occasional (14%–5%):** Impotence, diaphoresis, dyspepsia, sexual dysfunction, dysmenorrhea, nervousness, weight gain, pharyngitis. **Rare (less than 5%):** Diarrhea, myalgia, rhinitis, increased appetite, paresthesia, memory impairment, anxiety, rash, pruritus, anorexia, abdominal pain, vomiting, flatulence, flushing, UTI, back pain.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may produce seizures, cardiovascular effects (severe orthostatic hypotension, dizziness, tachycardia, palpitations, arrhythmias), altered temperature regulation (hyperpyrexia, hypothermia). Abrupt discontinuation after prolonged therapy may produce headache, malaise, nausea, vomiting, vivid dreams. Anemia, agranulocytosis have been noted.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess psychological status, thought content, level of interest, mood, behavior, suicidal ideation.

INTERVENTION/EVALUATION

Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Assess appearance, behavior, speech pattern, level of interest, mood.

PATIENT/FAMILY TEACHING

• May cause dry mouth, constipation, blurred vision. Avoid tasks that require alertness, motor skills until response to drug is established. • Tolerance to postural hypotension, sedative, anticholinergic effects usually develop during early therapy. • Maximum therapeutic effect may be noted in 2–4 wks. • Do not abruptly discontinue medication. • Daily dose may be given at bedtime to minimize daytime sedation. • Avoid alcohol. • Report worsening depression, suicidal ideation, change in behavior.

clonazepam

kloe-**naz**-e-pam
(Apo-Clonazepam, Clonapam, Klonopin, Rivotril)

Do not confuse clonazepam or Klonopin with clobazam, clonidine, clozapine, or lorazepam.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Benzodiazepine **(Schedule IV). CLINICAL:** Anticonvulsant, antianxiety.

USES

Adjunct in treatment of Lennox-Gastaut syndrome (petit mal variant epilepsy); akinetic, myoclonic seizures; absence seizures (petit mal). Treatment of panic disorder. **OFF-LABEL:** Restless legs syndrome, neuralgia, multifocal tic disorder, parkinsonian dysarthria, bipolar disorder, adjunct therapy for schizophrenia, stomatitis, essential tremor.

PRECAUTIONS

Contraindications: Narrow-angle glaucoma, severe hepatic disease, pregnancy. **Cautions:** Renal/hepatic impairment, impaired gag reflex, chronic respiratory disease, elderly, debilitated pts, depression, pts at suicidal risk, or drug dependence.

epilepticus. Overdose results in drowsiness, confusion, diminished reflexes, coma. **Antidote:** Flumazenil (see Appendix K for dosage).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Review history of seizure disorder (frequency, duration, intensity, level of consciousness [LOC]). For panic attack, assess motor responses (agitation, trembling, tension), autonomic responses (cold/clammy hands, diaphoresis).

INTERVENTION/EVALUATION

Observe for excess sedation, respiratory depression, suicidal ideation. Assess children, elderly for paradoxical reaction, particularly during early therapy. Initiate seizure precautions, observe frequently for recurrence of seizure activity. Assist with ambulation if drowsiness, ataxia occur. For pts on long-term therapy, obtain LFT, renal function tests, blood counts should be performed periodically. Evaluate for therapeutic response: decreased intensity and frequency of seizures or, if used in panic attack, calm facial expression, decreased restlessness.

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Do not abruptly discontinue medication after long-term therapy. • Strict maintenance of drug therapy is essential for seizure control. • Avoid alcohol. • Report depression, thoughts of suicide/self-harm, excessive drowsiness, GI symptoms, worsening or loss of seizure control.

clonidine

klon-i-deen
(Apo-Clonidine, Catapres, Catapres-TTS, Dixarit, Duraclon, Kapvay, Novo-Clonidine)

■ **BLACK BOX ALERT** ■ **Epidural:** Not to be used for perioperative, obstetric, or postpartum pain.
Do not confuse Catapres with Cataflam, or clonidine with clomiphene, clorazepam, Klonopin, or quinidine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Antiadrenergic, sympatholytic. **CLINICAL:** Antihypertensive.

USES

Immediate-Release: Transdermal Patch: Treatment of hypertension alone or in combination with other antihypertensive agents. **Kapvay:** Treatment of attention-deficit hyperactivity disorder (ADHD). **Epidural:** Combined with opiates for relief of severe pain. **OFF-LABEL:** Opioid or nicotine withdrawal, prevention of migraine headaches, treatment of diarrhea in diabetes mellitus, treatment of dysmenorrhea, menopausal flushing, alcohol dependence, glaucoma, clozapine-induced sialorrhea, Tourette's syndrome, insomnia in children.

PRECAUTIONS

Contraindications: Epidural: Contraindicated in pts with bleeding diathesis or infection at the injection site; pts receiving anticoagulation therapy. **Cautions:** Depression, elderly. Severe coronary insufficiency, recent MI, cerebrovascular disease, chronic renal impairment, preexisting bradycardia, sinus node dysfunction, conduction disturbances; concurrent use with digoxin, diltiazem, metoprolol, verapamil.

ACTION

Stimulates alpha-adrenergic receptors, reducing sympathetic CNS response. **Epidural:** Prevents pain signal transmission to brain and produces analgesia at pre- and post-alpha-adrenergic receptors in spinal cord. **ADHD:** Mechanism of action unknown. **Therapeutic**

C

Attention-Deficit Hyperactivity Disorder (ADHD)

PO: CHILDREN 45 KG OR LESS: Initially 0.05 mg/day at bedtime. May increase in increments of 0.05 mg/day q3–7days up to 0.2 mg/day (27–40.5 kg), 0.3 mg/day (40.5–45 kg). **GREATER THAN 45 KG:** 0.1 mg at bedtime. May increase 0.1 mg/day q3–7 days. **Maximum:** 0.4 mg/day. **Extended-Release Tablet *(Kapvay)*: CHILDREN 6 YRS AND OLDER:** Initially, 0.1 mg daily at bedtime. May increase in increments of 0.1 mg/day at weekly intervals (**Maximum:** 0.4 mg/day). Doses should be taken twice daily with higher split dose given at bedtime.

Severe Pain

Epidural: ADULTS, ELDERLY: 30–40 mcg/hr. **CHILDREN:** Range: 0.5–2 mcg/kg/hr, not to exceed adult dose.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (40%–10%): Dry mouth, drowsiness, dizziness, sedation, constipation. **Occasional (5%–1%): Tablets, Injection:** Depression, pedal edema, loss of appetite, decreased sexual function, itching eyes, dizziness, nausea, vomiting, nervousness. **Transdermal:** Pruritus, redness or darkening of skin. **Rare (less than 1%):** Nightmares, vivid dreams, feeling of coldness in distal extremities (esp. the digits).

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose produces profound hypotension, irritability, bradycardia, respiratory depression, hypothermia, miosis (pupillary constriction), arrhythmias, apnea. Abrupt withdrawal may result in rebound hypertension associated with nervousness, agitation, anxiety, insomnia, paresthesia, tremor, flushing, diaphoresis. May produce sedation in pts with acute CVA.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain B/P immediately before each dose is administered, in addition to regular monitoring (be alert to B/P fluctuations).

INTERVENTION/EVALUATION

Monitor B/P, pulse, mental status. Monitor daily pattern of bowel activity, stool consistency. If clonidine is to be withdrawn, discontinue concurrent beta-blocker therapy several days before discontinuing clonidine (prevents clonidine withdrawal hypertensive crisis). Slowly reduce clonidine dosage over 2–4 days.

PATIENT/FAMILY TEACHING

• Sugarless gum, sips of tepid water may relieve dry mouth. • Avoid tasks that require alertness, motor skills until response to drug is established. • To reduce hypotensive effect, rise slowly from lying to standing. • Skipping doses or voluntarily discontinuing drug may produce severe, rebound hypertension. • Avoid alcohol. • If patch loosens during 7-day application period, secure with adhesive cover.

clopidogrel

TOP 100 HIGH ALERT

kloe-**pid**-oh-grel
(Apo-Clopidogrel, Plavix)

■ **BLACK BOX ALERT** ■ Diminished effectiveness in CYP2C19 metabolizers increases risk for cardiovascular events. Pts with CYP2C19*2 and/or CYP2C19*3 alleles may have reduced platelet inhibition.

Do not confuse Plavix with Elavil or Paxil.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Thienopyridine derivative. **CLINICAL:** Antiplatelet.

ADVERSE EFFECTS/ TOXIC REACTIONS

Agranulocytosis, aplastic anemia/ pancytopenia, thrombotic thrombocytopenic purpura (TTP) occur rarely. Hepatitis, hypersensitivity reaction, anaphylactoid reaction have been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline chemistries, platelet count, PFA level. Perform platelet counts before drug therapy, q2days during first wk of treatment, and weekly thereafter until therapeutic maintenance dose is reached. Abrupt discontinuation of drug therapy produces elevated platelet count within 5 days.

INTERVENTION/EVALUATION

Monitor platelet count for evidence of thrombocytopenia. Assess Hgb, Hct, WBC; serum ALT, AST, bilirubin, BUN, creatinine; signs/symptoms of hepatic insufficiency during therapy.

PATIENT/FAMILY TEACHING

• It may take longer to stop bleeding during drug therapy. • Report any unusual bleeding. • Inform physicians, dentists if clopidogrel is being taken, esp. before surgery is scheduled or before taking any new drug.

clorazepate

klor-**az**-e-pate
(Apo-Clorazepate, Novo-Clopate, Tranxene T-Tab)
Do not confuse clorazepate with clofibrate or clonazepam.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Benzodiazepine **(Schedule IV). CLINICAL:** Antianxiety, anticonvulsant.

USES

Management of generalized anxiety disorders, short-term relief of anxiety symptoms, partial seizures, acute alcohol withdrawal symptoms.

PRECAUTIONS

Contraindications: Narrow-angle glaucoma. **Cautions:** Renal/hepatic impairment, depression, high risk of suicidal ideation, history of drug dependence, elderly, debilitated pts, pts with respiratory disease, sleep apnea.

ACTION

Depresses all levels of CNS, including limbic and reticular formation, by binding to benzodiazepine receptor sites on gamma-aminobutyric acid (GABA) receptor complex. Modulates GABA, a major inhibitory neurotransmitter in the brain. **Therapeutic Effect:** Produces anxiolytic effect, suppresses seizure activity.

PHARMACOKINETICS

Readily absorbed from GI tract. Metabolized in liver. (**Half-life:** 48–96 hrs) and oxazepam (**Half-life:** 6–8 hrs). Excreted primarily in urine.

C

clozapine

kloe-za-peen
(Apo-Clozapine, Clozaril, FazaClo, Versacloz)

■ **BLACK BOX ALERT** ■ Significant risk of life-threatening agranulocytosis, increased risk of potentially fatal cardiovascular events, particularly myocarditis, in elderly pts with dementia-related psychosis. May cause severe orthostatic hypotension, dose-dependent seizures.
Do not confuse clozapine with clonazepam, clonidine, or Klonopin, or Clozaril with Clinoril or Colazal.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Dibenzodiazepine derivative. **CLINICAL:** Antipsychotic.

USES

Management of severely ill schizophrenic pts who have failed to respond to other antipsychotic therapy. Treatment of recurrent suicidal behavior. **OFF-LABEL:** Schizoaffective disorder, bipolar disorder, childhood psychosis, obsessive-compulsive disorder, agitation related to Alzheimer's dementia.

PRECAUTIONS

Contraindications: History of clozapine-induced agranulocytosis or severe granulocytopenia. **Cautions:** History of seizures, cardiovascular disease, myocarditis, respiratory/hepatic/renal impairment, alcohol withdrawal, high risk of suicide, paralytic ileus, myasthenia gravis, pts at risk for aspiration pneumonia, urinary retention, narrow-angle glaucoma, prostatic hypertrophy, xerostomia, visual disturbances, constipation, history of bowel obstruction, diabetes mellitus. History of long QT prolongation/ventricular arrhythmias; concomitant use of medications that prolong QT interval; hypokalemia, hypomagnesemia. **Pregnancy Category B.**

ACTION

Interferes with binding of dopamine and serotonin receptor sites. **Therapeutic Effect:** Diminishes schizophrenic behavior.

PHARMACOKINETICS

Readily absorbed from GI tract. Protein binding: 97%. Metabolized in liver. Excreted in urine. **Half-life:** 12 hrs.

INTERACTIONS

DRUG: Antihypertensive medications may increase risk of hypotension. **Alcohol, other CNS depressants** may increase CNS depressant effects. **Bone marrow depressants** may increase myelosuppression. **Cimetidine, citalopram, ciprofloxacin, erythromycin** may increase concentration, risk of adverse effects. **SSRIs (e.g., paroxetine)** may increase concentration. **Lithium** may increase risk of confusion, dyskinesia, seizures. **Medications prolonging QT interval** may increase risk of QT prolongation. **CYP3A4 inducers (e.g., phenytoin, carbamazepine, rifampin)** may decrease concentration/effects. **HERBAL: St. John's wort** may decrease concentration/therapeutic effects. **Kava kava, gotu kola, valerian, St. John's wort** may increase risk of CNS depression. **FOOD:** None known. **LAB VALUES:** May increase serum glucose, cholesterol (rare), triglycerides (rare).

AVAILABILITY (Rx)

Suspension, Oral (Versacloz): 50 mg/ml (100 ml). **Tablets (Clozaril):** 25 mg, 50 mg, 100 mg, 200 mg. **Tablets (Orally Disintegrating [FazaClo]):** 12.5 mg, 25 mg, 100 mg, 150 mg, 200 mg.

ADMINISTRATION/HANDLING

PO

• Give without regard to food. • **Suspension:** Use oral syringes (provided). Shake well, administer dose immediately after preparing. Suspension stable for 100 days after initial bottle opening.

C

PATIENT/FAMILY TEACHING

• Do not abruptly discontinue long-term drug therapy. • Avoid tasks that require alertness, motor skills until response to drug is established. • Drowsiness generally subsides during continued therapy. • Avoid alcohol, caffeine. • Report fever, sore throat, flu-like symptoms.

cobicistat

koe-bi-**sye**-stat
(Tybost)

FIXED-COMBINATION(S)

Evotaz: cobicistat (antiretroviral booster)/atazanavir (antiretroviral): 150 mg/300 mg. **Prezcobix:** cobicistat (antiretrovial booster)/darunavir (antiretroviral): 150 mg/800 mg. **Stribild:** cobicistat (antiretroviral booster)/emtricitabine/elvitegravir/tenofovir (antiretroviral agents): 150 mg/200 mg/150 mg/300 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: CYP3A inhibitor. **CLINICAL:** Antiretroviral booster.

USES

Indicated to increase systemic exposure of atazanavir or darunavir (once daily dosing regimen), in combination with other antiretroviral agents for treatment of HIV-1 infection.

PRECAUTIONS

Contraindications: Concomitant use with alfuzosin, dihydroergotamine, dronedarone, ergotamine, indinavir, irinotecan, lovastatin, methylergonovine, midazolam (oral), nevirapine, rifampin, sildenafil (use in PAH), simvastatin, St. John's wort. **Cautions:** Hepatic/renal impairment, hypercholesterolemia. **Not recommended with:** darunavir 600 mg twice daily, fosamprenavir, saquinavir, or tipranavir; other protease inhibitors including tenofovir DF if creatinine clearance less than 70 ml/min; any treatment regimen requiring more than one antiretroviral agent requiring pharmacokinetic enhancement; darunavir, in combination with efavirenz, nevirapine, or etravirine; atazanavir, in combination with etravirine or efavirenz in treatment-experienced pts; cobicistat, in combination with Stribild. Co-administration of cobicistat and ritonavir. Cobicistat is not interchangeable with ritonavir.

ACTION

Inhibits cytochrome P450 3A (CYP3A). **Therapeutic Effect:** Boosts exposure of atazanavir or darunavir. Does not exhibit antiviral activity.

PHARMACOKINETICS

Readily absorbed after PO administration. Metabolized in liver. Protein binding: 97%–98%. Peak plasma concentration: 3.5 hrs. Eliminated in feces (86%), urine (8%). **Half-life:** 3–4 hrs.

HIV infection nor reduce risk of transmission. • As immune system strengthens, it may respond to dormant infections hidden within the body. Report body aches, chills, cough, fever, night sweats, shortness of breath. • Treatment may cause kidney failure if used with tenofovir regimen. Report abdominal pain, darkened urine, decreased urine output. • Clay-colored stools, significant weight loss, or yellowing of skin or eyes may indicate liver problem. • Do not take any new medications, including over-the-counter drugs or herbal products, unless approved by your doctor.

codeine

HIGH ALERT

koe-deen
(Codeine Contin)
Do not confuse codeine with Cardene or Lodine.

■ **BLACK BOX ALERT** ■ Respiratory depression, death have occurred in children following tonsillectomy and/or adenoidectomy.

FIXED-COMBINATION(S)

Capital with Codeine, Tylenol with Codeine: acetaminophen/codeine: 120 mg/12 mg per 5 ml. **Tylenol with Codeine:** acetaminophen/codeine: 300 mg/15 mg, 300 mg/30 mg, 300 mg/60 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Opioid agonist. **CLINICAL:** Analgesic: Single entity: **Schedule II:** Fixed-combination form: **Schedule III:** Less than 90 mg, fixed combinations.

USES

Relief of mild to moderate pain. **OFF-LABEL:** Short-term relief of cough.

PRECAUTIONS

Contraindications: Respiratory depression in absence of resuscitative equipment, acute or severe bronchial asthma or hypercarbia, paralytic ileus. Postoperative pain management in children following tonsillectomy/adenoidectomy. **Cautions:** Adrenal insufficiency, biliary tract impairment, CNS depression/coma, morbid obesity, prostatic hyperplasia, urinary stricture, thyroid dysfunction, severe renal/hepatic impairment, COPD, respiratory disease, cardiovascular disease, hypovolemia, GI obstruction, head injury, elevated intracranial pressure, history of drug abuse, patients with 2 or more copies of variant CYP2D6*2 allele (may have extensive conversion to morphine).

ACTION

Binds to opioid receptors in CNS. Inhibits ascending pain pathways. **Therapeutic Effect:** Alters perception, emotional response to pain; suppresses cough reflex.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	30–60 min	1–1.5 hrs	4–6 hrs
IM	10–30 min	0.5–1 hr	4–6 hrs

Well absorbed following PO administration. Protein binding: (7–25%.) Metabolized in liver. Excreted in urine. **Half-life:** 2.5–3.5 hrs.

Do not confuse colchicine with Cortrosyn.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Alkaloid.
CLINICAL: Antigout.

USES

Prevention, treatment of acute gouty arthritis. Used to reduce frequency of recurrence of familial Mediterranean fever (FMF). **OFF-LABEL:** Treatment of biliary cirrhosis, recurrent pericarditis.

PRECAUTIONS

Contraindications: Concomitant use of a P-glycoprotein (e.g., cyclosporine) or strong CYP3A4 inhibitor (e.g., clarithromycin) in presence of renal or hepatic impairment. **Cautions:** Hepatic impairment, elderly, debilitated, renal impairment. Concomitant use of cyclosporine, diltiazem, verapamil, fibrates, statins; may increase risk of myopathy.

ACTION

Decreases leukocyte motility, phagocytosis, lactic acid production. **Therapeutic Effect:** Decreases urate crystal deposits, reduces inflammatory process.

PHARMACOKINETICS

Rapidly absorbed from GI tract. Highest concentration is in liver, spleen, kidney. Protein binding: 30%–50%. Reenters intestinal tract by biliary secretion and is reabsorbed from intestines. Partially metabolized in liver. Eliminated primarily in feces. **Half-life:** 12–30 min.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Bile acid sequestrant. **CLINICAL:** Antihyperlipidemic agent, hypoglycemic agent.

USES

Adjunctive therapy to diet and exercise to reduce elevated LDL-C. Improves glycemic control in pts with type 2 diabetes mellitus when used with other antidiabetic agents. Used as monotherapy or in combination with other cholesterol-lowering drugs (statins). Indicated for children (10–17 yrs of age) with heterozygous familial hypercholesterolemia with LDL-C greater than 190 mg/dL or LDL-C greater than 160 mg/dL (after adequate trial of diet therapy) with positive family history of premature cardiovascular history, or two or more other cardiovascular risk factors.

PRECAUTIONS

Contraindications: Bowel obstruction, hypertriglyceridemia-induced pancreatitis, serum triglycerides greater than 500 mg/dL. **Cautions:** Chronic constipation, major GI surgery, gastroparesis, serum triglycerides 300–500 mg/dL, fat-soluble vitamin deficiency.

ACTION

Binds with bile acids in the intestine, preventing reabsorption. Increases clearance of low-density lipoprotein cholesterol (LDL-C). Glycemic control mechanism unknown. **Therapeutic Effect:** Decreases serum LDL-C levels, Hgb A1c levels.

PHARMACOKINETICS

Not absorbed after PO administration. Strictly limited to intestines. Primarily excreted in feces.

ACTION

Responsible for development and maintenance of female reproductive system and secondary sexual characteristics; modulates release of gonadotropin-releasing hormone, reduces follicle-stimulating hormone (FSH), luteinizing hormone (LH). **Therapeutic Effect:** Reduces elevated levels of gonadotropins, LH, and FSH.

PHARMACOKINETICS

Well absorbed from GI tract. Widely distributed. Protein binding: 50%–80%. Metabolized in liver. Primarily excreted in urine. **Half-life (total estrone):** 27 hrs.

psychosis, renal insufficiency, seizure disorders, GI disease, cardiovascular disease, peptic ulcer, myasthenia gravis, hepatic impairment, diabetes, cataracts, or glaucoma. Prolonged therapy should be discontinued slowly.

ACTION

Decreases inflammation by suppressing migration of polymorphonuclear leukocytes, suppressing increased capillary permeability. **Therapeutic Effect:** Prevents/suppresses cell-mediated immune reactions. Decreases/prevents tissue response to inflammatory process.

PHARMACOKINETICS

Slowly absorbed from GI tract. Widely distributed. Metabolized in liver. Excreted in urine/feces. **Half-life:** 0.5–2 hrs.

concentration has been drawn before start of test or 24-hr urine for 17-KS or 17-OHCS is initiated.

C

INTERVENTION/EVALUATION

Adhere to time frame for blood draws; monitor urine collection if indicated.

PATIENT/FAMILY TEACHING

- Explain procedure, purpose of test.

crizotinib

kriz-**o**-ti-nib
(Xalkori)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tyrosine kinase inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of locally advanced or metastatic non–small-cell lung cancer (NSCLC) that is anaplastic lymphoma kinase (ALK) positive.

PRECAUTIONS

Contraindications: None known. **Cautions:** Baseline hepatic impairment, congenital long QT interval syndrome. Pregnancy (avoid use). Concomitant use of CYP3A4 inducers/inhibitors, agents known to cause bradycardia.

ACTION

Inhibits receptor tyrosine kinases including anaplastic lymphoma kinase (ALK), hepatocyte growth factor receptors (HGFR, c-Met), receptor d'origine nantais (RON). **Therapeutic Effect:** Inhibits tumor cell proliferation and survival.

PHARMACOKINETICS

Well absorbed after PO administration. Peak plasma concentration: 4–6 hrs. Protein binding: 91%. Metabolized in liver. Excreted in feces (63%) and urine (22%). **Half-life:** 42 hrs.

floaters, photopsia may indicate retinal hole, retinal detachment.

C

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess vital signs, O_2 saturation. Obtain baseline CBC with differential, serum chemistries, LFT, PT/INR, EKG. Question possibility of pregnancy or plans for breastfeeding. Obtain full medication history including vitamins, minerals, herbal products. Detection of ALK-positive NSCLC test needed prior to treatment. Assess history of tuberculosis, HIV, HF, bradyarrhythmias, electrolyte imbalance, medications that prolong QT interval. Assess visual acuity, history of vitreous floaters.

INTERVENTION/EVALUATION

Assess vital signs, O_2 saturation routinely. Monitor CBC with differential monthly, LFT, monthly; increase testing for grades 2, 3, 4 adverse effects. Obtain EKG for bradycardia, electrolyte imbalance, chest pain, difficulty breathing. Monitor for bruising, hematuria, jaundice, right upper abdominal pain, weight loss, or acute infection (fever, diaphoresis, lethargy, oral mucosal changes, productive cough). Report decrease in RBC, Hgb, Hct, platelets, neutrophils, lymphocytes. Worsening cough, fever, or shortness of breath may indicate pneumonitis. Consider ophthalmological evaluation for vision changes. Reinforce birth control compliance.

PATIENT/FAMILY TEACHING

• Blood levels will be drawn routinely. • Report urine changes, bloody or clay-colored stools, upper abdominal pain, nausea, vomiting, bruising, fever, cough, difficulty breathing. • Report history of liver abnormalities or heart problems including long QT syndrome, syncope, palpitations, extremity swelling. • Immediately report any newly prescribed medications, suspected pregnancy, or vision changes including light flashes, blurred vision, photophobia, or new or increased floaters. • Contraception recommended during treatment and for at least 3 mos after treatment. • Avoid alcohol, grapefruit products.

cyanocobalamin (vitamin B_{12})

sye-an-oh-koe-**bal**-a-min
(Nascobal)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Coenzyme.
CLINICAL: Vitamin, antianemic.

USES

Treatment of pernicious anemia, vitamin B_{12} deficiency due to malabsorption diseases, increased B_{12} requirement due to pregnancy, thyrotoxicosis, hemorrhage, malignancy, hepatic/renal disease.

PRECAUTIONS

Contraindications: Hereditary optic nerve atrophy. **Cautions:** Folic acid deficiency, anemia, premature neonates.

ACTION

Coenzyme for metabolic functions (fat, carbohydrate metabolism, protein synthesis). **Therapeutic Effect:** Necessary for cell growth and replication, hematopoiesis, myelin synthesis.

PHARMACOKINETICS

In presence of calcium, absorbed systemically in lower half of ileum. Initially, bound to intrinsic factor; this complex passes down intestine, binding to receptor sites on ileal mucosa. Protein binding: High. Metabolized in liver. Primarily eliminated unchanged in urine. **Half-life:** 6 days.

Canadian trade name

C

cyclobenzaprine

sye-kloe-**ben**-za-preen
(Amrix, Apo-Cyclobenzaprine, Fexmid, Novo-Cycloprine)
Do not confuse cyclobenzaprine with cycloserine or cyproheptadine, or Flexeril with Floxin.

CLASSIFICATION

CLINICAL: Skeletal muscle relaxant.

USES

Treatment of muscle spasm associated with acute, painful musculoskeletal conditions. **OFF-LABEL:** Treatment of muscle spasms associated with temporomandibular joint pain (TMJ).

PRECAUTIONS

Contraindications: Acute recovery phase of MI, arrhythmias, HF, heart block, conduction disturbances, hyperthyroidism, use within 14 days of MAOIs. **Cautions:** Hepatic impairment, history of urinary hesitancy or retention, angle-closure glaucoma, increased intraocular pressure (IOP), elderly.

ACTION

Centrally acting skeletal muscle relaxant that reduces tonic somatic muscle activity at level of brainstem. **Therapeutic Effect:** Relieves local skeletal muscle spasm.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1 hr	3–4 hrs	12–24 hrs

Well but slowly absorbed from GI tract. Protein binding: 93%. Metabolized in GI tract and liver. Primarily excreted in urine. **Half-life:** 8–37 hrs.

Elderly: Age-related renal impairment may require dosage adjustment.

C

INTERACTIONS

DRUG: **CYP2D6 inducers (e.g., carbamazepine, phenobarbital)** may decrease concentration; **CYP2D6 inhibitors (e.g., paroxetine, amiodarone)** may increase concentration. **Anthracycline agents (e.g., doxorubicin, epirubicin)** may increase risk of cardiomyopathy. **CYP3A4 inhibitors (e.g., ketoconazole)** may increase concentration, risk of adverse effects. **Live virus vaccines** may potentiate virus replication, increase vaccine side effects, decrease pt's antibody response to vaccine. **HERBAL:** Pts with an estrogen-dependent tumor should avoid **black cohosh, dong quai.** **FOOD:** None known. **LAB VALUES:** May increase serum uric acid.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution: 500 mg, 1 g, 2 g.

C

*"Tall Man" lettering ✤ Canadian trade name

organ rejection, relieves symptoms of psoriasis, arthritis.

PHARMACOKINETICS

Variably absorbed from GI tract. Protein binding: 90%. Metabolized in liver. Eliminated primarily by biliary or fecal excretion. Not removed by hemodialysis. **Half-life:** Adults, 10–27 hrs; children, 7–19 hrs.

Encourage diligent oral hygiene (gingival hyperplasia). Monitor B/P for evidence of hypertension. **Note:** Reference ranges dependent on organ transplanted, organ function, cyclosporine toxicity. Trough levels should be obtained immediately prior to next dose. **Therapeutic serum level:** 50–400 ng/ml; **toxic serum level:** greater than 400 ng/ml.

PATIENT/FAMILY TEACHING

• Blood levels will be drawn routinely. • Report severe headache, persistent nausea/vomiting, unusual swelling of extremities, chest pain. • Avoid grapefruit products (increases concentration/effects), St. John's wort (decreases concentration).

cytarabine HIGH ALERT

sye-**tar**-a-bine
(Ara-C, Cytosar-U, Depo-Cyt)

■ **BLACK BOX ALERT** ■ Must be administered by personnel trained in administration/handling of chemotherapeutic agents. ***Conventional:*** Potent myelosuppressant. High risk of multiple toxicities (GI, CNS, pulmonary, cardiac). ***Liposomal:*** Chemical arachnoiditis, manifested by profound nausea, vomiting, fever, may be fatal if untreated.

Do not confuse cytarabine with Cytoxan or vidarabine, or Cytosar with Cytoxan or Neosar.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antimetabolite. **CLINICAL:** Antineoplastic.

USES

Ara-C: Remission induction in acute myeloid leukemia (AML), treatment of acute lymphocytic leukemia (ALL) and chronic myelocytic leukemia (CML), prophylaxis and treatment of meningeal leukemia. **Depo-Cyt:** Treatment of lymphomatous meningitis. **OFF-LABEL: Ara-C:** Carcinomatous meningitis, Hodgkin's and non-Hodgkin's lymphomas, myelodysplastic syndrome.

PRECAUTIONS

Contraindications: (Liposomal): Active meningeal infection. **Cautions:** Renal/hepatic impairment, prior drug-induced bone marrow suppression.

ACTION

Inhibits DNA polymerase. Cell cycle–specific for S phase of cell division. **Therapeutic Effect:** Appears to inhibit DNA synthesis. Potent immunosuppressive activity.

PHARMACOKINETICS

Widely distributed; moderate amount crosses blood-brain barrier. Protein binding: 15%. Primarily excreted in urine. **Half-life:** 1–3 hrs.

may occur. High-dose therapy may produce severe CNS, GI, pulmonary toxicity.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, renal function, LFT. Leukocyte count decreases within 24 hrs after initial dose, continues to decrease for 7–9 days followed by brief rise at 12 days, decreases again at 15–24 days, then rises rapidly for next 10 days. Platelet count decreases 5 days after drug initiation to its lowest count at 12–15 days, then rises rapidly for next 10 days.

INTERVENTION/EVALUATION

Monitor serum BUN, creatinine, uric acid, ALT, AST, bilirubin, alkaline phosphatase. Monitor CBC for evidence of myelosuppression. Monitor for blood dyscrasias (fever, sore throat, signs of local infection, unusual bruising/bleeding from any site), symptoms of anemia (excessive fatigue, weakness). Monitor for signs of neuropathy (gait disturbances, handwriting difficulties, paresthesia).

PATIENT/FAMILY TEACHING

• Increase fluid intake (may protect against hyperuricemia). • Do not have immunizations without physician's approval (drug lowers resistance). • Avoid contact with those who have recently received live virus vaccine. • Promptly report fever, sore throat, signs of local infection, unusual bruising/bleeding from any site.

Generic Drugs D

dabigatran
dabrafenib
dacarbazine
dalbavancin
dalfampridine
dalteparin
dantrolene
dapagliflozin
daptomycin
darbepoetin alfa
darifenacin
darunavir
dasatinib
DAUNOrubicin
decitabine
deferasirox
degarelix
denosumab
desipramine
desloratadine
desmopressin
desvenlafaxine
dexamethasone
dexlansoprazole
dexmedetomidine
dexmethylphenidate
dexrazoxane
dextroamphetamine and amphetamine
diazepam
diclofenac
dicyclomine
digoxin
dihydroergotamine
diltiazem
dimenhydrinate
dimethyl fumarate
dinoprostone
diphenhydrAMINE
diphenoxylate with atropine
dipyridamole
DOBUTamine
docetaxel
docusate
dofetilide
dolutegravir
donepezil
DOPamine
doripenem
doxazosin
doxepin
DOXOrubicin
doxycycline
dronabinol
dronedarone
droxidopa
dulaglutide
duloxetine
dutasteride

efficacy not established in those younger than 18 yrs. **Elderly:** Severe renal impairment may require dosage adjustment.

INTERACTIONS

DRUG: **Rifampin** may decrease concentration. **Antacids, proton pump inhibitors** may decrease level, effect. **Antiplatelet agents, NSAIDs, other anticoagulants, thrombolytics** may increase risk of bleeding. **HERBAL:** **Feverfew, ginkgo biloba, green tea, red clover** may increase risk of bleeding. **St. John's wort** may decrease concentration/effect. **FOOD:** **High-fat meal** delays absorption approximately 2 hrs. **LAB VALUES:** May increase aPTT, PT, INR.

AVAILABILITY (Rx)

SIDE EFFECTS

Frequent (less than 16%): Dyspepsia (heartburn, nausea, indigestion), diarrhea, upper abdominal pain.

D

ADVERSE EFFECTS/ TOXIC REACTIONS

Gastrointestinal bleeding occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess CBC, including platelet count. Check PT, PTT. Determine baseline B/P.

INTERVENTION/EVALUATION

Assess for any sign of bleeding (hematuria, melena, bleeding from gums, petechiae, bruising). Do not obtain B/P in lower extremities (possible deep vein thrombosis). Assess for decrease in B/P, increase in pulse rate, complaint of abdominal pain, diarrhea. Obtain aPTT, PT, platelet count. Question for increase in discharge during menses. Monitor for hematoma. Use care in removing any dressing, tape.

PATIENT/FAMILY TEACHING

• Do not chew, crush, open, or divide capsules. • Use electric razor, soft toothbrush to prevent bleeding. • Report any sign of red or dark urine, black or red stool, coffee-ground vomitus, red-speckled mucus from cough. • Keep in original container. • Once bottle is opened, must be used within 60 days. • Open blister pack at time of use.

dabrafenib

da-**braf**-e-nib
(Tafinlar)
Do not confuse dabrafenib with dasatinib.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Kinase inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of unresectable or metastatic melanoma with BRAF V600E mutation as detected by FDA-approved test.
◄ALERT► Not indicated for treatment of wild-type BRAF melanomas.

PRECAUTIONS

Contraindications: None known. **Cautions:** Diabetes mellitus, hepatic/renal impairment, dehydration, glucose-6-phosphate dehydrogenase (G6PD) deficiency, pts at increased risk for arrhythmias.

ACTION

Inhibits BRAF kinase gene mutation, a main cause of tumor cell growth, in the absence of growth factors that are normally required for proliferation. **Therapeutic Effect:** Inhibits tumor cell growth and metastasis.

PHARMACOKINETICS

Readily absorbed after PO administration. Protein binding: 99.7%. Peak plasma concentration: 2 hrs. Metabolized in liver. Excreted in feces (71%), urine (23%). **Half-life:** 8 hrs.

D

PATIENT/FAMILY TEACHING

• Treatment may cause hair loss. • Do not breastfeed. • Avoid pregnancy; nonhormonal contraception should be used during treatment and up to 4 wks after treatment. • Take capsule at least 1 hr before or at least 2 hrs after meal. Swallow whole; do not chew, crush, open, or divide. • Report any increased urination, thirst, confusion, vision changes, eye pain, fever, skin changes including moles or lesions. • Minimize exposure to sunlight. • Males may experience a decreased sperm count. • Report any newly prescribed medications.

dacarbazine

HIGH ALERT

da-**kar**-bah-zeen
(DTIC)

■ **BLACK BOX ALERT** ■ Myelosuppression is most common toxicity. May cause hepatic necrosis, hepatic vein thrombosis. May be carcinogenic or teratogenic. Administer only under supervision of an experienced cancer chemotherapy physician.

Do not confuse dacarbazine with Dicarbosil or procarbazine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Alkylating agent. **CLINICAL:** Antineoplastic.

USES

Treatment of metastatic malignant melanoma, second-line therapy of Hodgkin's disease. **OFF-LABEL:** Treatment of islet cell carcinoma, soft-tissue sarcoma, pheochromocytoma, medullary carcinoma of thyroid.

PRECAUTIONS

Contraindications: Hypersensitivity to dacarbazine. **Cautions:** Renal/hepatic impairment, bone marrow suppression.

ACTION

Forms methyldiazonium ions, which attack nucleophilic groups in DNA. Cross-links DNA strands. **Therapeutic Effect:** Inhibits DNA, RNA, protein synthesis.

PHARMACOKINETICS

Minimally crosses blood-brain barrier. Protein binding: 5%. Metabolized in liver. Excreted in urine. **Half-life:** 5 hrs (increased in renal impairment).

dalbavancin

dal-ba-**van**-sin
(Dalvance)
Do not confuse dalbavancin with oritavancin or telavancin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Glycopeptide. **CLINICAL:** Antibiotic.

USES

Treatment of adult pts with acute bacterial skin and skin structure infections (ABSSSI) caused by susceptible strains of gram-positive microorganisms including *Staphylococcus aureus* (methicillin-susceptible and methicillin-resistant strains), *Streptococcus pyogenes*, *Streptococcus agalactiae,* and *Streptococcus anginosus* group (including *S. anginosus*, *S. intermedius*, *S. constellatus*).

PRECAUTIONS

Contraindications: Known hypersensitivity reaction to dalbavancin. **Cautions:** Hepatic/renal impairment, chronic hepatitis, hx alcohol abuse, hx hypersensitivity reaction to glycopeptides (e.g., vancomycin), recent *Clostridium difficile* infection or antibiotic-associated colitis.

ACTION

Inhibits cell wall synthesis by binding to bacterial cell membrane. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Widely distributed. Metabolism not defined. Protein binding: 93%. Primarily eliminated in urine. **Half-life:** 14.4 days.

USES

Indicated to improve ambulation in pts with MS, as demonstrated by increase in walking speed.

D

PRECAUTIONS

Contraindications: History of seizures, moderate to severe renal impairment (creatinine clearance [CrCl] equal to or less than 50 ml/min). **Cautions:** Mild renal impairment (CrCl equal to 51–80 ml/min).

ACTION

Increases conduction of action potentials in demyelinated axons, inhibiting potassium channels. **Therapeutic Effect:** Improves ambulation in those with multiple sclerosis (MS).

PHARMACOKINETICS

Rapidly absorbed from GI tract. Minimally metabolized in liver. Primarily excreted in urine. **Half-life:** 5.2–6.5 hrs.

D

ADMINISTRATION/HANDLING

Subcutaneous

• Store at room temperature. • Inject in U-shaped area around the navel, upper outer side of thigh, upper outer quadrangle of buttock. • Use fine needle (25–26 gauge) to minimize tissue trauma. • Introduce entire length of needle (½ inch) into skin fold held between thumb and forefinger, holding needle during injection at 45- to 90-degree angle. • Do not rub injection site after administration (prevents bruising). • Alternate administration site with each injection. • New injections should be administered at least 1 inch from the old site. Never inject into an area where skin is tender, bruised, red, or hard.

INDICATIONS/ROUTES/DOSAGE

Abdominal Surgery, Low to Moderate DVT Risk

Subcutaneous: ADULTS, ELDERLY: 2,500 international units 1–2 hrs before surgery, then daily for 5–10 days.

Abdominal Surgery, High DVT Risk

Subcutaneous: ADULTS, ELDERLY: 5,000 international units 1–2 hrs before surgery, then daily for 5–10 days.

Total Hip Surgery

Subcutaneous: ADULTS, ELDERLY: 2,500 international units 1–2 hrs before surgery, then 2,500 units 4–8 hrs after surgery, then 5,000 units/day (starting at least 6 hrs after postsurgical dose) for 7–10 days.

Unstable Angina, Non–Q-Wave MI

Subcutaneous: ADULTS, ELDERLY: 120 international units/kg q12h (**maximum:** 10,000 international units/dose) given with aspirin until clinically stable.

Venous Thromboembolism (Cancer Pts)

Subcutaneous: ADULTS, ELDERLY: Initially (1 mo), 200 international units/kg (**maximum:** 18,000 international units) daily for 30 days. **Maintenance (2–6 mos):** 150 international units/kg once daily (**maximum:** 18,000 international units). If platelet count 50,000–100,000/mm^3, reduce dose by 2,500 units until platelet count recovers to 100,000/mm^3 or more. If platelet count less than 50,000/mm^3, discontinue until platelet count recovers to more than 50,000/mm^3.

Prevention of DVT, Acutely Ill Pt, Immobile Pt

Subcutaneous: ADULTS, ELDERLY: 5,000 international units once a day.

Dosage in Renal Impairment

For creatinine clearance less than 30 ml/min, monitor anti-Xa levels to determine appropriate dose.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (7%–3%): Hematoma at injection site. **Rare (less than 1%):** Hypersensitivity reaction (chills, fever, pruritus, urticaria, asthma, rhinitis, lacrimation, headache); mild, local skin irritation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may lead to bleeding complications ranging from local ecchymoses to major hemorrhage. Thrombocytopenia occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline coagulation studies, CBC, esp. platelet count. Determine baseline B/P.

INTERVENTION/EVALUATION

Periodically monitor CBC, platelet count, stool for occult blood (no need for daily monitoring in pts with normal presurgical coagulation parameters). Assess for any sign of bleeding (bleeding at surgical

(**not** Bacteriostatic Water for Injection). ***(Ryanodex):*** 250 mg vial with 5 ml Sterile Water for Injection.

Rate of Administration • For therapeutic or emergency dose, give IV over 2–3 min. • For IV infusion, administer over 1 hr. • Diligently monitor for extravasation (high pH of IV preparation). May produce severe complications. ***(Ryanodex):*** Do not dilute; infuse into IV catheter or indwelling catheter.

Storage • Store at room temperature. • Use within 6 hrs after reconstitution. • Solution is clear, colorless. Discard if cloudy, precipitate forms.

PO

• Give without regard to food.

IV INCOMPATIBILITIES

D_5W, 0.9% NaCl.

INDICATIONS/ROUTES/DOSAGE

Spasticity

PO: ADULTS, ELDERLY: Initially, 25 mg once daily for 7 days; then 25 mg 3 times/day for 7 days; then 50 mg 3 times/day for 7 days; then 100 mg 3 times/day. **Maximum:** 400 mg/day. **CHILDREN:** Initially, 0.5 mg/kg/dose once daily for 7 days; then 0.5 mg/kg/dose 3 times/day for 7 days; then 1 mg/kg/dose 3 times/day for 7 days; then 2 mg/kg/dose 3 times/day. **Maximum:** 400 mg/day.

Perioperative Prophylaxis for Malignant Hyperthermic Crisis

PO: ADULTS, ELDERLY, CHILDREN: 4–8 mg/kg/day in 3–4 divided doses beginning 1–2 days before surgery; give last dose 3–4 hrs before surgery.

IV: ADULTS, ELDERLY, CHILDREN: 2.5 mg/kg about 1.25 hrs before surgery with additional doses as needed.

Management of Malignant Hyperthermic Crisis

IV: ADULTS, ELDERLY, CHILDREN: Initially, a minimum of 2.5 mg/kg rapid IV; may repeat up to total cumulative dose of 10 mg/kg. May follow with 4–8 mg/kg/day PO in 4 divided doses up to 3 days after crisis. ***(Ryanodex):*** Minimum dose of 1 mg/kg. **Maximum:** 10 mg/kg (cumulative).

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Drowsiness, dizziness, weakness, general malaise, diarrhea (mild). **Occasional:** Confusion, diarrhea (severe), headache, insomnia, constipation, urinary frequency. **Rare:** Paradoxical CNS excitement or restlessness, paresthesia, tinnitus, slurred speech, tremor, blurred vision, dry mouth, nocturia, impotence, rash, pruritus.

ADVERSE EFFECTS/ TOXIC REACTIONS

Risk of hepatotoxicity, most notably in females, pts 35 yrs and older, pts taking other hepatotoxic medications concurrently. Overt hepatitis noted most frequently between 3rd and 12th mo of therapy. Overdose results in vomiting, muscular hypotonia, muscle twitching, respiratory depression, seizures.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline LFT (ALT, AST, alkaline phosphatase, total bilirubin). Record onset, type, location, duration of muscular spasm. Check for immobility, stiffness, swelling.

INTERVENTION/EVALUATION

Assist with ambulation. For pts on long-term therapy, hepatic/renal function tests, CBC should be performed periodically. Assess for therapeutic response: relief of pain, stiffness, spasm.

PATIENT/FAMILY TEACHING

• Drowsiness usually diminishes with continued therapy. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid

Dosage in Hepatic Impairment

No dose adjustment.

Concomitant Use of Insulin or Insulin Secretagogue

Consider lowering dose of insulin or insulin secretagogue to reduce risk of hypoglycemia.

SIDE EFFECTS

Occasional (6%–3%): Nasopharyngitis, back pain, increased urination, nausea. **Rare (2%):** Constipation, extremity pain, discomfort with urination.

ADVERSE REACTIONS/TOXIC EFFECTS

Orthostatic hypotension, postural dizziness, symptomatic hypotension, syncope, volume depletion may occur; pts who are elderly, use loop diuretics, or have baseline renal impairment have increased risk. Genital mycotic (yeast) infections occurred in 6% of pts; most reported cases were vulvovaginal infections in women and balanitis in men. Hypoglycemic events reported in 1.5% of pts (5% in elderly). Hypersensitivity reactions including anaphylaxis, angioedema (tongue/lip swelling), erythema, rash, pruritus, urticaria have occurred. Newly diagnosed bladder cancer occur rarely. Genitourinary infections including cystitis, kidney infection, prostatitis, pyelonephritis, trigonitis, urethritis, UTI occurred in 5.7% of pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain capillary blood glucose, Hgb A1c, LDL-C, renal function test, urinalysis. Assess hydration status. Correct volume depletion prior to initiating treatment. Assess pt's understanding of diabetes management, routine home glucose monitoring. Receive full medication history including herbal products. Question history of co-morbidities, esp. hypersensitivity reaction, renal impairment, type 1 diabetes. Assess breastfeeding status.

INTERVENTION/EVALUATION

Monitor capillary blood glucose, Hgb A1c, renal function tests. Assess for hypoglycemia, hyperglycemia, mycotic infections. Screen for glucose-altering conditions: fever, increased activity or stress, trauma, surgery. Obtain dietary consult for nutritional education. Encourage PO intake. Monitor for hypotension. Monitor for hypersensitivity reaction such as dyspnea, urticaria, angioedema, dizziness.

PATIENT/FAMILY TEACHING

• Diabetes mellitus requires lifelong control. Diet and exercise are principal parts of treatment; do not skip or delay meals. • Test blood sugar regularly. • When taking combination drug therapy or when glucose demands are altered (fever, infection, trauma, stress), have low blood sugar treatment available (glucagon, oral dextrose). • Monitor daily calorie intake. • Report suspected pregnancy. Do not breastfeed. • Genital itching or discharge may indicate yeast infection. • Therapy may increase risk for dehydration/low blood pressure, esp. in pts who are elderly, on low-salt diet, have low blood pressure, or take water pills (diuretics). Drink plenty of fluids. • Report any decrease in urine output, dark-colored urine, painful urination, or flank pain. • Therapy may increase risk of bladder cancer; report any blood in urine or painful urination. • May rarely cause allergic reaction; report itching, hives, difficulty breathing, wheezing.

daptomycin

dap-toe-mye-sin
(Cubicin)
Do not confuse Cubicin with Cleocin, or daptomycin with dactinomycin.

Dosage in Renal Impairment

Creatinine clearance less than 30 ml/min, (HD) hemodialysis, (PD) peritoneal dialysis: Dosage is 4 mg/kg q48h for skin and soft tissue infections; 6 mg/kg q48h for staphylococcal bacteremia. **(HD) hemodialysis:** Give dose after dialysis. **(CRRT) continuous renal replacement therapy (CVVHD):** 8 mg/kg q48h, **(CVVH or CVVHDF):** 8 mg/kg q48h or 4–6 mg/kg q24h.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (6%–5%): Constipation, nausea, peripheral injection site reactions, headache, diarrhea. **Occasional (4%–3%):** Insomnia, rash, vomiting. **Rare (less than 3%):** Pruritus, dizziness, hypotension.

ADVERSE EFFECTS/ TOXIC REACTIONS

Skeletal muscle myopathy (muscle pain/weakness, particularly of distal extremities) occurs rarely. Antibiotic-associated colitis, other superinfections (abdominal cramps, severe diarrhea, fever) may result from altered bacterial balance in GI tract.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CPK, blood cultures before first dose (therapy may begin before results are known).

INTERVENTION/EVALUATION

Assess oral cavity for white patches on mucous membranes, tongue (thrush). Monitor for myopathy (muscle pain, weakness), CPK levels, renal function tests. Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable, but increasing severity may indicate onset of antibiotic-associated colitis. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema). Monitor for dizziness, institute appropriate measures.

PATIENT/FAMILY TEACHING

- Report rash, headache, nausea, dizziness, constipation, diarrhea, muscle pain, or any other new symptom.

darbepoetin alfa

TOP 100

dar-be-poe-**e**-tin **al**-fa (Aranesp)

■ **BLACK BOX ALERT** ■ Increased risk of serious cardiovascular events, thromboembolic events, mortality, time-to-tumor progression when administered to a target hemoglobin greater than 11 g/dL. Shortened overall survival and/or increased risk of tumor progression has been reported with breast, cervical, head/neck, NSCL cancers. **Do not confuse Aranesp with Aricept, or darbepoetin with dalteparin or epoetin.**

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Glycoprotein. **CLINICAL:** Hematopoietic agent.

USES

Treatment of anemia associated with chronic renal failure (including pts on dialysis and pts not on dialysis), treatment of anemia caused by concurrent myelosuppressive chemotherapy in pts planned to receive chemotherapy for minimum of 2 additional months. **OFF-LABEL:** Treatment of symptomatic anemia in myelodysplastic syndrome (MDS).

PRECAUTIONS

Contraindications: Pure red cell aplasia, uncontrolled hypertension. **Cautions:** History of seizures, hypertension. Not recommended in pts with mild to moderate anemia and HF or CAD.

Decrease dose: Decrease dose by 40% if Hgb increases greater than 1 g/dL in any 2-wk period or Hgb reaches level that will avoid red blood cell transfusions. **Note:** Withhold dose when Hgb exceeds a level needed to avoid RBC transfusions, resume at dose 40% lower when Hgb approaches a level where transfusions may be required.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent: Myalgia, hypertension/hypotension, headache, diarrhea. **Occasional:** Fatigue, edema, vomiting, reaction at injection site, asthenia, dizziness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Vascular access thrombosis, HF, sepsis, arrhythmias, anaphylactic reaction occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess B/P before drug administration. B/P often rises during early therapy in pts with history of hypertension. Assess serum iron (transferrin saturation should be greater than 20%), serum ferritin (greater than 100 ng/ml) before and during therapy. Consider supplemental iron therapy. Establish baseline CBC (esp. note Hgb, Hct).

INTERVENTION/EVALUATION

Monitor serum ferritin, CBC, serum creatinine, BUN, potassium, phosphorus, reticulocyte count. Monitor B/P aggressively for increase (25% of pts taking medication require antihypertension therapy, dietary restrictions).

PATIENT/FAMILY TEACHING

• Frequent blood tests needed to determine correct dose. • Report swollen extremities, breathing difficulty, extreme fatigue, or severe headache. • Avoid tasks requiring alertness, motor skills until response to drug is established.

darifenacin

dare-i-**fen**-a-sin
(Enablex)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Muscarinic receptor antagonist. **CLINICAL:** Urinary antispasmodic.

USES

Management of symptoms of bladder overactivity (urge incontinence, urinary urgency/frequency).

PRECAUTIONS

Contraindications: Uncontrolled narrow-angle glaucoma, paralytic ileus, GI/GU obstruction, urine retention. **Cautions:** Bladder outflow obstruction, hepatic impairment, nonobstructive prostatic hyperplasia, decreased GI motility, constipation, hiatal hernia, reflux esophagitis, ulcerative colitis, controlled narrow-angle glaucoma, myasthenia gravis, concurrent use of CYP3A4 inhibitors.

ACTION

Acts as a direct antagonist at muscarinic receptor sites in cholinergically innervated organs; limits bladder contractions. **Therapeutic Effect:** Reduces symptoms of bladder irritability/overactivity (urge incontinence, urinary urgency/frequency), improves bladder capacity.

PHARMACOKINETICS

Well absorbed following PO administration. Protein binding: 98%. Metabolized in liver. Excreted in urine (60%), feces (40%). **Half-life:** 13–19 hrs.

PRECAUTIONS

Contraindications: Concurrent therapy with alfuzosin, dihydroergotamine, ergonovine, ergotamine, lovastatin, methylergonovine, oral midazolam, pimozide, rifampin, sildenafil (for treatment of PAH), simvastatin, St. John's wort, triazolam. **Cautions:** Diabetes mellitus, hemophilia, known sulfonamide allergy, hepatic impairment.

ACTION

Binds to site of HIV-I protease activity, inhibiting cleavage of viral precursors into functional proteins required for infectious HIV. **Therapeutic Effect:** Prevents formation of mature viral cells.

PHARMACOKINETICS

Readily absorbed following PO administration. Protein binding: 95%. Metabolized in liver. Eliminated in feces (79.5%), urine (13.9%). Not significantly removed by hemodialysis. **Half-life:** 15 hrs.

(particularly thrombocytopenia), pts prone to fluid retention, those with prolonged QT interval, cardiovascular/pulmonary disease. Concomitant use of anticoagulants, CYP3A4 inducers/inhibitors may increase risk of pulmonary arterial hypertension.

ACTION

Reduces activity of proteins responsible for uncontrolled growth of leukemia cells by binding to most imatinib-resistant BCR-ABL mutations of pts with chronic myelogenous leukemia (CML) or acute lymphoblastic leukemia (ALL). **Therapeutic Effect:** Inhibits proliferation, tumor growth of CML and ALL cancer cell lines.

PHARMACOKINETICS

Extensively distributed in extravascular space. Protein binding: 96%. Metabolized in liver. Eliminated primarily in feces. **Half-life:** 3–5 hrs.

SIDE EFFECTS

Frequent (50%–32%): Fluid retention, diarrhea, headache, fatigue, musculoskeletal pain, fever, rash, nausea, dyspnea. **Occasional (28%–12%):** Cough, abdominal pain, vomiting, anorexia, asthenia, arthralgia, stomatitis, dizziness, constipation, peripheral neuropathy, myalgia. **Rare (less than 12%):** Abdominal distention, chills, weight increase, pruritus.

ADVERSE EFFECTS/ TOXIC REACTIONS

Pleural effusion occurs in 8% of pts, febrile neutropenia in 7%, GI bleeding, pneumonia in 6%, thrombocytopenia in 5%, dyspnea in 4%; anemia, cardiac failure in 3%.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC weekly for first mo, biweekly for second mo, and periodically thereafter. Monitor LFT before treatment begins and monthly thereafter.

INTERVENTION/EVALUATION

Assess lower extremities for pedal edema, early evidence of fluid retention. Weigh daily, monitor for unexpected rapid weight gain. Offer antiemetics to control nausea, vomiting. Monitor daily pattern of bowel activity, stool consistency. Assess oral mucous membranes for evidence of stomatitis. Monitor CBC for neutropenia, thrombocytopenia; monitor hepatic function tests for hepatotoxicity.

PATIENT/FAMILY TEACHING

• Avoid crowds, those with known infection. • Avoid contact with anyone who recently received live virus vaccine; do not receive vaccinations. • Antacids may be taken up to 2 hrs before or 2 hrs after taking dasatinib. • Avoid grapefruit products. Do not chew, crush, dissolve, or divide tablets.

*DAUNOrubicin

HIGH ALERT

daw-noe-**roo**-bi-sin
(Cerubidine, DaunoXome)

■ **BLACK BOX ALERT** ■ Irreversible cardiotoxicity may occur. Myelosuppresant. Lipid component may cause infusion-related effects (back pain, flushing, chest tightness) within first 5 min of infusion. Must be administered by personnel trained in administration/handling of chemotherapeutic agents. Caution in renal impairment or hepatic dysfunction. Potent vesicant.

Do not confuse daunorubicin with dactinomycin, doxorubicin, epirubicin, idarubicin, or valrubicin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Anthracycline antibiotic. **CLINICAL:** Antineoplastic.

USES

Cerubidine: Treatment of leukemias (acute lymphocytic [ALL], acute myeloid [AML]) in combination with other agents. **DaunoXome:** Advanced HIV-related Kaposi's sarcoma.

PRECAUTIONS

Contraindications: None known. **Cautions:** Preexisting heart disease, hypertension, concurrent chemotherapeutic agents, elderly, infants, radiation therapy.

ACTION

Inhibits DNA, DNA-dependent RNA synthesis by binding with DNA strands. Cell cycle–phase nonspecific. **Therapeutic Effect:** Prevents cell division.

PHARMACOKINETICS

Widely distributed. Protein binding: High. Does not cross blood-brain barrier. Metabolized in liver to active metabolite. Excreted in urine (40%); biliary

excretion (40%). **Half-life:** 18.5 hrs; metabolite: 26.7 hrs.

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Refer to individual protocols. **Cerubidine:** Cumulative dose should not exceed 550 mg/m² in adults (increased risk of cardiotoxicity) or 400 mg/m² in those receiving chest irradiation.

Acute Lymphoblastic Leukemia

IV *(Cerubidine)*: ADULTS, ELDERLY: 45 mg/m² on days 1, 2, and 3 of induction course. **CHILDREN 2 YRS AND OLDER, BODY SURFACE AREA 0.5 m² OR GREATER:** 25 mg/m² on day 1 of every wk for up to 4–6 cycles. Cumulative dose not to exceed 300 mg/m². **CHILDREN YOUNGER THAN 2 YRS, BODY SURFACE AREA LESS THAN 0.5 m²:** 1 mg/kg/dose per protocol. Cumulative dose not to exceed 10 mg/kg.

Acute Myeloid Leukemia

IV *(Cerubidine)*: ADULTS YOUNGER THAN 60 YRS: 45 mg/m² on days 1, 2, and 3 of induction course, then on days 1 and 2 of subsequent courses. **ADULTS 60 YRS AND OLDER:** 30 mg/m² on days 1, 2, and 3 of induction course, then on days 1 and 2 of subsequent courses. **CHILDREN 2 YRS AND OLDER, BSA 0.5 m² OR GREATER:** 30–60 mg/m²/day on days 1–3 of cycle.

Kaposi's Sarcoma

IV *(Daunoxome)*: ADULTS: 40 mg/m² over 1 hr repeated q2wks.

Dosage in Renal Impairment

Cerubidine: Serum creatinine greater than 3 mg/dL: 50% of normal dose.

Daunoxome: Serum creatinine greater than 3 mg/dL: 50% of normal dose.

Dosage in Hepatic Impairment

Cerubidine: Bilirubin 1.2–3 mg/dL: 75% of normal dose. **Bilirubin 3.1–5 mg/dL:** 50% of normal dose. **Bilirubin Greater than 5 mg/dL:** Daunorubicin is not recommended for use in this pt population.

Daunoxome: Bilirubin 1.2–3 mg/dL: 75% of normal dose. **Bilirubin greater than 3 mg/dL:** 50% of normal dose.

SIDE EFFECTS

Frequent: Complete alopecia (scalp, axillary, pubic), nausea, vomiting (beginning a few hrs after administration and lasting 24–48 hrs). **DaunoXome:** Mild to moderate nausea, fatigue, fever. **Occasional:** Diarrhea, abdominal pain, esophagitis, stomatitis, transverse pigmentation of fingernails, toenails. **Rare:** Transient fever, chills.

ADVERSE EFFECTS/ TOXIC REACTIONS

Myelosuppression manifested as hematologic toxicity (severe leukopenia, anemia, thrombocytopenia). Decrease in platelet count, WBC count occurs in 10–14 days, returns to normal level by third week. Cardiotoxicity noted as either acute, transient, abnormal. EKG findings and/or cardiomyopathy manifested as HF (risk increases when cumulative dose exceeds 550 mg/m² in adults, 300 mg/m² in children 2 yrs and older, or total dosage greater than 10 mg/kg in children younger than 2 yrs).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain WBC, platelet, erythrocyte counts before and at frequent intervals during therapy. EKG should be obtained before therapy. Antiemetics may be effective in preventing, treating nausea.

INTERVENTION/EVALUATION

Monitor for stomatitis. May lead to ulceration within 2–3 days. Assess skin, nailbeds for hyperpigmentation. Monitor hematologic status, renal/hepatic function, serum uric acid. Monitor daily pattern of bowel activity, stool consistency. Monitor for hematologic toxicity (fever, sore throat, signs of local infection, unusual bruising/bleeding from any site),

symptoms of anemia (excessive fatigue, weakness).

PATIENT/FAMILY TEACHING

• Urine may turn reddish color for 1–2 days after beginning therapy. • Hair loss is reversible, but new hair growth may have different color, texture. • New hair growth resumes about 5 wks after last therapy dose. • Maintain strict oral hygiene. • Do not have immunizations without physician's approval (drug lowers resistance). • Avoid contact with those who have recently received live virus vaccine. • Promptly report fever, sore throat, signs of local infection, unusual bruising/bleeding from any site, yellowing of whites of eyes/skin, difficulty breathing. • Increase fluid intake (may protect against hyperuricemia). • Report for persistent nausea, vomiting.

decitabine

HIGH ALERT

de-**sye**-ta-bine
(Dacogen)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: DNA demethylation agent. **CLINICAL:** Antineoplastic.

USES

Treatment of myelodysplastic syndromes. **OFF-LABEL:** Treatment of acute myelogenous leukemia, sickle cell anemia.

PRECAUTIONS

Contraindications: None known. **Cautions:** Baseline thrombocytopenia, anemia, neutropenia; diabetes mellitus, fluid retention, hepatic/renal impairment.

ACTION

Incorporated into DNA, causing hypomethylation.
Therapeutic Effect: Causes cell death (S-phase of cell cycle).

PHARMACOKINETICS

Protein binding: less than 1%. Elimination appears to occur by removal of an amino group from the enzyme cytidine deaminase, found principally in liver, but also in granulocytes, intestinal epithelium, whole blood. **Half-life:** 30 min.

USES

Treatment of chronic iron overload due to blood transfusions (transfusional hemosiderosis) or due to non–transfusion-dependent thalassemia syndrome.

PRECAUTIONS

Contraindications: Platelet counts less than 50,000/mm^3; poor performance status and high-risk myelodysplastic syndromes or advanced malignancies; creatinine clearance less than 40 ml/min or serum creatinine greater than 2 times the upper limit of normal. **Cautions:** Renal/hepatic impairment, elderly, concurrent medications that may increase GI effects (e.g., NSAIDs).

ACTION

Selective for iron. Binds iron with high affinity in a 2:1 ratio. **Therapeutic Effect:** Induces iron excretion.

PHARMACOKINETICS

Well absorbed following PO administration. Protein binding: 99%. Metabolized in liver. Excreted in feces (84%), urine (8%). **Half-life:** 8–16 hrs.

for use in this pt population. **Elderly:** No age-related precautions noted.

INTERACTIONS

DRUG: Dronedarone, amiodarone, macrolide antibiotics other QT prolonging medications increase risk of QT prolongation. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** Expected to decrease serum testosterone levels. May increase serum ALT, AST levels.

AVAILABILITY (Rx)

Injection, Powder for Solution: 80 mg, 120 mg.

ADMINISTRATION/HANDLING

Subcutaneous

• Reconstitute 80-mg vial with 4.2 ml Sterile Water for Injection to provide 20 mg/ml concentration (120 mg with 3 ml SWI to provide 40 mg/ml concentration). • Administer within 1 hr following reconstitution. • Wear gloves during preparation and administration. • Vial must be kept vertical at all times; do not shake. • Administer in abdominal region in areas that will not be exposed to pressure (on or close to waistband area).

INDICATIONS/ROUTES/DOSAGE

Prostate Cancer

Subcutaneous: ADULTS, ELDERLY: Loading dose: 240 mg given as 2 injections of 120 mg (40 mg/ml). **Maintenance:** 80 mg q28days beginning 28 days after loading dose.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: (27%–11%): Hot flashes, injection site pain, erythema, increased weight. **Occasional (7%–5%):** Hypertension, local edema, fatigue, back pain, constipation, urinary tract infection, asthenia, arthralgia, chills. **Rare: (1%):** Insomnia, headache, nausea, dizziness, erectile dysfunction, gynecomastia, testicular atrophy, night sweats.

ADVERSE EFFECTS/ TOXIC REACTIONS

Long-term androgen deprivation therapy may prolong QT interval. Loss of bone density may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline EKG, electrolyte parameters, LFT, prostate-specific antigen (PSA), testosterone levels prior to initiation of therapy.

INTERVENTION/EVALUATION

Monitor serum electrolytes, PSA periodically. If PSA increases, measure testosterone serum concentrations. Monitor routine EKG for QT prolongation. Assess for decrease in testosterone levels throughout therapy. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

• Advise pt that swelling, itching, redness may occur at injection site. • Avoid tasks that require alertness, motor skills until response to drug is established.

denosumab

TOP 100

den-**oh**-sue-mab
(Prolia, Xgeva)
Do not confuse denosumab with daclizumab, or Prolia with Avandia or Zebeta.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Monoclonal antibody. **CLINICAL:** Bone resorption inhibitor.

USES

Prolia: Treatment of postmenopausal women with osteoporosis at high risk for fracture. Treatment to increase bone

SIDE EFFECTS

Frequent (35%–12%): Back pain, extremity pain. **Occasional (8%–5%):** Musculoskeletal pain, vertigo, peripheral edema, sciatica. **Rare (4%–2%):** Bone pain, upper abdominal pain, rash, insomnia, flatulence, pruritus, myalgia, asthenia, GI reflux.

ADVERSE EFFECTS/ TOXIC REACTIONS

Increases risk of infection, specifically cystitis, upper respiratory tract infection, pneumonia, pharyngitis, herpes zoster (shingles) occur in 2%–6% of pts. Osteonecrosis of the jaw (OJN) was reported. Suppression of bone turnover, pancreatitis have been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Hypocalcemia must be corrected prior to treatment. Calcium 1,000 mg/day and vitamin D at least 400 international units/day should be given. Dental exam should be provided prior to treatment.

INTERVENTION/EVALUATION

Monitor serum magnesium, calcium, ionized calcium, phosphate. In pts predisposed with hypocalcemia and disturbances of mineral metabolism, clinical monitoring of calcium, mineral levels is highly recommended. Adequately supplement all pts with calcium and vitamin D. Monitor for delayed fracture healing.

PATIENT/FAMILY TEACHING

• Report rash, new-onset eczema. • Seek prompt medical attention if signs, symptoms of severe infection (rash, itching, reddened skin, cellulitis) occur. • Report muscle stiffness, numbness, cramps, spasms (signs of hypocalcemia); swelling or drainage from jaw, mouth, or teeth.

desipramine

de-**sip**-ra-meen
(Novo-Desipramine, Norpramin)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal ideation and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse desipramine with clomipramine, dalfampridine, diphenhydramine, disopyramide, or imipramine, or Norpramin with nortriptyline.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tricyclic.
CLINICAL: Antidepressant.

USES

Treatment of depression, often in conjunction with psychotherapy. **OFF-LABEL:** Treatment of ADHD, adjunct in chronic pain treatment, neurogenic pain, depression in children 6–12 yrs.

PRECAUTIONS

Contraindications: Use within 14 days of MAOIs, acute recovery phase of MI. Initiation in pts receiving linezolid. **Cautions:** Cardiovascular disease, cardiac conduction disturbances, urinary retention, diabetes, BPH, glaucoma, narrow-angle glaucoma, xerostomia, visual problems, constipation, history of bowel obstruction, seizure disorders, hyperthyroidism, pts taking thyroid replacement therapy, high risk of suicide, renal/hepatic impairment, elderly.

ACTION

Blocks reuptake of neurotransmitters, (norepinephrine, serotonin) at presynaptic membranes, increasing their availability at postsynaptic receptor sites. Strong anticholinergic activity. **Therapeutic Effect:** Relieves depression.

mood. **Therapeutic serum level:** 115–300 ng/ml; **toxic serum level:** greater than 400 ng/ml. Monitor EKG if pt has history of arrhythmias.

PATIENT/FAMILY TEACHING

• Go from lying to standing slowly. • Tolerance to postural hypotension, sedative, anticholinergic effects usually develops during early therapy. • Maximum therapeutic effect may be noted in 2–4 wks. • Do not abruptly discontinue medication. • Avoid alcohol, grapefruit products. • Report worsening depression, suicidal ideation, unusual changes in behavior (esp. at initiation of therapy or with changes in dosage).

desloratadine

des-lor-**a**-ta-deen
(Aerius, Clarinex, Clarinex ReditTabs)
Do not confuse Clarinex with Celebrex or Claritin.

FIXED-COMBINATION(S)

Clarinex-D 24 Hour: desloratadine/pseudoephedrine (a sympathomimetic): 5 mg/240 mg. **Clarinex-D 12 Hour:** desloratadine/pseudoephedrine: 2.5 mg/120 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: H_1 antagonist. **CLINICAL:** Nonsedating antihistamine.

USES

Relief of nasal/non-nasal symptoms of seasonal and perennial rhinitis (sneezing, rhinorrhea, itching/tearing of eyes, stuffiness), chronic idiopathic urticaria (hives).

PRECAUTIONS

Contraindications: None known. **Cautions:** Renal/hepatic impairment, breastfeeding.

ACTION

Exhibits selective peripheral histamine H_1 receptor blocking action. **Therapeutic Effect:** Prevents allergic response mediated by histamine (rhinitis, urticaria).

PHARMACOKINETICS

Rapidly absorbed from GI tract. Distributed mainly in liver, lungs, GI tract, bile. Protein binding: 82%. Metabolized in liver. Eliminated in urine, feces. **Half-life:** 27 hrs (increased in elderly, renal/hepatic impairment).

those younger than 3 mos (increased risk of fluid balance problems). Careful fluid restrictions recommended in infants. **Elderly:** Increased risk of hyponatremia, water intoxication.

D

INTERACTIONS

DRUG: **Carbamazepine, lamotrigine, NSAIDs, SSRIs, tricyclic antidepressants** may increase effect. **Demeclocycline, lithium** may decrease effect. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May decrease serum sodium.

AVAILABILITY (Rx)

Injection Solution (DDAVP): 4 mcg/ml. **Nasal Solution (DDAVP):** 100 mcg/ml. **Nasal Spray (Stimate):** 1.5 mg/ml (150 mcg/spray). **(DDAVP):** 100 mcg/ml (10 mcg/spray). **Tablets (DDAVP):** 0.1 mg, 0.2 mg.

ADMINISTRATION/HANDLING

Children: Safety and efficacy not established. **Elderly:** No age-related precautions noted.

INTERACTIONS

DRUG: Concurrent use of **MAOIs** may cause neuroleptic malignant syndrome: hyperthermia, rigidity, myoclonus, autonomic instability (including rapid fluctuations of vital signs), mental status changes, coma, extreme agitation. **Alcohol** may increase CNS depressant effects. May decrease **midazolam** concentration. May increase **desipramine** concentration. **Aspirin, NSAIDs, warfarin** increase risk of bleeding. **Ketoconazole** may increase concentration/effect. **HERBAL:** **Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depressant effects. **FOOD:** None known. **LAB VALUES:** May increase total serum cholesterol, LDL cholesterol, triglycerides, ALT, AST, prolactin level.

AVAILABILITY (Rx)

0.75 mg, 1 mg, 1.5 mg, 2 mg, 4 mg, 6 mg. **Tablets (TaperPak [DexPak]):** 1.5 mg (35 or 51 tablets on taper dose card).

ADMINISTRATION/HANDLING

PHARMACOKINETICS

Extensively metabolized in liver. Excreted in urine (51%), feces (48%). Protein binding: 97%. **Half-life:** 1–2 hrs.

psychological dependence. Severe depression may occur during drug withdrawal.

Do not confuse dexmethylphenidate with methadone.

D

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Cerebral cortex stimulator **(Schedule II).**
CLINICAL: CNS stimulant.

USES

Treatment of ADHD.

PRECAUTIONS

Contraindications: Diagnosis or family history of Tourette's syndrome, glaucoma, history of marked agitation, anxiety, tension, motor tics, use of MAOIs within 14 days. **Cautions:** Cardiovascular disease (HF, recent MI), seizure disorder, psychosis, emotional instability, acute stress reactions, hyperthyroidism. Avoid use in pts with history of substance abuse.

ACTION

Blocks reuptake of norepinephrine, dopamine into presynaptic neurons, increasing release of these neurotransmitters into synaptic cleft. **Therapeutic Effect:** Decreases motor restlessness, fatigue; increases motor activity, mental alertness, attention span; elevates mood.

PHARMACOKINETICS

Readily absorbed from GI tract. Metabolized in liver. Excreted in urine. **Half-life:** 2.2 hrs.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution: (Zinecard): 250 mg (10 mg/ml reconstituted in 25-ml single-use vial). **(Totect, Zinecard):** 500 mg (10 mg/ml reconstituted in 50-ml single-use vial).

ADMINISTRATION/HANDLING

◄ALERT► Do not mix with other drugs. Use caution in handling/preparation of reconstituted solution (glove use recommended). If powder/solution comes in contact with skin, wash immediately with soap and water.

by 10 mg/day at weekly intervals until therapeutic response is achieved. **Maximum:** 60 mg/day given in 1–3 divided doses with interval of 4–6 hrs between doses. **CHILDREN 6–12 YRS:** Initially, 5 mg/day. Increase by 5 mg/day at weekly intervals until therapeutic response is achieved. **Maximum:** 60 mg/day given in 1–3 divided doses with interval of 4–6 hrs between doses.

ADHD

ADULTS, ELDERLY: (ADDERALL-XR): Initially, 20 mg once daily in the morning. May increase up to 60 mg/day. **CHILDREN 13–17 YRS: (ADDERALL-XR):** Initially, 10 mg once daily in the morning. May increase to 20 mg/day after 1 wk if symptoms are not controlled. May increase up to 60 mg/day. **CHILDREN 6–12 YRS: (ADDERALL):** Initially, 5 mg 1–2 times a day. May increase in 5-mg increments at weekly intervals until optimal response is obtained. **Maximum:** 40 mg/day given in 1–3 divided doses (use intervals of 4–6 hrs between additional doses). **(ADDERALL-XR):** Initially, 5–10 mg once daily in the morning. May increase daily dose in 5- to 10-mg increments at weekly intervals. **Maximum:** 30 mg/day. **CHILDREN 3–5 YRS: (ADDERALL):** Initially, 2.5 mg/day given every morning. May increase daily dose in 2.5-mg increments at weekly intervals until optimal response is obtained. **Maximum:** 40 mg/day given in 1–3 divided doses (use intervals of 4–6 hrs between additional doses). Not recommended in children younger than 3 yrs.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Increased motor activity, talkativeness, nervousness, mild euphoria, insomnia. **Occasional:** Headache, chills, dry mouth, GI distress, worsening depression in pts who are clinically depressed, tachycardia, palpitations, chest pain, dizziness, decreased appetite.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may produce skin pallor/flushing, arrhythmias, psychosis. Abrupt withdrawal after prolonged use of high doses may produce lethargy (may last for wks). Prolonged administration to children with ADHD may temporarily suppress normal weight/height pattern.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess child's attention span, impulse control, interaction with others. Screen for drug–seeking behavior, past drug abuse. Obtain baseline B/P.

INTERVENTION/EVALUATION

Monitor for CNS overstimulation, increase in B/P, growth rate, change in pulse rate, respirations, weight loss. **Narcolepsy:** Observe/document frequency of narcoleptic episodes. **ADHD:** Observe for improved attention span.

PATIENT/FAMILY TEACHING

• Normal dosage levels may produce tolerance to drug's anorexic mood-elevating effects within a few wks. • Dry mouth may be relieved with sugarless gum, sips of water. • Take early in day. • Do not break, chew, or crush extended-release capsules. • May mask extreme fatigue. • Report pronounced anxiety, dizziness, decreased appetite, dry mouth, new or worsening behavior, chest pain, palpitations. • Avoid alcohol, caffeine.

diazepam

dye-**az**-e-pam
(Apo-Diazepam, Diastat, Diazepam Intensol, Novo-Dipam, Valium)

Do not confuse diazepam with diazoxide, diltiazem, Ditropan, or lorazepam, or Valium with Valcyte.

hand). • Administer IV at rate not exceeding 5 mg/min for adults. For children, give 1–2 mg/min (too-rapid IV may result in hypotension, respiratory depression). • Monitor respirations q5–15min for 2 hrs.

Storage • Store at room temperature.

IM

• Injection may be painful. Inject deeply into large muscle mass.

PO

• Give without regard to meals. • Dilute oral concentrate with water, juice, carbonated beverages; may be mixed in semisolid food (applesauce, pudding). • Tablets may be crushed.

GEL

• Insert rectal tip and gently push plunger over 3 sec. Remove tip after 3 additional sec. • Buttocks should be held together for 3 sec after removal.

IV INCOMPATIBILITIES

Amphotericin B complex (Abelcet, AmBisome, Amphotec), cefepime (Maxipime), diltiazem (Cardizem), fluconazole (Diflucan), foscarnet (Foscavir), furosemide (Lasix), heparin, hydrocortisone (SoluCortef), hydromorphone (Dilaudid), meropenem (Merrem IV), potassium chloride, propofol (Diprivan), vitamins.

IV COMPATIBILITIES

Dobutamine (Dobutrex), fentanyl, morphine.

INDICATIONS/ROUTES/DOSAGE

Anxiety

PO: ADULTS: 2–10 mg 2–4 times a day. **ELDERLY:** Initially, 1–2 mg 1–2 times a day. **CHILDREN:** 0.12–0.8 mg/kg/day in divided doses q6–8h.

IV, IM: ADULTS: 2–10 mg; may repeat in 3–4 hrs if needed. **CHILDREN:** 0.04–0.3 mg/kg/dose q2–4h. **Maximum:** 0.6 mg/kg within 8-hr period.

Skeletal Muscle Relaxation

PO: ADULTS: 2–10 mg 2–4 times a day. **ELDERLY:** Initially, 1–2 mg 1–2 times a day. **CHILDREN:** 0.12–0.8 mg/kg/day in divided doses q6–8h.

Alcohol Withdrawal

PO: ADULTS, ELDERLY: 10 mg 3–4 times during first 24 hrs, then reduced to 5 mg 3–4 times a day as needed.

Status Epilepticus

IV: ADULTS, ELDERLY: 5–10 mg q5–10min. **Maximum:** 30 mg. **INFANTS, CHILDREN:** 0.1–0.3 mg/kg over 5 min or less; may repeat after 5–10 min. **Maximum:** 10 mg/dose.

Control of Increased Seizure Activity (Breakthrough Seizures) in Pts with Refractory Epilepsy Who Are on Stable Regimens of Anticonvulsants

Rectal Gel: ADULTS, CHILDREN 12 YRS AND OLDER: 0.2 mg/kg; may be repeated in 4–12 hrs. **CHILDREN 6–11 YRS:** 0.3 mg/kg; may be repeated in 4–12 hrs. **CHILDREN 2–5 YRS:** 0.5 mg/kg; may be repeated in 4–12 hrs.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Decrease maintenance dose by 50%.

SIDE EFFECTS

Frequent: Pain with IM injection, drowsiness, fatigue, ataxia. **Occasional:** Slurred speech, orthostatic hypotension, headache, hypoactivity, constipation, nausea, blurred vision. **Rare:** Paradoxical CNS reactions (hyperactivity/nervousness in children, excitement/restlessness in elderly/debilitated) generally noted during first 2 wks of therapy, particularly in presence of uncontrolled pain.

CABG surgery. **Cautions:** HF, hypertension, renal/hepatic impairment, hepatic porphyria, history of GI disease.

ACTION

Inhibits prostaglandin synthesis, intensity of pain stimulus reaching sensory nerve endings. **Therapeutic Effect:** Produces analgesic, anti-inflammatory effects.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	30 min	2–3 hrs	Up to 8 hrs

Completely absorbed from GI tract. Protein binding: greater than 99%. Widely distributed. Metabolized in liver. Primarily excreted in urine. Minimally removed by hemodialysis. **Half-life:** 1.2–2 hrs.

USES

Treatment of functional bowel/irritable bowel syndrome.

PRECAUTIONS

Contraindications: Bladder neck obstruction, myasthenia gravis, narrow-angle glaucoma, obstructive disease of GI tract, severe ulcerative colitis, tachycardia, infants younger than 6 mos of age, nursing mothers. **Caution:** Autonomic neuropathy, mild to moderate ulcerative colitis, hyperthyroidism, hepatic/renal disease, hypertension, tachyarrhythmias, HF, coronary artery disease, hiatal hernia. Childern with Down's syndrome, spastic paralysis or brain damage.

ACTION

Blocks action of acetylcholine in smooth muscle. **Therapeutic Effect:** Reduces tone, motility of GI tract.

PHARMACOKINETICS

Readily absorbed from GI tract. Widely distributed. Metabolized in liver. **Half-life:** 9–10 hrs.

INTERACTIONS

DRUG: **Amiodarone** may increase concentration/toxicity. **Beta-blockers, calcium channel blockers** may have additive effect on slowing AV nodal conduction. **Potassium-depleting diuretics** may increase toxicity due to hypokalemia. **Sympathomimetics** may increase risk of arrhythmias. **HERBAL:** **Ephedra** may increase risk of arrhythmias. **Licorice** may cause sodium and water retention, loss of potassium. **FOOD:** **Meals with increased fiber (bran) or high in pectin** may decrease absorption. **LAB VALUES:** None known.

AVAILABILITY (Rx)

Oral Solution (Lanoxin): 50 mcg/ml. **Injection Solution (Lanoxin):** 100 mcg/ml, 250 mcg/ml. **Tablets (Lanoxin):** 125 mcg, 250 mcg.

ADMINISTRATION/HANDLING

◀ALERT▶ IM rarely used (produces severe local irritation, erratic absorption). If no other route possible, give deep into muscle followed by massage. Give no more than 2 ml at any one site.

artery vasospasm, hemiplegic or basilar migraine, peripheral vascular disease, sepsis, severe renal/hepatic impairment, use of MAOIs within 14 days, use of 5-HT_B agonists within 24 hrs, CYP3A4 inhibitors (e.g., azole antifungals, macrolide antibiotics, protease inhibitors), pregnancy, breastfeeding. **Cautions:** Elderly.

ACTION

Directly stimulates vascular smooth muscle, resulting in peripheral and cerebral vasoconstriction. May have antagonist effects on serotonin. **Therapeutic Effect:** Suppresses vascular headaches, migraine headaches.

PHARMACOKINETICS

Slowly, incompletely absorbed from GI tract; rapidly and extensively absorbed after rectal administration. Protein binding: greater than 90%. Eliminated in feces by the biliary system. **Half-life:** 21 hrs.

dimenhydrinate

dye-men-**hye**-dra-nate
(Apo-Dimenhydrinate, Dramamine, Driminate)
Do not confuse dimenhydrinate with diphenhydramine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Anticholinergic, antihistamine. **CLINICAL:** Antiemetic, antivertigo.

USES

Prevention and treatment of nausea, vomiting, dizziness, vertigo associated with motion sickness. **OFF-LABEL:** Nausea and vomiting of pregnancy.

PRECAUTIONS

Contraindications: None known. **Cautions:** Narrow-angle glaucoma, peptic ulcer, prostatic hypertrophy, pyloroduodenal or bladder neck obstruction, asthma, COPD, increased IOP, cardiovascular disease, hyperthyroidism, hypertension, seizure disorders.

ACTION

Competes with histamine for receptor sites on effector cells of GI tract, blood vessels, and respiratory tract. Depressant action on labyrinthine function. Diminishes vestibular stimulation. **Therapeutic Effect:** Prevents, treats nausea, vomiting, vertigo associated with motion sickness.

PHARMACOKINETICS

	Onset	Peak	Duration
PO	15-60 min	1–2 hrs	4–6 hrs

Well absorbed following PO administration. Metabolized in liver. Primarily excreted in urine. **Half-life:** 1.5 hrs.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (40%): Flushing. **Occasional (18%–5%):** Abdominal pain, diarrhea, nausea, vomiting, dyspepsia, pruritus, rash, erythema.

ADVERSE EFFECTS/ TOXIC REACTIONS

Lymphopenia may increase risk for infection. Severe flushing may lead to noncompliance of therapy.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, CMP, urine pregnancy if applicable. Question any plans of breastfeeding. Assess hydration status (urine output, skin turgor). Question history of hepatic impairment, lymphopenia.

INTERVENTION/EVALUATION

Monitor CBC, LFT. Encourage PO intake. Offer antiemetics for nausea, vomiting. Question any episodes of noncompliance due to flushing, GI symptoms. Monitor for infectious process (fever, malaise, chills, body aches, cough).

PATIENT/FAMILY TEACHING

• Pts will most likely experience abdominal pain, diarrhea, nausea, and flushing. Side effects may decrease over time. • Take with meals to decrease flushing reaction. • Swallow capsule whole; do not chew, crush, dissolve, or divide. • Two dosage strengths will be provided for starting dose and maintenance dose. • Report any yellowing of skin or eyes, upper abdominal pain, bruising, dark-colored urine, fever, body aches, cough, dehydration.

dinoprostone

dye-noe-**pros**-tone
(Cervidil, Prepidil, Prostin E_2)

■ **BLACK BOX ALERT** ■ To be used only by personnel medically trained in dinoprostone-specific drug effects in a hospital setting.
Do not confuse Cervidil or Prepidil with bepridil.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Prostaglandin. **CLINICAL:** Oxytocic, abortifacient.

USES

Vaginal suppository: To induce abortion from wk 12 through wk 20 of pregnancy, to evacuate uterine contents in missed abortion or intrauterine fetal death up to 28 wks gestational age (as calculated from first day of last normal menstrual period), benign hydatidiform mole. **Gel:** Ripening of unfavorable cervix in pregnant women at or near term with medical/obstetric need for labor induction. Induction of labor at or near term. **Vaginal insert:** Initiation and/or cervical ripening in pts with medical indication for induction of labor.

PRECAUTIONS

Contraindications: Gel: Active cardiac, hepatic, pulmonary, renal disease; acute pelvic inflammatory disease (PID); fetal malpresentation; grand multiparae with 6 or more previous term pregnancy cases with nonvertex presentation; history of cesarean section, major uterine surgery; history of difficult labor, traumatic delivery; hypersensitivity to other prostaglandins; placenta previa, unexplained vaginal bleeding during this pregnancy; pts for whom vaginal delivery is not indicated (vasa previa, active herpes genitalia); significant cephalopelvic disproportion. **Vaginal Suppository:** Active cardiac, hepatic, pulmonary, renal disease; acute PID. **Cautions:** Renal/hepatic impairment, asthma, glaucoma, cardiovascular or pulmonary disease, epilepsy. **Endocervical gel:** With ruptured membrane. **Vaginal gel:** With ruptured membrane, nonvertex or nonsingleton pregnancy, previous

chills/shivering, urticaria, bradycardia, increased uterine pain accompanying abortion, peripheral vasoconstriction. **Rare:** Flushing of skin, vulvar edema.

D

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may cause uterine contractions with spasm and tetanic contraction, leading to cervical laceration/perforation, uterine rupture/hemorrhage.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Offer emotional support. **Suppository:** Obtain orders for antiemetics, antidiarrheals, meperidine, other pain medication for abdominal cramps. Assess any uterine activity, vaginal bleeding. **Gel:** Assess Bishop score. Assess degree of effacement (determines size of shielded endocervical catheter).

INTERVENTION/EVALUATION

Suppository: Check strength, duration, frequency of contractions. Monitor vital signs q15min until stable, then hourly until abortion complete. Check resting uterine tone. Administer medications for relief of GI effects if indicated or for abdominal cramps. **Gel:** Monitor uterine activity (onset of uterine contractions), fetal status (heart rate), character of cervix (dilation, effacement). Have pt remain recumbent 12 hrs after application with continuous electronic monitoring of fetal heart rate, uterine activity. Record maternal vital signs at least hourly in presence of uterine activity. Reassess Bishop score.

PATIENT/FAMILY TEACHING

- **Suppository:** Report promptly fever, chills, foul-smelling/increased vaginal discharge, uterine cramps, pain.

*diphenhydrAMINE

dye-fen-**hye**-dra-meen
(Allerdryl, Banophen, Benadryl, Benadryl Children's Allergy, Diphen, Diphenhist, Dytan, Genahist, Nytol)
Do not confuse Benadryl with benazepril, Bentyl, or Benylin, or diphenhydramine with desipramine, dicyclomine, or dimenhydrinate.

FIXED-COMBINATION(S)

Advil PM: diphenhydramine/ibuprofen (NSAID): 38 mg/200 mg. With calamine, an astringent, and camphor, a counterirritant **(Caladryl).**

CLASSIFICATION

PHARMACOTHERAPEUTIC: Ethanolamine. **CLINICAL:** Antihistamine, anticholinergic, antipruritic, antitussive, antiemetic, antidyskinetic.

USES

Treatment of allergic reactions including nasal allergies; parkinsonism, including drug-induced extrapyramidal symptoms; prevention/treatment of nausea, vomiting, or vertigo due to motion sickness; antitussive; short-term management of insomnia; adjunct to epinephrine in treatment of anaphylaxis. Topical form used for relief of pruritus from insect bites, skin irritations.

PRECAUTIONS

Contraindications: Acute exacerbation of asthma, neonates or premature infants, breastfeeding. **Cautions:** Narrow-angle glaucoma, stenotic peptic ulcer, prostatic hypertrophy, pyloroduodenal/bladder neck obstruction, asthma, COPD, increased IOP, cardiovascular disease, hyperthyroidism.

ACTION

Competes with histamine for receptor site on effector cells in GI tract, blood vessels, respiratory tract. **Therapeutic Effect:** Produces anticholinergic, antipruritic, antitussive, antiemetic, antidyskinetic, sedative effects.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	15–30 min	1–4 hrs	4–6 hrs
IV, IM	Less than 15 min	1–4 hrs	4–6 hrs

Well absorbed after PO, parenteral administration. Protein binding: 98%–99%. Widely distributed. Metabolized in liver. Primarily excreted in urine. **Half-life:** 1–4 hrs.

D

Antitussive

PO: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 25 mg q4h. **Maximum:** 150 mg/day. **CHILDREN 6–11 YRS:** 12.5 mg q4h. **Maximum:** 75 mg/day. **CHILDREN 2–5 YRS:** 6.25 mg q4h. **Maximum:** 37.5 mg/day.

Nighttime Sleep Aid

PO: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 25–50 mg at bedtime. **CHILDREN 2–11 YRS:** 1 mg/kg/dose. **Maximum:** 50 mg.

Pruritus

Topical: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: Apply 1% or 2% cream or spray 3–4 times a day. **CHILDREN 2–11 YRS:** Apply 1% cream or spray 3–4 times a day.

SIDE EFFECTS

Frequent: Drowsiness, dizziness, muscle weakness, hypotension, urinary retention, thickening of bronchial secretions, dry mouth, nose, throat, lips; in elderly: sedation, dizziness, hypotension. **Occasional:** Epigastric distress, flushing, visual/hearing disturbances, paresthesia, diaphoresis, chills.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reactions (eczema, pruritus, rash, cardiac disturbances, photosensitivity) may occur. Overdose symptoms may vary from CNS depression (sedation, apnea, hypotension, cardiovascular collapse, death) to severe paradoxical reactions (hallucinations, tremors, seizures). Children, infants, neonates may experience paradoxical reactions (restlessness, insomnia, euphoria, nervousness, tremors). Overdosage in children may result in hallucinations, seizures, death.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

If pt is having acute allergic reaction, obtain history of recently ingested foods, drugs, environmental exposure, emotional stress. Monitor B/P rate; depth, rhythm, type of respiration; quality, rate of pulse. Assess lung sounds for rhonchi, wheezing, rales.

INTERVENTION/EVALUATION

Monitor B/P, esp. in elderly (increased risk of hypotension). Monitor children closely for paradoxical reaction.

PATIENT/FAMILY TEACHING

• Tolerance to antihistaminic effect generally does not occur; tolerance to sedative effect may occur. • Avoid tasks that require alertness, motor skills until response to drug is established. • Dry mouth, drowsiness, dizziness may be an expected response to drug. • Avoid alcohol.

diphenoxylate with atropine

dye-fen-**ox**-i-late **at**-roe-peen (Lomotil)

Do not confuse Lomotil with Lamictal, Lamisil, or Lasix, or Lonox with Lanoxin, Loprox, or Lovenox.

FIXED-COMBINATION(S)

Lomotil: diphenoxylate/atropine (anticholinergic, antispasmodic): 2.5 mg/0.025 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Meperidine derivative. **CLINICAL:** Antidiarrheal.

USES

Adjunctive treatment of acute, chronic diarrhea.

PRECAUTIONS

Contraindications: Children younger than 2 yrs, obstructive jaundice, diarrhea associated with pseudomembranous colitis or enterotoxin-producing bacteria. **Cautions:** Children, acute ulcerative colitis, renal/hepatic impairment.

D

dipyridamole

HIGH ALERT

dye-peer-**id**-a-mole
(Apo-Dipyridamole FC, Persantine)
Do not confuse Aggrenox with Aggrastat, dipyridamole with disopyramide, or Persantine with Periactin.

FIXED-COMBINATION(S)

Aggrenox: dipyridamole/aspirin (antiplatelet): 200 mg/25 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Blood modifier, platelet aggregation inhibitor, coronary vasodilator. **CLINICAL:** Antiplatelet, antianginal, diagnostic agent.

USES

Used with warfarin to decrease thrombosis following artificial heart valve replacement. **OFF-LABEL:** Stroke prevention (in combination with aspirin).

PRECAUTIONS

Contraindications: None known. **Cautions:** Hypotension, unstable angina, recent MI, hepatic impairment. Bronchospastic disease. Concomitant use of other antiplatelet medication or anticoagulation.

ACTION

Inhibits activity of adenosine deaminase and phosphodiesterase, enzymes causing accumulation of adenosine, cyclic adenosine monophosphate (AMP). **Therapeutic Effect:** Inhibits platelet aggregation; may cause coronary vasodilation.

PHARMACOKINETICS

Slowly, variably absorbed from the GI tract. Widely distributed. Protein binding: 91%–99%. Metabolized in liver. Primarily eliminated via biliary excretion. **Half-life:** 10–15 hrs.

INTERVENTION/EVALUATION

Assist with ambulation if dizziness occurs. Assess B/P for hypotension. Monitor for change in heart rate. Assess skin for flushing, rash.

PATIENT/FAMILY TEACHING

• Avoid alcohol. • If nausea occurs, cola, unsalted crackers, dry toast may relieve effect. • Therapeutic response may not be achieved before 2–3 mos of continuous therapy. • Go from lying to standing slowly.

*DOBUTamine HIGH ALERT

doe-**bue**-ta-meen
(Dobutrex)
Do not confuse dobutamine with dopamine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Sympathomimetic. **CLINICAL:** Cardiac stimulant.

USES

Short-term management of cardiac decompensation. **OFF-LABEL:** Positive inotropic agent in myocardial dysfunction or sepsis, stress echocardiography.

PRECAUTIONS

Contraindications: Idiopathic hypertrophic subaortic stenosis. **Cautions:** Atrial fibrillation, hypovolemia, post MI, concurrent use of MAOIs, elderly.

ACTION

Direct-action inotropic agent acting primarily on $beta_1$-adrenergic receptors. **Therapeutic Effect:** Enhances myocardial contractility, increases heart rate.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	1–2 min	10 min	Length of infusion

Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 2 min.

D

IV INCOMPATIBILITIES

Acyclovir (Zovirax), alteplase (Activase), amphotericin B complex (Abelcet, AmBisome, Amphotec), bumetanide (Bumex), cefepime (Maxipime), foscarnet (Foscavir), furosemide (Lasix), heparin, piperacillin/tazobactam (Zosyn), sodium bicarbonate.

IV COMPATIBILITIES

Amiodarone (Cordarone), calcium chloride, calcium gluconate, diltiazem (Cardizem), dopamine (Intropin), enalapril (Vasotec), epinephrine, famotidine (Pepcid), hydromorphone (Dilaudid), insulin (regular), lidocaine, lorazepam (Ativan), magnesium sulfate, midazolam (Versed), milrinone (Primacor), morphine, nitroglycerin, nitroprusside (Nipride), norepinephrine (Levophed), potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Dosage determined by pt response to drug.

Management of Cardiac Decompensation

IV Infusion: ADULTS, ELDERLY, CHILDREN: 2.5–20 mcg/kg/min titrated to desired response. May be infused at a rate of up to 40 mcg/kg/min to increase cardiac output. **NEONATES:** 2–20 mcg/kg/min titrated to desired response.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (greater than 5%): Increased heart rate, B/P. **Occasional (5%–3%):** Pain at injection site. **Rare (3%–1%):** Nausea, headache, anginal pain, shortness of breath, fever.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may produce marked increase in heart rate (30 beats/min or higher), marked increase in B/P (50 mm Hg or higher), anginal pain, premature ventricular contractions (PVCs).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Pt must be on continuous cardiac monitoring. Determine weight (for dosage calculation). Obtain initial B/P, heart rate, respirations. Correct hypovolemia before drug therapy.

INTERVENTION/EVALUATION

Continuously monitor for cardiac rate, arrhythmias. Maintain accurate I&O; measure urinary output frequently. Assess serum potassium, plasma dobutamine (therapeutic range: 40–190 ng/ml). Monitor B/P continuously (hypertension risk greater in pts with preexisting hypertension). Check cardiac output, pulmonary wedge pressure/central venous pressure (CVP) frequently. Immediately notify physician of decreased urinary output, cardiac arrhythmias, significant increase in B/P, heart rate, or less commonly, hypotension.

docetaxel HIGH ALERT

doe-se-**tax**-el
(Docefrez, Taxotere)

■ **BLACK BOX ALERT** ■ Avoid use with bilirubin more than upper limit of normal (ULN) or ALT, AST more than 1.5 times ULN in conjunction with alkaline phosphatase more than 2.5 times ULN. Severe hypersensitivity reaction (rash, hypotension, bronchospasm, anaphylaxis) may occur. Fluid retention syndrome (pleural effusions, ascites, edema, dyspnea at rest) has been reported. Pts with abnormal hepatic function, receiving higher doses, and pts with non–small-cell lung carcinoma (NSCLC) and history of prior platinum treatment receiving docetaxel dose of 100 mg/m^2 at higher risk for mortality. Avoid use with ANC more than 1,500/mm^3.

Do not confuse docetaxel with paclitaxel or Taxotere with Taxol.

D

IV COMPATIBILITIES

Bumetanide (Bumex), calcium gluconate, dexamethasone (Decadron), diphenhydramine (Benadryl), dobutamine (Dobutrex), dopamine (Intropin), furosemide (Lasix), granisetron (Kytril), heparin, hydromorphone (Dilaudid), lorazepam (Ativan), magnesium sulfate, mannitol, morphine, ondansetron (Zofran), palonosetron (Aloxi), potassium chloride.

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Pt should be premedicated with oral corticosteroids (e.g., dexamethasone 16 mg/day for 5 days beginning day 1 before docetaxel therapy); reduces severity of fluid retention, hypersensitivity reaction.

Breast Carcinoma

IV: ADULTS: 60–100 mg/m^2 given over 1 hr q3wks as a single agent. Operable, node positive: 75 mg/m^2 q3wks for 6 courses (in combination with doxorubicin and cyclophosphamide).

Non–Small-Cell Lung Carcinoma

IV: ADULTS: 75 mg/m^2 q3wks (as monotherapy or in combination with cisplatin).

Prostate Cancer

IV: ADULTS, ELDERLY: 75 mg/m^2 q3wks with concurrent administration of prednisone.

Head/Neck Cancer

IV: ADULTS, ELDERLY: 75 mg/m^2 q3wks (in combination with cisplatin and fluorouracil) for 3–4 cycles, followed by radiation therapy.

Gastric Adenocarcinoma

IV: ADULTS, ELDERLY: 75 mg/m^2 q3wks (in combination with cisplatin and fluorouracil).

Dose Modification for Gastric or Head/Neck Cancer

ALT, AST > 2.5 to ≤ 5 times ULN and alkaline phosphatase ≤ 2.5 times ULN	80% of dose
ALT, AST > 1.5 to ≤ 5 times ULN and alkaline phosphatase > 2.5 to ≤ 5 times ULN	80% of dose
ALT, AST > 5 times ULN and/or alkaline phosphatase > 5 times ULN	Discontinue docetaxel

Note: Toxicity includes febrile neutropenia, neutrophils less than 500/mm^3 for longer than 1 wk, severe cutaneous reactions. Also, for NSCLC, platelet nadir less than 25,000/mm^3, any grade 3 or 4 nonhematologic toxicity.

Breast Cancer

Reduce dose to 75 mg/mm^3; if toxicity persists, reduce to 55 mg/mm^3.

Breast Cancer Adjuvant

Administer when neutrophils are less than 1,500/mm^3. If toxicity persists, or grade 3 or 4 stomatitis, reduce dose to 60 mg/mm^3.

Non–Small-Cell Lung Cancer

Monotherapy

Hold dose until toxicity resolves, then reduce dose to 55 mg/mm^3; peripheral neuropathy grade 3 or 4, discontinue.

Combination Therapy

Reduce dose to 65 mg/mm^3; may further reduce to 50 mg/mm^3 if needed.

Prostate Cancer

Reduce dose to 60 mg/mm^3; discontinue if toxicity persists.

Gastric or Head and Neck Cancer

Reduce dose to 60 mg/mm^3; if neutropenic toxicity persists, further reduce to 45 mg/mm^3. For grade 3 or 4 thrombocytopenia, reduce dose from 75 mg/mm^3 to 60 mg/mm^3; discontinue if toxicity persists.

PRECAUTIONS

Contraindications: Acute abdominal pain, concomitant use of mineral oil, intestinal obstruction, nausea, vomiting. **Cautions:** Do not use for longer than 1 wk.

ACTION

Decreases surface film tension by mixing liquid with bowel contents. **Therapeutic Effect:** Increases infiltration of liquid to form softer stool.

PHARMACOKINETICS

Minimal absorption from GI tract. Acts in small and large intestines. Results usually occur 1–2 days after first dose but may take 3–5 days.

resuscitation available for minimum of 3 days. Anticipate proarrhythmic events.

INTERVENTION/EVALUATION

Assess for conversion of cardiac dysrhythmias and absence of new arrhythmias. Constantly monitor EKG. Provide emotional support. Monitor renal function for electrolyte imbalance (prolonged or excessive diarrhea, sweating, vomiting, thirst).

PATIENT/FAMILY TEACHING

• Instruct pt on need for compliance and requirement for periodic monitoring of EKG and renal function. • Do not break, crush, or open capsule.

dolutegravir

doe-loo-**teg**-ra-veer
(Tivicay)

FIXED COMBINATION(S)

Triumaq: dolutegravir/abacavir/lamivudine (antiretrovirals): 50 mg/600 mg/300 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Integrase stand transfer inhibitor (INSTI). **CLINICAL:** Antiretroviral.

USES

Treatment of HIV-1 infection in adults and children age 12 yrs and older and weighing at least 40 kg, in combination with at least two other antiretroviral agents.

PRECAUTIONS

Contraindications: Co-administration of dofetilide. **Cautions:** Diabetes mellitus, hepatic/renal impairment, history of hepatitis or tuberculosis, prior hypersensitivity reaction to INSTIs.

ACTION

Inhibits HIV integrase by blocking strand transfer of retroviral DNA integration (essential for HIV replication cycle). **Therapeutic Effect:** Interferes with HIV replication, slowing progression of HIV infection.

PHARMACOKINETICS

Readily absorbed after PO administration. Peak plasma concentration: 2–3 hrs. Protein binding: 99%. Metabolized in liver. Excreted primarily unchanged in feces and as metabolite in urine. **Half-life:** 14 hrs.

USES

Treatment of dementia of Alzheimer's disease. **OFF-LABEL:** Treatment of behavioral syndromes in dementia, dementia associated with Parkinson's disease, Lewy body dementia.

PRECAUTIONS

Contraindications: History of hypersensitivity to piperidine derivatives. **Cautions:** Asthma, COPD, bradycardia, bladder outflow obstruction, history of ulcer disease, those taking concurrent NSAIDs, supraventricular cardiac conduction disturbances (e.g., "sick sinus syndrome," Wolff-Parkinson-White syndrome), seizures.

ACTION

Inhibits enzyme acetylcholinesterase, increasing concentration of acetylcholine at cholinergic synapses, enhancing cholinergic function in CNS. **Therapeutic Effect:** Slows progression of Alzheimer's disease.

PHARMACOKINETICS

Well absorbed after PO administration. Protein binding: 96%. Extensively metabolized. Eliminated in urine, feces. **Half-life:** 70 hrs.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess cognitive function (e.g., memory, attention, reasoning). Obtain baseline vital signs. Assess history for peptic ulcer, urinary obstruction, asthma, COPD, seizure disorder, cardiac conduction disturbances.

INTERVENTION/EVALUATION

Monitor behavior, mood/cognitive function, activities of daily living. Monitor for cholinergic reaction (GI discomfort/cramping, feeling of facial warmth, excessive salivation/diaphoresis), lacrimation, pallor, urinary urgency, dizziness. Monitor for nausea, diarrhea, headache, insomnia.

PATIENT/FAMILY TEACHING

• Report nausea, vomiting, diarrhea, diaphoresis, increased salivary secretions, severe abdominal pain, dizziness. • May take without regard to food (best taken at bedtime). • Not a cure for Alzheimer's disease but may slow progression of symptoms.

*DOPamine

HIGH ALERT

dope-a-meen

■ **BLACK BOX ALERT** ■ If extravasation occurs, infiltrate area with phentolamine (5–10 ml 0.9% NaCl) as soon as possible, no later than 12 hrs after extravasation.

Do not confuse dopamine with dobutamine or Dopram.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Sympathomimetic (adrenergic agonist). **CLINICAL:** Cardiac stimulant, vasopressor.

USES

Adjunct in treatment of hypotension, shock (associated with MI, trauma, renal failure, cardiac decompensation, open heart surgery, persisting after adequate fluid volume replacement). **OFF-LABEL:** Symptomatic bradycardia or heart block unresponsive to atropine or cardiac pacing.

PRECAUTIONS

Contraindications: Pheochromocytoma, ventricular fibrillation. Hypersensitivity to sulfites. **Cautions:** Ischemic heart disease, occlusive vascular disease, hypovolemia, recent use of MAOIs (within 2–3 weeks), ventricular arrhythmias, post-MI.

ACTION

Stimulates adrenergic and dopaminergic receptors. Effects are dose dependent. Lower dosage stimulates dopaminergic receptors, causing renal vasodilation. Higher doses stimulate both dopaminergic and $beta_1$-adrenergic receptors, causing cardiac stimulation and renal vasodilation. **Therapeutic Effect: Low dosage (1–3 mcg/kg/min):** Increases renal blood flow, urinary flow, sodium excretion. **Low to moderate dosage (4–10 mcg/kg/min):** Increases myocardial contractility, stroke volume, cardiac output. **High dosage (greater than 10 mcg/kg/min):** Increases peripheral resistance, vasoconstriction, B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	1–2 min	N/A	Less than 10 min

Widely distributed. Does not cross blood-brain barrier. Metabolized in liver, kidneys, plasma. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 2 min.

INTERACTIONS

DRUG: May have increased effects with **vasopressors, vasoconstrictive agents. COMT inhibitors** may increase level/effects. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** None significant.

AVAILABILITY (Rx)

Injection Solution: 40 mg/ml, 80 mg/ml, 160 mg/ml. **Injection (Premix with Dextrose):** 0.8 mg/ml (250 ml, 500 ml), 1.6 mg/ml (250 ml, 500 ml), 3.2 mg/ml (250 ml).

ADMINISTRATION/HANDLING

◀ALERT▶ Blood volume depletion must be corrected before administering dopamine (may be used concurrently with fluid replacement).

calculation). Obtain initial B/P, heart rate, respirations. Assess potency of IV access.

INTERVENTION/EVALUATION

Continuously monitor for cardiac arrhythmias. Measure urinary output frequently. If extravasation occurs, immediately infiltrate affected tissue with 10–15 ml 0.9% NaCl solution containing 5–10 mg phentolamine mesylate. Monitor B/P, heart rate, respirations q15min during administration (more often if indicated). Assess cardiac output, pulmonary wedge pressure, or central venous pressure (CVP) frequently. Assess peripheral circulation (palpate pulses, note color/temperature of extremities). Immediately notify physician of decreased urinary output, cardiac arrhythmias, significant changes in B/P, heart rate, or failure to respond to increase or decrease in infusion rate, decreased peripheral circulation (cold, pale, mottled extremities). Taper dosage before discontinuing (abrupt cessation of therapy may result in marked hypotension). Be alert to excessive vasoconstriction (decreased urine output, increased heart rate, arrhythmias, disproportionate increase in diastolic B/P, decrease in pulse pressure); slow or temporarily stop infusion, notify physician.

doripenem

dor-i-**pen**-em
(Doribax)
Do not confuse Doribax with Zovirax, or doripenem with ertapenem, imipenem, or meropenem.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Carbapenem. **CLINICAL:** Antibiotic.

USES

Treatment of complicated intra-abdominal infections, complicated UTIs due to susceptible gram-positive, gram-negative (including *Pseudomonas aeruginosa)*, and anaerobic bacteria. **OFF-LABEL:** Treatment of intravascular catheter-related bloodstream infection due to ESBL producing *Escherichia coli* and *Klebsiella* spp. Pneumonia, including ventilator-associated.

PRECAUTIONS

Contraindications: History of serious hypersensitivity to carbapenems (meropenem, imipenem-cilastin, ertapenem). Anaphylactic reactions to beta-lactam antibiotics. **Cautions:** Hypersensitivity to penicillins, cephalosporins.

ACTION

Inactivates penicillin-binding proteins, resulting in inhibition of cell wall synthesis. **Therapeutic Effect:** Produces bacterial cell death.

PHARMACOKINETICS

Penetrates into body fluids, tissues. Widely distributed. Protein binding: 8%. Primarily excreted in urine. Removed by dialysis. **Half-life:** 1 hr.

ADMINISTRATION/HANDLING

D

INDICATIONS/ROUTES/DOSAGE

Hypertension

PO ***(Immediate-Release)*****: ADULTS:** Initially, 1 mg once a day. May increase upward over several weeks to a maximum of 16 mg/day. **ELDERLY:** Initially, 0.5 mg once a day. May increase upward over several weeks.

Benign Prostatic Hyperplasia

PO ***(Immediate-Release)*****: ADULTS, ELDERLY:** Initially, 1 mg/day. May increase q1–2wks. **Maximum:** 8 mg/day. ***(Extended-Release)*****:** Initially, 4 mg/day. May increase to 8 mg in 3–4 wks. **Note:** When switching to extended-release, omit evening dose prior to starting morning dose.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Use caution.

SIDE EFFECTS

Frequent (20%–10%): Dizziness, asthenia headache, edema. **Occasional (9%–3%):** Nausea, pharyngitis, rhinitis, pain in extremities, drowsiness. **Rare (2%–1%):** Palpitations, diarrhea, constipation, dyspnea, myalgia, altered vision, anxiety.

ADVERSE EFFECTS/ TOXIC REACTIONS

First-dose syncope (hypotension with sudden loss of consciousness) may occur 30–90 min following initial dose of 2 mg or greater, too-rapid increase in dosage, addition of another antihypertensive agent to therapy. First-dose syncope may be preceded by tachycardia (pulse rate 120–160 beats/min).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Give first dose at bedtime. If initial dose is given during daytime, pt must remain recumbent for 3–4 hrs. Assess B/P, pulse immediately before each dose, and q15–30min until B/P is stabilized (be alert to fluctuations).

INTERVENTION/EVALUATION

Monitor B/P, I/O. Monitor pulse diligently (first-dose syncope may be preceded by tachycardia). Assess for edema, headache. Assist with ambulation if dizziness, light-headedness occurs.

PATIENT/FAMILY TEACHING

• Full therapeutic effect may not occur for 3–4 wks. • May cause syncope (fainting); go from lying to standing slowly. • Avoid tasks that require alertness, motor skills until response to drug is established.

doxepin

dox-e-pin

(Apo-Doxepin, Novo-Doxepin, Prudoxin, Silenor, Sinequan, Zonalon)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal ideation and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse doxepin with digoxin, doxapram, doxazosin, Doxidan, or doxycycline, or Sinequan with Seroquel, or Singulair.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Tricyclic.
CLINICAL: Antidepressant, antianxiety, antineuralgic, antiulcer, antipruritic.

USES

Treatment of depression, often in conjunction with psychotherapy. **Silenor:** Treatment of insomnia in pts with difficulty staying asleep. **Topical:** Treatment of pruritus associated with atopic dermatitis. **OFF-LABEL:** Treatment of neurogenic pain, treatment of anxiety.

Dosage in Renal Impairment
No dose adjustment.

Dosage in Hepatic Impairment
Use lower initial dose; adjust gradually. **Silenor:** Initially, 3 mg once daily.

D

SIDE EFFECTS

Frequent: PO: Orthostatic hypotension, drowsiness, dry mouth, headache, increased appetite, weight gain, nausea, unusual fatigue, unpleasant taste. **Topical:** Edema, increased pruritus, eczema, burning, tingling, stinging at application site, altered taste, dizziness, drowsiness, dry skin, dry mouth, fatigue, headache, thirst. **Occasional: PO:** Blurred vision, confusion, constipation, hallucinations, difficult urination, eye pain, irregular heartbeat, fine muscle tremors, nervousness, impaired sexual function, diarrhea, diaphoresis, heartburn, insomnia. **Silenor:** Nausea, upper respiratory infection. **Topical:** Anxiety, skin irritation/cracking, nausea. **Rare: PO:** Allergic reaction, alopecia, tinnitus, breast enlargement. **Topical:** Fever, photosensitivity.

ADVERSE EFFECTS/ TOXIC REACTIONS

Abrupt or too-rapid withdrawal may result in headache, malaise, nausea, vomiting, vivid dreams. Overdose may produce confusion, severe drowsiness, agitation, tachycardia, arrhythmias, shortness of breath, vomiting.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess B/P, pulse, EKG (those with history of cardiovascular disease). Perform CBC, serum electrolyte tests before long-term therapy. Assess pt's appearance, behavior, level of interest, mood, suicidal ideation, sleep pattern.

INTERVENTION/EVALUATION

Monitor B/P, pulse, weight. Perform CBC, serum electrolyte tests periodically to assess renal/hepatic function. Monitor mental status, suicidal ideation. Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Assess appearance, behavior, speech pattern, level of interest, mood. **Therapeutic serum level:** 110–250 ng/ml; **toxic serum level:** greater than 300 ng/ml.

PATIENT/FAMILY TEACHING

• Do not discontinue abruptly. • Change positions slowly to avoid dizziness. • Avoid tasks that require alertness, motor skills until response to drug is established. • Do not cover affected area with occlusive dressing after applying cream. • May cause dry mouth. • Avoid alcohol, limit caffeine. • May increase appetite. • Avoid exposure to sunlight/artificial light source. • Therapeutic effect may be noted within 2–5 days, maximum effect within 2–3 wks. • Report worsening depression, suicidal ideation, unusual changes in behavior (esp. at initiation of therapy or with changes in dosage).

*DOXOrubicin

HIGH ALERT

dox-o-**rue**-bi-sin
(Adriamycin, Caelyx, Doxil, Lipodox)

■ **BLACK BOX ALERT** ■ May cause concurrent or cumulative myocardial toxicity. Acute allergic or anaphylaxis-like infusion reaction may be life-threatening. Severe myelosuppresion may occur. Must be administered by personnel trained in administration/handling of chemotherapeutic agents. Secondary acute myelogenous leukemia and myelodysplastic syndrome have been reported. Potent vesicant.

Do not confuse doxorubicin with dactinoycin, daunorubicin, doxazosin, epirubicin, idarubicin, or valrubicin, or Adriamycin with Aredia or idamycin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Anthracycline antibiotic. **CLINICAL:** Antineoplastic.

USES

Adriamycin: Treatment of acute lymphocytic leukemia (ALL), acute myeloid leukemia (AML), Hodgkin's disease, malignant lymphoma; breast, gastric, small-cell lung, ovarian, epithelial, thyroid, bladder carcinomas; neuroblastoma, Wilms tumor, osteosarcoma, soft tissue sarcoma. **Doxil:** Treatment of AIDS-related Kaposi's sarcoma, metastatic ovarian cancer. Used with bortezomib to treat multiple myeloma in pts who have not previously received bortezomib and have received at least one previous treatment. **OFF-LABEL: Adriamycin:** Multiple myeloma, endometrial carcinoma, uterine sarcoma; head and neck cancer, liver, kidney cancer. **Doxil:** Metastatic breast cancer, Hodgkin's lymphoma, cutaneous T-cell lymphomas, advanced soft tissue sarcomas, recurrent or metastatic cervical cancer, advanced or metastatic uterine sarcoma.

PRECAUTIONS

Contraindications: Adriamycin: Severe hepatic impairment, recent MI, severe arrhythmias. Previous or concomitant treatment with high accumulative doses of doxorubicin, daunorubicin, idarubicin, or other anthracyclines or anthracenediones; baseline ANC count less than 1,500/mm^3. **Doxil:** Breastfeeding (Canada). **Cautions:** Hepatic impairment. Cardiomyopathy, preexisting myelosuppression, severe HF.

ACTION

Inhibits DNA, DNA-dependent RNA synthesis by binding with DNA strands. Liposomal encapsulation increases uptake by tumors, prolongs drug action, may decrease toxicity. **Therapeutic Effect:** Prevents cell division.

PHARMACOKINETICS

Widely distributed. Protein binding: 74%–76%. Does not cross blood-brain barrier. Metabolized in liver. Primarily eliminated by biliary system. Not removed by hemodialysis. **Half-life:** 20–48 hrs.

Doxil

Adjustments for Hand-Foot Syndrome, Stomatitis, Hematologic Toxicities: Refer to manufacturer's labeling.

Dosage in Hepatic Impairment

ADRIAMYCIN

Hepatic Function	Dosage
ALT, AST 2–3 times ULN	75% of normal dose
ALT, AST greater than 3 times ULN or bilirubin 1.2–3 mg/dL	50% of normal dose
Bilirubin 3.1–5 mg/dL	25% of normal dose
Bilirubin greater than 5 mg/dL	Not recommended

ULN = upper limit of normal.

DOXIL

Hepatic Function	Dosage
Bilirubin 1.2–3 mg/dL	50% of normal dose
Bilirubin greater than 3 mg/dL	25% of normal dose

SIDE EFFECTS

Frequent: Complete alopecia (scalp, axillary, pubic hair), nausea, vomiting, stomatitis, esophagitis (esp. if drug is given on several successive days), reddish urine. **Doxil:** Nausea. **Occasional:** Anorexia, diarrhea; hyperpigmentation of nailbeds, phalangeal, dermal creases. **Rare:** Fever, chills, conjunctivitis, lacrimation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Myelosuppression manifested as hematologic toxicity (principally leukopenia and, to lesser extent, anemia, thrombocytopenia) generally occurs within 10–15 days, returns to normal levels by third wk. Cardiotoxicity (either acute, manifested as transient EKG abnormalities, or chronic, manifested as HF) may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain ANC, CBC, platelet, erythrocyte counts before and at frequent intervals during therapy. Obtain EKG before therapy, LFT before each dose. Antiemetics may be effective in preventing, treating nausea.

INTERVENTION/EVALUATION

Monitor for stomatitis (burning or erythema of oral mucosa at inner margin of lips, difficulty swallowing). Observe IV injection site for infiltration, vein irritation. May lead to ulceration of mucous membranes within 2–3 days. Assess dermal creases, nailbeds for hyperpigmentation. Monitor hematologic status, renal/hepatic function studies, serum uric acid levels. Monitor daily pattern of bowel activity, stool consistency. Monitor for hematologic toxicity (fever, sore throat, signs of local infection, unusual bruising/bleeding from any site), symptoms of anemia (excessive fatigue, weakness).

PATIENT/FAMILY TEACHING

• Hair loss is reversible, but new hair growth may have different color, texture. New hair growth resumes 2–3 mos after last therapy dose. • Maintain strict oral hygiene. • Do not have immunizations without physician's approval (drug lowers resistance). • Avoid contact with those who have recently received live virus vaccine. • Promptly report fever, sore throat, signs of local infection, unusual bruising/bleeding from any site. • Report persistent nausea/vomiting. • Avoid alcohol (may cause GI irritation, a common side effect with liposomal doxorubicin).

doxycycline TOP 100

dox-i-**sye**-kleen

(Adoxa, Apo-Doxy 🍁, Doryx, Doxy-100, Doxycin 🍁, Monodox, Novo-Doxylin 🍁, Oracea, Periostat, Vibramycin, Vibra-Tabs 🍁).

Do not confuse doxycycline with dicyclomine or doxepin, Monodox with Maalox, Oracea with Orencia, Vibramycin with Vancomycin or Vibativ, or Vibra-Tabs with Vibativ.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Tetracycline. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to *H. ducreyi, Pasteurella pestis, P. tularensis, Bacteroides* spp., *V. cholerae, Brucella* spp., *Rickettsiae, Y. pestis, Francisella tularensis, M. pneumoniae* including brucellosis, chlamydia, cholera, granuloma inguinale, lymphogranuloma venereum, malaria prophylaxis, nongonococcal urethritis, pelvic inflammatory disease (PID), plague, psittacosis, relapsing fever, rickettsia infections, primary and secondary syphilis, tularemia. Treatment of inflammatory lesions in adults with rosacea. **OFF-LABEL:** Sclerosing agent for pleural effusion; vancomycin-resistant enterococci (VRE); alternative for MRSA, treatment of refractory periodontitis, juvenile periodontitis.

PRECAUTIONS

Contraindications: Hypersensitivity to tetracyclines. **Cautions:** History or predisposition to oral candidiasis. Avoid use during pregnancy, during tooth development in children. Avoid prolonged exposure to sunlight.

ACTION

Inhibits bacterial protein synthesis by binding to ribosomes. **Therapeutic Effect:** Bacteriostatic.

PHARMACOKINETICS

Rapidly absorbed after PO administration. Protein binding: 90%. Partially excreted in urine; partially eliminated in bile. **Half-life:** 15–24 hrs.

stimulant in AIDS. **OFF-LABEL:** Cancer-related anorexia.

PRECAUTIONS

Contraindications: Hypersensitivity to sesame oil, tetrahydrocannabinol products, marijuana; history of schizophrenia. **Cautions:** History of psychiatric illness, history of substance abuse, mania, depression, seizure disorder, hepatic impairment, elderly.

ACTION

Unknown. May inhibit endorphins in brain's emetic center, suppress prostaglandins synthesis or effect on cannabinoid receptor in CNS. **Therapeutic Effect:** Inhibits nausea/vomiting, stimulates appetite.

PHARMACOKINETICS

Well absorbed after PO administration, only 10%–20% reaches systemic circulation. Protein binding: 97%. Undergoes first-pass metabolism. Highly lipid soluble. Primarily excreted in feces. **Half-life:** 25–36 hrs.

antiarrhythmics) are contraindicated. **Calcium channel blockers, beta blockers** that depress SA/AV node function may increase effects. May increase concentration, toxicity of **digoxin. Simvastatin** may increase risk of myopathy, rhabdomyolysis. **CYP3A4 inducers (e.g., rifampin)** may increase risk for torsades, VF. **CYP3A4 inhibitors (e.g., ketoconazole)** may increase concentration. May increase concentration of **tacrolimus, sirolimus.** **HERBAL:** **St. John's wort** may decrease effect. **FOOD:** **Grapefruit products** may decrease effects. **LAB VALUES:** May increase serum alkaline phosphatase, ALT, AST, ANA titer. May cause changes in EKG, thyroid function tests. Expected to increase serum creatinine by about 0.1 mg/dL; elevation has rapid onset, reaches plateau after 7 days, and is reversible after discontinuation.

AVAILABILITY (Rx)

Dosage in Hepatic Impairment
Not studied; use caution.

Persistent Supine Hypertension
Reduce dose or permanently discontinue.

D

SIDE EFFECTS

Occasional (13%–7%): Headache, dizziness, nausea, hypertension.

ADVERSE EFFECTS/TOXIC REACTIONS

May cause or exacerbate supine hypertension; risk increased if administered within 3 hrs of bedtime. May increase risk of cardiovascular events, esp. in pts with history of ischemic heart disease, arrhythmias, and HF. Hyperpyrexia and confusion may indicate neuroleptic malignant syndrome (fever, hyperthermia, muscle rigidity, involuntary movements, altered mental status). May cause hypersensitivity reaction including bronchial asthma.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain orthostatic vital signs; note B/P in supine position. Initiate fall precautions. Question history of arrhythmia, cardiovascular disease, HF, hypertension, recent MI. Receive full medication history including herbal products.

INTERVENTION/EVALUATION

Closely monitor B/P, both in supine position and in elevated HOB position, esp. after any increased change in dosage. Ensure HOB is elevated when pt resting/sleeping. Monitor orthostatic vital signs for treatment effectiveness. Routinely screen for neuroleptic malignant syndrome.

PATIENT/FAMILY TEACHING

• Treatment may cause high blood pressure while lying flat. Recommend sleeping with HOB elevated. • Do not take within 3 hrs of bedtime. • Slowly go from lying to standing. • Immediately report confusion, fever, headache, muscle rigidity, involuntary movements, allergic reactions such as difficulty breathing or wheezing. • Do not breastfeed.

dulaglutide

doo-la-**gloo**-tide
(Trulicity)

■ **BLACK BOX ALERT** ■ Contraindicated in pts with a personal/family history of medullary thyroid carcinoma (MTC) or in pts with multiple endocrine neoplasia syndrome type 2 (MEN2). Unknown if dulaglutide causes thyroid cell tumors in humans.

Do not confuse dulaglutide with albiglutide or liraglutide.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: GLP-1 receptor agonist. **CLINICAL:** Antidiabetic.

USES

Adjunct to diet and exercise to improve glycemic controls in pts with type 2 diabetes mellitus.

PRECAUTIONS

Contraindications: Personal/family history of medullary thyroid carcinoma or multiple endocrine neoplasia syndrome type 2. Prior hypersensitivity reaction to drug class. **Cautions:** Pts with increased serum calcitonin, thyroid nodules, hx pancreatitis, renal impairment. Not recommended in pts with severe GI disease, diabetic ketoacidosis, or type 1 diabetes.

ACTION

Activates GLP-1 receptors in pancreatic beta cells increasing intracellular cyclic AMP. **Therapeutic Effect:** Causes glucose-dependent insulin release, decreases glucagon secretion, slows gastric emptying. Improves glycemic control.

other hypoglycemic agents or insulin. Assess pt's understanding of diabetes management, routine home glucose monitoring, medication self-administration. Assess hydration status.

D

INTERVENTION/EVALUATION

Monitor capillary blood glucose levels, Hgb A1c; renal function test in pts with renal impairment reporting severe GI reactions including diarrhea, gastroparesis, vomiting. Screen for thyroid tumors (dysphagia, dyspnea, persistent hoarseness, neck mass). If tumor suspected, consider endocrinologist consultation. Clinical significance of serum calcitonin level or thyroid ultrasound with GLP-1–associated thyroid tumors is debated/unknown. Assess for hypoglycemia, hyperglycemia, hypersensitivity/allergic reaction. Screen for glucose-altering conditions: fever, stress, surgical procedures, trauma. Obtain dietary consult for nutritional education. Encourage PO intake.

PATIENT/FAMILY TEACHING

• Diabetes mellitus requires lifelong control. Diet and exercise are principal parts of treatment; do not skip or delay meals. Test blood sugar regularly. Monitor daily calorie intake. • When taking additional medications to lower blood sugar or when glucose demands are altered (fever, infection, stress trauma), have low blood sugar treatment available (glucagon, oral dextrose). • Report suspected pregnancy or plans for breastfeeding. • Therapy may increase risk of thyroid cancer; report lumps or swelling of the neck; hoarseness, shortness of breath, trouble swallowing. • Persistent, severe abdominal pain that radiates to the back (with or without vomiting) may indicate acute pancreatitis. • Rash, itching, hives may indicate allergic reaction.

duloxetine

TOP 100

du-**lox**-e-teen
(Cymbalta)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal thinking and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse duloxetine with fluoxetine or paroxetine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin norepinephrine reuptake inhibitor (SNRI). **CLINICAL:** Antidepressant.

USES

Treatment of major depression. Management of pain associated with diabetic neuropathy, fibromyalgia, or chronic musculoskeletal pain. Treatment of generalized anxiety disorder. **OFF-LABEL:** Treatment of stress incontinence.

PRECAUTIONS

Contraindications: Uncontrolled narrow-angle glaucoma, use within 14 days of MAOIs. Concomitant use with linezolid or IV methylene blue. **Cautions:** Renal impairment, history of alcoholism, chronic hepatic disease, history of mania, pts with suicidal ideation or behavior. Concurrent use with inhibitors of CYP1A2 or thioridazine, CNS depressants. Hypertension, controlled narrow-angle glaucoma, pts with impaired GI motility. Concomitant use of NSAIDs (may increase risk of bleeding), history of seizures. Use of medications that lower seizure threshold; elderly; pts at high risk for suicide.

ACTION

Appears to inhibit serotonin and norepinephrine reuptake at CNS neuronal presynaptic membranes; is a less potent inhibitor of dopamine reuptake. **Therapeutic Effect:** Produces antidepressant effect.

D

ADVERSE EFFECTS/ TOXIC REACTIONS

May slightly increase heart rate. Colitis, dysphagia, gastritis, irritable bowel syndrome occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess appearance, behavior, speech pattern, level of interest, mood, sleep pattern, suicidal tendencies. Question pain level, intensity, location of pain.

INTERVENTION/EVALUATION

For those on long-term therapy, serum chemistry profile to assess hepatic/renal function should be performed periodically. Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Monitor B/P, mental status, anxiety, social functioning, serum glucose levels.

PATIENT/FAMILY TEACHING

• Therapeutic effect may be noted within 1–4 wks. • Do not abruptly discontinue medication. • Avoid tasks that require alertness, motor skills until response to drug is established. • Inform physician of intention of pregnancy or if pregnancy occurs. • Report anxiety, agitation, panic attacks, worsening of depression. • Avoid heavy alcohol intake (associated with severe hepatic injury).

dutasteride

du-**tas**-ter-ide
(Avodart)

FIXED-COMBINATION(S)

Jalyn: dutasteride/tamsulosin (alpha-adrenergic blocker): 0.5 mg/0.4 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Androgen hormone inhibitor. **CLINICAL:** Benign prostatic hyperplasia (BPH) agent.

USES

Treatment of benign prostatic hyperplasia (BPH), alone or in combination with tamsulosin (Flomax). **OFF-LABEL:** Treatment of hair loss.

PRECAUTIONS

Contraindications: Females who are pregnant or of childbearing potential, pediatric pts. **Cautions:** Obstructive uropathy, physical handling of tablets by those who are or may be pregnant. **Pregnancy Category X.**

ACTION

Inhibits 5-alpha reductase, an intracellular enzyme that converts testosterone into dihydrotestosterone (DHT) in the prostate gland, reducing serum DHT level. **Therapeutic Effect:** Reduces enlarged prostate gland.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	24 hrs	N/A	3–8 wks

Moderately absorbed after PO administration. Widely distributed. Protein binding: 99%. Metabolized in liver. Primarily excreted in feces. **Half-life:** Up to 5 wks.

INTERACTIONS

DRUG: **CYP3A4 inhibitors (e.g., ritonavir)** may increase concentration. **HERBAL:** Avoid **saw palmetto** (limited experience with this combination). **St. John's wort** may decrease concentration. **FOOD:** None known. **LAB VALUES:** Decreases serum prostate-specific antigen (PSA) level.

AVAILABILITY (Rx)

Generic Drugs E

ecallantide
eculizumab
efavirenz
eletriptan
eltrombopag
elvitegravir
empagliflozin
emtricitabine
enalapril
enfuvirtide
enoxaparin
entacapone
entecavir
enzalutamide
epinephrine
epirubicin
eplerenone
epoetin alfa
eprosartan
eptifibatide
eribulin
erlotinib
ertapenem
erythromycin
escitalopram
esmolol
esomeprazole
estradiol
estramustine
eszopiclone
etanercept
ethambutol
etodolac
etoposide, VP-16
etravirine
everolimus
exemestane
exenatide
ezetimibe
ezogabine

ecallantide

e-**kal**-an-tide
(Kalbitor)

■ **BLACK BOX ALERT** ■ Risk of anaphylactic reaction. Must be administered by health care personnel with appropriate support to manage anaphylaxis, hereditary angioedema and an understanding of the similarity of symptoms.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Plasma kallikrein inhibitor. **CLINICAL:** Proteolytic complex.

USES

Treatment of acute attacks of hereditary angioedema in pts 12 yrs and older.

PRECAUTIONS

Contraindications: Known hypersensitivity to other proteolytic medications or to ecallantide. **Cautions:** None known.

ACTION

Blocks inflammatory and coagulation pathways; converts kininogen to bradykinin by inactivating enzymatic active components. **Therapeutic Effect:** Reduces conversion of kininogen to bradykinin, thereby treating symptoms of hereditary angioedema.

PHARMACOKINETICS

Half-life: 1.5–2.5 hrs.

AVAILABILITY (Rx)

Single-Use Vial: 10 mg/ml. Dose supplied as three single-use vials in one carton.

ADMINISTRATION/HANDLING

Subcutaneous

Reconstitution • Withdraw 1 ml (10 mg) from each vial.

Rate of Administration • Administer as 3 subcutaneous injections. • Injection site for each injection may be in same or different anatomic locations (abdomen, thigh, upper arm). There is no need for site rotation. Injection sites should be located at least 2 inches away from anatomic site of attack.

Storage • Refrigerate unused vials. • Liquid appears as clear, colorless. Discard if solution contains particulate or is discolored. • Vials kept at room temperature must be used within 14 days or returned to refrigeration.

INDICATIONS/ROUTES/DOSAGE

Hereditary Angioedema

Subcutaneous: ADULTS, ELDERLY, ADOLESCENTS 12 YRS AND OLDER: 30 mg (3 ml) administered as three injections of 10 mg (1 ml) each. If attack persists, an additional 30-mg dose may be administered within 24 hrs.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (8%–3%): Headache, nausea, diarrhea, fever, injection site reactions, nasopharyngitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Symptoms associated with anaphylactic reactions may include chest discomfort, flushing, pharyngeal edema, pruritus, rhinorrhea, sneezing, urticaria, rash, wheezing, hypotension. Reactions occur within first hr after dosing.

dilute with equal volume of 0.9% NaCl, D_5W, or lactated Ringer's to provide final concentration of 5 mg/ml. • Final admixture is 120 ml for 600-mg dose or 180 ml for 900-mg dose. • Gently invert bag to ensure thorough mixing. • Prior to administration, allow admixture to adjust to room temperature.

Rate of Administration • Administer over 35 min. • Total infusion time should not exceed 2 hrs.

Storage • Refrigerate vials. • Discard solution that is discolored or contains particulate matter. • Solution is stable for 24 hrs at room temperature or if refrigerated.

INDICATIONS/ROUTES/DOSAGE

Paroxysmal Nocturnal Hemoglobinuria

IV Infusion: ADULTS, ELDERLY: 600 mg every 7 days for 4 doses, followed by 900 mg 7 days later, then 900 mg every 14 days thereafter.

Atypical Hemolytic Uremic Syndrome

IV Infusion: ADULTS, ELDERLY: 900 mg every 7 days for 4 doses, followed by 1,200 mg 7 days later, then 1,200 mg every 14 days thereafter. **CHILDREN (BASED ON BODY WEIGHT):**

Body Weight	Induction	Maintenance
40 kg and over	900 mg weekly × 4 doses	1,200 mg wk 5, then 1,200 mg q2wks
30–39 kg	600 mg weekly × 2 doses	900 mg wk 3, then 900 mg q2wks
20–29 kg	600 mg weekly × 2 doses	600 mg wk 3, then 600 mg q2wks
10–19 kg	600 mg weekly × 1 dose	300 mg wk 2, then 300 mg q2wks
5–9 kg	300 mg weekly × 1 dose	300 mg wk 2, then 300 mg q3wks

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (44%–23%): Headache, pharyngitis. **Occasional (19%–12%):** Back pain, nausea, cough, fatigue. **Rare (7%):** Constipation, myalgia, sinusitis, herpes simplex infection, extremity pain, influenza-like symptoms.

ADVERSE EFFECTS/ TOXIC REACTIONS

Eculizumab increases susceptibility to serious meningococcal infections (septicemia, meningitis), encapsulated bacteria. Pts who discontinue treatment may be at increased risk for serious hemolysis.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline laboratory studies. Vaccinate pts with meningococcal vaccine at least 2 wks prior to receiving first dose of eculizumab.

INTERVENTION/EVALUATION

Observe for infusion site reaction. Monitor CBC, LDH, AST, urinalysis results. Monitor for early signs of meningococcal infection (moderate to severe headache with nausea or vomiting; moderate to severe headache and fever; moderate to severe headache with stiff neck or stiff back; fever 103°F or higher; fever with rash, confusion, severe myalgia with flu-like symptoms, photosensitivity).

PATIENT/ FAMILY TEACHING

• Vaccination may not prevent meningococcal infection.

efavirenz

e-**fav**-ir-enz
(Sustiva)

FIXED COMBINATION(S)

Atripla: efavirenz/emtricitabine (an antiretroviral)/tenofovir (an antiretroviral): 600 mg/200 mg/300 mg.

Dosage: Concurrent Voriconazole
PO: Reduce efavirenz to 300 mg once daily; increase voriconazole to 400 mg q12h.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (52%): **Mild to severe:** Dizziness, vivid dreams, insomnia, confusion, impaired concentration, amnesia, agitation, depersonalization, hallucinations, euphoria. **Occasional:** **Mild to moderate:** Maculopapular rash (27%); nausea, fatigue, headache, diarrhea, fever, cough (less than 26%).

ADVERSE EFFECTS/ TOXIC REACTIONS

Serious adverse psychiatric experiences (aggressive reactions, agitation, delusions, emotional lability, mania, neurosis, paranoia, psychosis, suicide) have been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Offer emotional support. Obtain baseline ALT, AST in pts with history of hepatitis B or C; serum cholesterol or triglycerides before initiating therapy and at intervals during therapy. Obtain history of all prescription and OTC medications (high level of drug interaction).

INTERVENTION/EVALUATION

Monitor for CNS, psychological symptoms: severe acute depression (including suicidal ideation or attempts), dizziness, impaired concentration, drowsiness, abnormal dreams, insomnia (begins during first or second day of therapy, generally resolves in 2–4 wks). Assess for evidence of rash (common side effect). Monitor hepatic enzyme studies for abnormalities. Assess for headache, nausea, diarrhea.

PATIENT/FAMILY TEACHING

• Avoid high-fat meals during therapy. • Report appearance of skin rash immediately. • CNS, psychological symptoms occur in more than half of pts (dizziness, impaired concentration, delusions, depression). • Take medication every day as prescribed. • Do not alter dose or discontinue medication without informing physician. • Do not chew, crush, dissolve, or divide tablets. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • Efavirenz is not a cure for HIV infection, nor does it reduce risk of transmission to others.

eletriptan

el-e-**trip**-tan
(Relpax)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin receptor agonist. **CLINICAL:** Antimigraine.

USES

Treatment of acute migraine headache with or without aura.

PRECAUTIONS

Contraindications: Arrhythmias associated with conduction disorders, cerebrovascular syndrome including strokes and transient ischemic attacks (TIAs), coronary artery disease, hemiplegic or basilar migraine, ischemic heart disease, peripheral vascular disease including ischemic bowel disease, severe hepatic impairment, uncontrolled hypertension; use within 24 hrs of treatment with another 5-HT_1 agonist, an ergotamine-containing or ergot-type medication such as dihydroergotamine (DHE) or methysergide. **Cautions:** Mild to moderate renal/hepatic impairment, controlled hypertension, history of CVA.

and bilirubin prior to initiation of eltrombopag, every 2 wks during dose adjustment phase, and monthly following establishment of a stable dose. If bilirubin is elevated, perform fractionation. Discontinue eltrombopag if ALT levels increase to 3 times or greater upper limit of normal and are progressive, persistent for 4 or more wks, accompanied by increased direct bilirubin, clinical symptoms of hepatic injury, or evidence of hepatic decompensation.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Thrombopoietin receptor agonist. **CLINICAL:** Prevents thrombocytopenia.

USES

Treatment of thrombocytopenia in pts with chronic immune (idiopathic) thrombocytopenic purpura (ITP) with insufficient response with corticosteroids, immunoglobulins, or splenectomy. Use only in pts who are at increased risk for bleeding; should not be used to normalize platelet counts. Treatment of thrombocytopenia in pts with chronic hepatitis C to allow the initiation and maintenance of interferon-based therapy. Treatment of severe aplastic anemia in pts having an insufficient response to immunosuppressive therapy.

PRECAUTIONS

Contraindications: None known. **Cautions:** Preexisting hepatic impairment, renal impairment (any degree), myelodysplastic syndrome (may increase risk for hematologic malignancies). Pts with known risk for thromboembolism, risk for cataracts.

ACTION

Interacts with the human thrombopoietin receptor and initiates signaling cascades. **Therapeutic Effect:** Induces proliferation and differentiation of megakaryocytes from bone marrow progenitor cells.

PHARMACOKINETICS

Readily absorbed from gastrointestinal tract. Primarily distributed in blood cells. Protein binding: 99%. Extensively metabolized including oxidation, conjugation with glucuronic acid or cysteine. Excreted primarily in feces. **Half-life:** 26–35 hrs.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Integrase strand transfer inhibitor. **CLINICAL:** Antiretroviral agent.

USES

Used in combination with an HIV protease inhibitor, co-administered with ritonavir and other antiretroviral medications for the treatment of HIV-1 infection in antiretroviral treatment–experienced adults.

PRECAUTIONS

Contraindications: None known. **Cautions:** Diabetes, hepatic impairment, hypercholesterolemia. Not recommended with a HIV protease inhibitor and cobicistat combination; co-administration of HIV-1 protease inhibitors other than atazanavir, darunavir, fosamprenavir, lopinavir, and tipranavir.

ACTION

Inhibits HIV integrase by preventing integration of HIV-1 DNA into host DNA, blocking formation of HIV-1 provirus. **Therapeutic Effect:** Interferes with HIV replication, slowing progression of HIV infection.

PHARMACOKINETICS

Readily absorbed after PO administration. Metabolized in liver. Protein binding: 98%–99%. Peak plasma concentration: 4 hrs. Eliminated in feces (95%), urine (7%). **Half-life:** 8.7 hrs.

dialysis. **Cautions:** Not recommended in type 1 diabetes, diabetic ketoacidosis. Concurrent use of diuretics, other hypoglycemic medications, mild to moderate renal impairment, hypovolemia (dehydration/anemia), elderly, those with low systolic B/P, hyperlipidemia, pts with history of genital mycotic infection.

ACTION

Increases excretion of urinary glucose by inhibiting reabsorption of filtered glucose in kidney. Inhibits SGLT2 in proximal renal tubule. **Therapeutic Effect:** Lowers serum glucose levels.

PHARMACOKINETICS

Readily absorbed following PO administration. Metabolized in liver by glucuronidation. Peak plasma concentration: 1.5 hrs. Protein binding: 86%. Excreted in urine (54%) and feces (41%). **Half-life:** 12.4 hrs.

E

AVAILABILITY (Rx)

Capsules: 200 mg. **Oral Solution:** 10 mg/ml.

ADMINISTRATION/HANDLING

PO

- Give without regard to food.

INDICATIONS/ROUTES/DOSAGE

HIV

Capsules

PO: ADULTS, ELDERLY, CHILDREN 3 MOS–17 YRS, WEIGHING MORE THAN 33 KG: 200 mg once daily.

Oral Solution

PO: ADULTS, ELDERLY: 240 mg once daily. **CHILDREN 3 MOS–17 YRS WEIGHING MORE THAN 33 KG:** 6 mg/kg once daily. **Maximum:** 240 mg once daily. **CHILDREN 0–3 MOS:** 3 mg/kg/day.

Dosage in Renal Impairment

Creatinine Clearance	Capsule	Oral Solution
30–49 ml/min	200 mg q48h	120 mg q24h
15–29 ml/min	200 mg q72h	80 mg q24h
Less than 15 ml/min; hemodialysis pts	200 mg q96h	60 mg q24h (administer after dialysis)

Administer after dialysis on dialysis days.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (23%–13%): Headache, rhinitis, rash, diarrhea, nausea. **Occasional (14%–4%):** Cough, vomiting, abdominal pain, insomnia, depression, paresthesia, dizziness, peripheral neuropathy, dyspepsia, myalgia. **Rare (3%–2%):** Arthralgia, abnormal dreams.

ADVERSE EFFECTS/ TOXIC REACTIONS

Lactic acidosis, hepatomegaly with steatosis (excess fat in liver) occur rarely; may be severe.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline laboratory tests, esp. hepatic function, serum triglycerides before beginning and at periodic intervals during therapy. Offer emotional support.

INTERVENTION/EVALUATION

Monitor daily pattern of bowel activity, stool consistency. Question for evidence of nausea, pruritus. Assess skin for rash, urticaria. Monitor serum chemistry tests, LFT for marked abnormalities, signs/symptoms of lactic acidosis.

PATIENT/FAMILY TEACHING

• May cause redistribution of body fat. • Continue therapy for full length of treatment. • Emtricitabine is not a cure for HIV infection, nor does it reduce risk of transmission to others. • Pts may continue to acquire illnesses associated with advanced HIV infection. • Avoid tasks that require alertness, motor skills until response to drug is established. • Report persistent or severe abdominal pain, nausea, vomiting, numbness.

enalapril

en-**al**-a-pril
(Apo-Enalapril, Epaned, Novo-Enalapril, Vasotec)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

Do not confuse enalapril with Anafranil, Elavil, Eldepryl, or ramipril.

FIXED-COMBINATION(S)

Lexxel: enalapril/felodipine (calcium channel blocker): 5 mg/2.5 mg, 5 mg/5 mg. **Teczem:** enalapril/diltiazem (calcium channel blocker): 5 mg/180 mg. **Vaseretic:** enalapril/hydrochlorothiazide (diuretic): 5 mg/12.5 mg, 10 mg/25 mg.

Rate of Administration • For IV push, give undiluted over 5 min. • For IV piggyback, infuse over 10–15 min.
Storage • Store parenteral form at room temperature. • Use only clear, colorless solution. • Diluted IV solution is stable for 24 hrs at room temperature.

PO

• Give without regard to food. • Tablets may be crushed.

Epaned

• Reconstitute with 150 ml Ora-Sweet SF (provided) to produce a 1 mg/ml concentration. Stable for 60 days after reconstitution.

IV INCOMPATIBILITIES

Amphotericin B (Fungizone), amphotericin B complex (Abelcet, AmBisome, Amphotec), cefepime (Maxipime), phenytoin (Dilantin).

IV COMPATIBILITIES

Calcium gluconate, dexmedetomidine (Precedex), dobutamine (Dobutrex), dopamine (Intropin), fentanyl (Sublimaze), heparin, lidocaine, magnesium sulfate, morphine, nitroglycerin, potassium chloride, potassium phosphate, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Hypertension

PO: ADULTS, ELDERLY: Initially, 2.5–5 mg/day. May increase at 1–2 wk intervals. Range: 2.5–40 mg/day in 1–2 divided doses. **CHILDREN 1 MO–16 YRS:** 0.08 mg/kg/day in 1–2 divided doses. **Maximum:** 5 mg/day. **NEONATES:** 0.04–0.1 mg/kg/day given q24h. **Epaned: ADULTS, ELDERLY:** Initially, 5 mg once daily. **CHILDREN:** Initially, 0.08 mg/kg once daily. **Maximum:** 5 mg.
IV: ADULTS, ELDERLY: 0.625–1.25 mg q6h up to 5 mg q6h.

Adjunctive Therapy for HF

PO: ADULTS, ELDERLY: Initially, 2.5–5 mg/day. Titrate slowly at 1–2 wk intervals. Range: 5–40 mg/day in 2 divided doses.

Asymptomatic Left Ventricular Dysfunction

PO: ADULTS, ELDERLY: 2.5 mg twice daily. Titrate up to 20 mg/day.

Dosage in Renal Impairment

Creatinine Clearance	PO	IV
30 ml/min or greater	5 mg/day; titrate to maximum 40 mg/day	1.25 mg q6h; titrate to desired response
Less than 30 ml/min	2.5 mg/day; titrate to control B/P	0.626 mg q6h; titrate to desired response

Hemodialysis: Initially, 2.5 mg on dialysis days, adjust dose on non-dialysis days depending on B/P.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (7%–5%): Headache, dizziness. **Occasional (3%–2%):** Orthostatic hypotension, fatigue, diarrhea, cough, syncope. **Rare (less than 2%):** Angina, abdominal pain, vomiting, nausea, rash, asthenia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Excessive hypotension ("first-dose syncope") may occur in pts with HF, severe salt or volume depletion. Angioedema (facial, lip swelling), hyperkalemia occur rarely. Agranulocytosis, neutropenia may be noted in pts with renal impairment, collagen vascular diseases (scleroderma, systemic lupus erythematosus). Nephrotic syndrome may be noted in those with history of renal disease.

use within 24 hrs. • Bring reconstituted solution to room temperature before injection.

INDICATIONS/ROUTES/DOSAGE

HIV Infection

Subcutaneous: ADULTS, ELDERLY: 90 mg (1 ml) twice a day. **CHILDREN 6–16 YRS:** 2 mg/kg twice a day. **Maximum:** 90 mg twice a day.

Pediatric Dosing Guidelines

Weight: kg (lb)	Dose: mg (ml)
11–15.5 (24–34)	27 (0.3)
15.6–20 (35–44)	36 (0.4)
20.1–24.5 (45–54)	45 (0.5)
24.6–29 (55–64)	54 (0.6)
29.1–33.5 (65–74)	63 (0.7)
33.6–38 (75–84)	72 (0.8)
38.1–42.5 (85–94)	81 (0.9)
Greater than 42.5 (greater than 94)	90 (1)

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Expected (98%): Local injection site reactions (pain, discomfort, induration, erythema, nodules, cysts, pruritus, ecchymosis). **Frequent (26%–16%):** Diarrhea, nausea, fatigue. **Occasional (11%–4%):** Insomnia, peripheral neuropathy, depression, cough, decreased appetite or weight loss, sinusitis, anxiety, asthenia, myalgia, cold sores. **Rare (3%–2%):** Constipation, influenza, conjunctivitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

May potentiate bacterial pneumonia. Hypersensitivity (rash, fever, chills, rigors, hypotension), thrombocytopenia, neutropenia, renal insufficiency/failure occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline laboratory tests, esp. CBC, LFT, triglycerides before beginning enfuvirtide therapy and at periodic intervals during therapy. Offer emotional support.

INTERVENTION/EVALUATION

Assess skin for local injection site hypersensitivity reaction. Question for evidence of nausea, fatigue. Assess sleep pattern. Monitor for insomnia, signs/symptoms of depression, pneumonia. Monitor CBC, serum chemistry tests for marked abnormalities.

PATIENT/FAMILY TEACHING

• Increased rate of bacterial pneumonia has occurred with enfuvirtide therapy; seek medical attention if cough with fever, rapid breathing occurs. • Continue therapy for full length of treatment. • Enfuvirtide is not a cure for HIV infection, nor does it reduce risk of transmission to others. • Report if injection site reaction is severe.

enoxaparin

TOP 100 HIGH ALERT

en-**ox**-a-par-in
(Lovenox)

■ **BLACK BOX ALERT** ■ Epidural or spinal anesthesia greatly increases potential for spinal or epidural hematoma, subsequent long-term or permanent paralysis.

Do not confuse Lovenox with Lasix, Levaquin, Lotronex, or Protonix.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Low-molecular-weight heparin. **CLINICAL:** Anticoagulant.

USES

Prevention of postop deep vein thrombosis (DVT) following hip or knee replacement

hip surgery: 40 mg with initial dose within 9–15 hrs before surgery.

Prevention of DVT After Abdominal Surgery

Subcutaneous: ADULTS, ELDERLY: 40 mg a day for 7–10 days, with initial dose given 2 hrs prior to surgery.

Prevention of DVT After Bariatric Surgery

BMI 50 or less (kg/m^2): 40 mg q12h. BMI greater than 50 kg/m^2: 60 mg q12h.

Prevention of Long-Term DVT in Nonsurgical Acute Illness

Subcutaneous: ADULTS, ELDERLY: 40 mg once a day; continue until risk of DVT has diminished (usually 6–11 days).

Prevention of Ischemic Complications of Unstable Angina, Non–Q-Wave MI (with Oral Aspirin Therapy)

Subcutaneous: ADULTS, ELDERLY: 1 mg/kg q12h (with oral aspirin).

STEMI

Subcutaneous: ADULTS YOUNGER THAN 75 YRS: 30 mg IV once plus 1 mg/kg q12h (**maximum:** 100 mg first 2 doses only). **ADULTS 75 YRS OR OLDER:** 0.75 mg/kg (**maximum:** 75 mg first 2 doses only) q12h.

Acute DVT

Subcutaneous: ADULTS, ELDERLY: 1 mg/kg q12h or 1.5 mg/kg once daily.

Usual Pediatric Dosage

Subcutaneous: CHILDREN 2 MOS AND OLDER: 0.5 mg/kg q12h (prophylaxis); 1 mg/kg q12h (treatment). **NEONATES, INFANTS YOUNGER THAN 2 MOS:** 0.75/mg/kg/dose q12h (prophylaxis); 1.5 mg/kg/dose q12h (treatment).

Dosage in Renal Impairment

Clearance is decreased when creatinine clearance is less than 30 ml/min. Monitor and adjust dosage as necessary.

Use	Dosage
Abdominal surgery, pts with acute illness	30 mg once/day
Hip, knee surgery	30 mg once/day
DVT, angina, MI	1 mg/kg once/day
STEMI: (<75 yrs)	30 mg IV once plus 1 mg/kg q24h
STEMI (75 yrs or greater)	1 mg/kg q24h
NSTEMI	1 mg/kg q24h

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (4%–1%): Injection site hematoma, nausea, peripheral edema.

ADVERSE EFFECTS/ TOXIC REACTIONS

May lead to bleeding complications ranging from local ecchymoses to major hemorrhage. May cause heparin-induced thrombocytopenia (HIT). **Antidote:** IV injection of protamine sulfate (1% solution) equal to dose of enoxaparin injected. One mg protamine sulfate neutralizes 1 mg enoxaparin. One additional dose of 0.5 mg protamine sulfate per 1 mg enoxaparin may be given if aPTT tested 2–4 hrs after first injection remains prolonged.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC. Note platelet count. Assess potential risk of bleeding.

INTERVENTION/EVALUATION

Periodically monitor CBC, platelet count, stool for occult blood (no need for daily monitoring in pts with normal presurgical coagulation parameters). Assess for any sign of bleeding (bleeding at surgical site, hematuria, blood in stool, bleeding from gums, petechiae, bruising, bleeding from injection sites).

PATIENT/FAMILY TEACHING

• Usual length of therapy is 7–10 days. • Do not take any OTC medication

ADVERSE EFFECTS/ TOXIC REACTIONS

Hallucinations may be noted.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Monitor for evidence of dyskinesia (difficulty with movement). Assess for clinical reversal of symptoms (improvement of tremor of head and hands at rest, mask-like facial expression, shuffling gait, muscular rigidity). Monitor B/P, hepatic function tests. Assess for orthostatic hypotension, diarrhea.

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • May cause color change in urine or sweat (dark yellow, orange). • Report any uncontrolled movement of face, eyelids, mouth, tongue, arms, hands, legs.

entecavir

en-**tek**-a-veer
(Baraclude)

■ **BLACK BOX ALERT** ■ Serious, sometimes fatal, hypersensitivity reaction, lactic acidosis, severe hepatomegaly with steatosis (fatty liver) have occurred. May cause HIV resistance in chronic hepatitis B pts. Severe acute exacerbations of hepatitis B may occur upon discontinuation of entecavir.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Reverse transcriptase inhibitor. **CLINICAL:** Antiretroviral agent.

USES

Treatment of chronic hepatitis B virus (HBV) infection with evidence of active viral replication and evidence of either persistent transaminase elevations or histologically active disease or evidence of decompensated hepatic disease. **OFF-LABEL:** HBV reinfection prophylaxis, post–liver transplant, HIV/HBV coinfection.

PRECAUTIONS

Contraindications: None known. **Cautions:** Renal impairment, pts receiving concurrent therapy that may reduce renal function.

ACTION

Inhibits hepatitis B viral polymerase, an enzyme blocking reverse transcriptase activity. **Therapeutic Effect:** Interferes with viral DNA synthesis.

PHARMACOKINETICS

Poorly absorbed from GI tract. Protein binding: 13%. Extensively distributed into tissues. Partially metabolized in liver. Eliminated primarily in urine. **Half-life:** 5–6 days (increased in renal impairment).

PRECAUTIONS

Contraindications: Women who are pregnant or may become pregnant (not indicated in female population). **Cautions:** History of seizure, underlying brain injury with loss of consciousness, transient ischemic attack within past 12 mos, CVA, brain metastases, brain arteriovenous abnormality, use of concurrent medications that may lower seizure threshold.

ACTION

Inhibits androgen binding to androgen receptors in target tissue, and inhibits interaction with DNA. **Therapeutic Effect:** Decreases proliferation, induces cell death of prostate cancer cells.

PHARMACOKINETICS

Readily absorbed in GI tract. Maximum plasma concentration achieved in 0.5–3 hrs. Metabolized in liver. Protein binding: (97%–98%). Primarily excreted in urine. **Half-life:** 5.8 days (Range: 2.8–10.2 days).

urine. Ophthalmic form may be systemically absorbed as a result of drainage into nasal pharyngeal passages. Mydriasis occurs within several min and persists several hrs; vasoconstriction occurs within 5 min and lasts less than 1 hr.

HF, severe arrhythmias. **Cautions:** Renal/hepatic/cardiac impairment.

ACTION

Inhibits DNA, RNA, protein synthesis by steric obstruction. Inhibits DNA helicase activity, preventing enzymatic separation of double-stranded DNA, interfering with replication, transcription. **Therapeutic Effect:** Produces cytotoxic activity.

PHARMACOKINETICS

Widely distributed into tissues. Protein binding: 77%. Metabolized in liver and RBCs. Primarily eliminated through biliary excretion. Not removed by hemodialysis. **Half-life:** 33 hrs.

PRECAUTIONS

Contraindications: Concurrent use with strong CYP3A4 inhibitors (e.g., ketoconazole, itraconazole), creatinine clearance less than 30 ml/min, serum potassium level greater than 5.5 mEq/L. **Hypertension:** Type 2 diabetes with microalbuminuria; CrCl less than 50 ml/min; serum creatinine greater than 2 mg/dL in men, greater than 1.8 mg/dL in women; concomitant use of potassium supplements or potassium-sparing diuretics. **Cautions:** Hyperkalemia, HF, post MI, diabetes, mild renal impairment.

ACTION

Binds to mineralocorticoid receptors in kidney, heart, blood vessels, brain, blocking binding of aldosterone. **Therapeutic Effect:** Reduces B/P.

PHARMACOKINETICS

Absorption unaffected by food. Protein binding: 50%. Metabolized in liver. Excreted in urine (67%), feces (32%). Not removed by hemodialysis. **Half-life:** 4–6 hrs.

PHARMACOKINETICS

Well absorbed after subcutaneous administration. Following administration, an increase in reticulocyte count occurs within 10 days, and increases in Hgb, Hct, and RBC count are seen within 2–6 wks. **Half-life:** 4–13 hrs.

zidovudine-treated HIV pts. Monitor serum BUN, uric acid, creatinine, phosphorus, potassium, esp. in chronic renal failure pts.

PATIENT/FAMILY TEACHING

• Frequent laboratory assessments needed to determine correct dosage. • Immediately report any severe headache. • Avoid potentially hazardous activity during first 90 days of therapy (increased risk of seizures in pts with chronic renal failure during first 90 days). • Specific dietary regimen must be maintained.

eprosartan

ep-roe-**sar**-tan
(Teveten)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

FIXED COMBINATION(S)

Teveten HCT: eprosartan/hydrochlorothiazide (a diuretic): 400 mg/12.5 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Angiotensin II receptor antagonist. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension (alone or in combination with other medications).

PRECAUTIONS

Contraindications: Concomitant use with aliskiren in pts with diabetes. **Cautions:** Unstented renal artery stenosis, preexisting renal insufficiency.

ACTION

Potent vasodilator. Blocks vasoconstrictor, aldosterone-secreting effects of angiotensin II, inhibiting binding of angiotensin II to AT_1 receptors. **Therapeutic Effect:** Causes vasodilation, decreases peripheral resistance, decreases B/P.

PHARMACOKINETICS

Rapidly absorbed after PO administration. Protein binding: 98%. Minimally metabolized in liver. Primarily excreted via urine, biliary system. Minimally removed by hemodialysis. **Half-life:** 5–9 hrs.

ADMINISTRATION/HANDLING

lasting more than 1 wk occurred in 12%. Anemia occurs in 58% of pts. Peripheral neuropathy occurs in 8% of pts but is the most common adverse reaction requiring discontinuation of therapy. Prolonged QTc may be noted on or after day 8 of treatment.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for possibility of pregnancy. Obtain baseline CBC, serum chemistries before treatment begins. Obtain CBC prior to each dose.

INTERVENTION/EVALUATION

Diligently monitor for neutropenia, peripheral neuropathy (most frequent cause of drug discontinuation). Monitor for symptoms of neuropathy (burning sensation, hyperesthesia, hypoesthesia, paresthesia, discomfort, neuropathic pain). Assess hands, feet for erythema. Monitor CBC for evidence of neutropenia, thrombocytopenia. Assess mouth for stomatitis (erythema, ulceration, mucosal burning).

PATIENT/FAMILY TEACHING

• Avoid crowds, those with known infection. • Avoid contact with anyone who recently received live virus vaccine. • Do not have immunizations without physician's approval (drug lowers body resistance). • Promptly report fever over 100.5°F, chills, cough, burning or pain urinating, numbness, tingling, burning sensation, erythema of hands/feet.

erlotinib

HIGH ALERT

er-**loe**-ti-nib
(Tarceva)
Do not confuse erlotinib with dasatinib, eribulin, geftinib, imatinib, or lapatinib.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Human epidermal growth factor. **CLINICAL:** Antineoplastic.

USES

Treatment of locally advanced or metastatic non–small-cell lung cancer (NSCLC) after failure of at least one prior chemotherapy regimen (as monotherapy). Treatment of locally advanced, unresectable, or metastatic pancreatic cancer (in combination with gemcitabine). Maintenance treatment of locally advanced or metastatic NSCLC that has not progressed after 4–6 cycles of first-line platinum-based chemotherapy.

PRECAUTIONS

Contraindications: None known. **Cautions:** Severe hepatic/renal impairment cardiovascular disease. Concurrent use of strong CYP3A4 inhibitors and inducers (see Appendix J), pts at risk for GI perforation (e.g., peptic ulcer disease, diverticular disease).

ACTION

Reversibly inhibits overall epidermal growth factor receptor (EGFR)–tyrosine kinase activity. **Therapeutic Effect:** Produces tumor cell death.

PHARMACOKINETICS

About 60% is absorbed after PO administration; bioavailability is increased by food to almost 100%. Protein binding: 93%. Extensively metabolized in liver. Primarily eliminated in feces (83%), urine (8%). **Half-life:** 24–36 hrs.

Peptostreptococcus spp., including moderate to severe intra-abdominal, skin/skin structure infections; community-acquired pneumonia; complicated UTI; acute pelvic infection; adult diabetic foot infections without osteomyelitis. Prevention of surgical site infection. **OFF-LABEL:** Treatment of IV catheter–related bloodstream infection; prosthetic joint infection.

PRECAUTIONS

Contraindications: History of anaphylactic hypersensitivity to beta-lactams (e.g., imipenem and cilastin, meropenem), hypersensitivity to amide-type local anesthetics (IM). **Cautions:** Hypersensitivity to penicillins, cephalosporins, renal impairment, CNS disorders, esp. brain lesions or history of seizures, elderly.

ACTION

Penetrates bacterial cell wall of microorganisms, binds to penicillin-binding proteins, inhibiting cell wall synthesis. **Therapeutic Effect:** Produces bacterial cell death.

PHARMACOKINETICS

Almost completely absorbed after IM administration. Protein binding: 85%–95%. Widely distributed. Primarily excreted in urine (80%), feces (10%). Removed by hemodialysis. **Half-life:** 4 hrs.

derivatives, lovastatin, simvastatin. **Cautions:** Elderly, myasthenia gravis, strong CYP3A4 inhibitor, hepatic impairment, pts with prolonged QT intervals, uncorrected hypokalemia or hypomagnesemia, concurrent use of class IA or III antiarrhythmics.

ACTION

Penetrates bacterial cell membranes, reversibly binds to bacterial ribosomes, inhibiting protein synthesis. **Therapeutic Effect:** Bacteriostatic.

PHARMACOKINETICS

Variably absorbed from GI tract (depending on dosage form used). Protein binding: 70%–90%. Widely distributed. Metabolized in liver. Primarily eliminated in feces by bile. Not removed by hemodialysis. **Half-life:** 1.4–2 hrs (increased in renal impairment).

USES

Treatment of major depressive disorder. Treatment of generalized anxiety disorder (GAD). **OFF-LABEL:** Treatment of mild dementia-associated agitation in nonpsychotic pt; vasomotor symptoms associated with menopause.

PRECAUTIONS

Contraindications: Use within 14 days of MAOIs. **Cautions:** Hepatic/renal impairment, history of seizures, concurrent use of CNS depressants, pts at high risk of suicide, concomitant aspirin, NSAIDs, warfarin (may potentiate bleeding risk), elderly.

ACTION

Blocks uptake of neurotransmitter serotonin at neuronal presynaptic membranes, increasing its availability at postsynaptic receptor sites. **Therapeutic Effect:** Antidepressant effect.

PHARMACOKINETICS

Well absorbed after PO administration. Protein binding: 56%. Primarily metabolized in liver. Primarily excreted in feces, with a lesser amount eliminated in urine. **Half-life:** 35 hrs.

AVAILABILITY (Rx)

Injection Solution: 10 mg/ml (250 ml), 20 mg/ml (100 ml).

ADMINISTRATION/HANDLING

◀ALERT▶ Give by IV infusion. Avoid butterfly needles, very small veins (can cause thrombophlebitis).

Storage • Use only clear and colorless to very slightly yellow solution. • Discard solution if particulate forms. • IV infusion stable for 12 hrs in 0.9% NaCl or lactated Ringer's; 6 hrs in D_5W.

PO (Capsules)

• Give 1 hr or more before eating (best before breakfast). • Do not crush, cut capsule; administer whole. • For those with difficulty swallowing capsules, open capsule and mix pellets with 1 tbsp applesauce. Swallow immediately without chewing.

PO (Oral Suspension)

• Empty contents into 5 ml water for 2.5 mg, 5 mg; 15 ml for 10 mg, 20 mg, 40 mg and stir. • Let stand 2–3 min to thicken. • Stir and drink within 30 min.

IV INCOMPATIBILITIES

Do not mix esomeprazole with any other medications through the same IV line or tubing.

IV COMPATIBILITIES

Ceftaroline (Teflaro), doripenem (Doribax).

INDICATIONS/ROUTES/DOSAGE

Erosive Esophagitis

PO: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 20–40 mg once daily for 4–8 wks. May continue for additional 4–8 wks. **CHILDREN 1–11 YRS, WEIGHING 20 KG OR MORE:** 10–20 mg/day for up to 8 wks. **WEIGHING LESS THAN 20 KG:** 10 mg/day for up to 8 wks.

Maintenance Therapy for Erosive Esophagitis

PO: ADULTS, ELDERLY: 20 mg/day.

Treatment of NSAID-Induced Gastric Ulcers

PO: ADULTS, ELDERLY: 20 mg/day for 4–8 wks.

Prevention of NSAID-Induced Gastric Ulcer

PO: ADULTS, ELDERLY: 20–40 mg once a day for up to 6 mos.

Gastroesophageal Reflux Disease (GERD)

IV: ADULTS, ELDERLY: 20 or 40 mg once daily for up to 10 days. **CHILDREN 1–17 YRS, WEIGHING 55 KG OR MORE:** 20 mg once daily; **1–17 YRS, WEIGHING LESS THAN 55 KG:** 10 mg once daily; **1 MO TO LESS THAN 1 YR:** 0.5 mg/kg once daily.
PO: ADULTS, ELDERLY, CHILDREN, 12–17 YRS: 20 mg once daily. **CHILDREN 1–11 YRS:** 10 mg/day for up to 8 wks.

Zollinger-Ellison Syndrome

PO: ADULTS, ELDERLY: 40 mg 2 times a day. Doses up to 240 mg/day have been used.

Duodenal Ulcer Caused by *Helicobacter Pylori*

PO: ADULTS, ELDERLY: 40 mg (esomeprazole) once a day, with amoxicillin 1,000 mg and clarithromycin 500 mg twice a day for 10 days.

Dosage in Renal Impairment

No dose adjustment.

Dosage Hepatic Impairment

Severe: Doses should not exceed 20 mg/day.

SIDE EFFECTS

Frequent (7%): Headache. **Occasional (3%–2%):** Diarrhea, abdominal pain, nausea. **Rare (less than 2%):** Dizziness, asthenia, vomiting, constipation, rash, cough.

ADVERSE EFFECTS/ TOXIC REACTIONS

Pancreatitis, hepatotoxicity, interstitial nephritis occur rarely.

Metabolized in liver. Primarily excreted in urine. **Half-life:** Unknown.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess frequency/severity of vasomotor symptoms. Question for hypersensitivity to estrogen, previous jaundice, thromboembolic disorders associated with pregnancy, estrogen therapy. Question for possibility of pregnancy (Pregnancy Category X).

INTERVENTION/EVALUATION

Monitor B/P, weight, serum calcium, glucose, hepatic enzymes. Monitor for loss of vision, sudden onset of proptosis, diplopia, migraine, thromboembolic disorders.

PATIENT/FAMILY TEACHING

• Limit alcohol, caffeine. • Avoid grapefruit products. • Immediately report sudden headache, vomiting, disturbance of vision/speech, numbness/weakness of extremities, chest pain, calf pain, shortness of breath, severe abdominal pain, mental depression, unusual bleeding. • Avoid smoking. • Report abnormal vaginal bleeding. • Never place patch on breast or waistline.

estramustine

HIGH ALERT

es-tra-**mus**-teen
(Emcyt)
Do not confuse Emcyt with Eryc, or estramustine with exemestane.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Alkylating agent, estrogen/nitrogen mustard.
CLINICAL: Antineoplastic.

USES

Treatment of metastatic or progressive carcinoma of prostate gland.

PRECAUTIONS

Contraindications: Active thrombophlebitis or thromboembolic disorders (unless tumor is cause of thromboembolic disorder and benefits outweigh risk), hypersensitivity to estradiol, nitrogen mustard. **Cautions:** History of thrombophlebitis, thrombosis, thromboembolic disorders; cerebrovascular, coronary artery disease; hepatic impairment; renal insufficiency, diabetes, pts with fluid accumulation; migraine, seizure disorder; hypertension.

ACTION

Binds to microtubule-associated proteins, causing their disassembly. **Therapeutic Effect:** Reduces serum testosterone concentration, increases estrogen levels.

PHARMACOKINETICS

Well absorbed from GI tract. Highly localized in prostatic tissue. Metabolized in liver. Primarily eliminated in feces by biliary system. **Half-life:** 20 hrs.

INTERACTIONS

DRUG: **Alcohol, anticonvulsants, antihistamines, other CNS depressants** may increase CNS depression. **CYP3A4 inhibitors (e.g., clarithromycin, itraconazole, ketoconazole, nelfinavir, ritonavir)** may increase concentration/toxicity. **HERBAL:** **Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depression. **FOOD:** Onset of action may be reduced if taken with or immediately after a **high-fat meal.** **LAB VALUES:** None known.

AVAILABILITY (Rx)

SIDE EFFECTS

Frequent (37%): Injection site erythema, pruritus, pain, swelling; abdominal pain, vomiting (more common in children than adults). **Occasional (16%–4%):** Headache, rhinitis, dizziness, pharyngitis, cough, asthenia, abdominal pain, dyspepsia. **Rare (less than 3%):** Sinusitis, allergic reaction.

ADVERSE EFFECTS/ TOXIC REACTIONS

Infection (pyelonephritis, cellulitis, osteomyelitis, wound infection, leg ulcer, septic arthritis, diarrhea, bronchitis, pneumonia) occurs in 29%–38% of pts. Rare adverse effects include heart failure, hypertension, hypotension, pancreatitis, GI hemorrhage.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain, inflammation. If significant exposure to varicella virus has occurred during treatment, therapy should be temporarily discontinued and treatment with varicella-zoster immune globulin should be considered.

INTERVENTION/EVALUATION

Assess for improvement of joint swelling, pain, tenderness. Monitor erythrocyte sedimentation rate (ESR), C-reactive protein level, CBC with differential, platelet count. Observe for signs of infection.

PATIENT/FAMILY TEACHING

• Instruct pt in subcutaneous injection technique, including areas of body acceptable as injection sites. • Injection site reaction generally occurs in first mo of treatment and decreases in frequency during continued therapy. • Do not receive live vaccines during treatment. • Report persistent fever, bruising, bleeding, pallor.

ethambutol

eth-**am**-bue-tol
(Etibi, Myambutol)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Isonicotinic acid derivative. **CLINICAL:** Antitubercular.

USES

In conjunction with other antitubercular agents for treatment of pulmonary tuberculosis. **OFF-LABEL:** Treatment of atypical mycobacterial infections (e.g., *Mycobacterium avium* complex [MAC]).

PRECAUTIONS

Contraindications: Optic neuritis. Use in young children, unconscious pts, or anyone unable to report visual changes. **Cautions:** Renal dysfunction, ocular defects (diabetic retinopathy, cataracts), recurrent ocular inflammatory conditions. Not recommended for children 13 yrs and younger (unless benefit outweighs risk).

ACTION

Inhibits arabinosyl transferase causing impaired mycobacterial cell wall synthesis. **Therapeutic Effect:** Suppresses multiplication of mycobacteria.

PHARMACOKINETICS

Rapidly, well absorbed from GI tract. Protein binding: 20%–30%. Widely distributed. Metabolized in liver. Primarily excreted in urine. Removed by hemodialysis. **Half-life:** 3–4 hrs (increased in renal impairment).

USES

Acute and long-term treatment of osteoarthritis, management of pain, treatment of rheumatoid arthritis (RA), juvenile idiopathic arthritis (JIA).

PRECAUTIONS

Contraindications: Perioperative pain in setting of CABG surgery, history of hypersensitivity to aspirin, NSAIDs. **Cautions:** Renal/hepatic impairment, history of GI tract disease, predisposition to fluid retention, HF. Active peptic ulcer disease, chronic inflammation of GI tract, GI bleeding/ulceration. Cardiovascular disease; concurrent use of aspirin, anticoagulants; smoking; elderly; use of alcohol; debilitated pts; asthma.

ACTION

Produces analgesic, anti-inflammatory effects by inhibiting prostaglandin synthesis. **Therapeutic Effect:** Reduces inflammatory response, intensity of pain.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (analgesic)	2–4 hrs	N/A	4–12 hrs

Completely absorbed from GI tract. Protein binding: greater than 99%. Widely distributed. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 6–7 hrs. **Extended-release:** 12 hrs.

PHARMACOKINETICS

Variably absorbed from GI tract. Rapidly distributed, low concentrations in CSF. Protein binding: 97%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 3–12 hrs.

USES

Used in combination with at least two other antiretroviral agents for treatment of HIV-1 infection in antiretroviral treatment-experienced adults and children 6 yrs and older weighing at least 16 kg.

PRECAUTIONS

Contraindications: None known. **Cautions:** Severe hepatic impairment, renal impairment, elderly.

ACTION

Binds directly to HIV-1 reverse transcriptase, changing shape of enzyme, blocking RNA-, DNA-dependent DNA polymerase activity. **Therapeutic Effect:** Interferes with HIV replication, slowing progression of HIV infection.

PHARMACOKINETICS

Well absorbed following PO administration if given following a meal. Protein binding: 99.6%. Metabolized in liver. Eliminated in feces and urine. **Half-life:** 41 hrs.

(e.g., carbamazepine, dexamethasone, phenobarbital, phenytoin, rifabutin, rifampin, rifapentine) may decrease concentration. **P-gp inhibitors (e.g., cyclosporine)** may increase everolimus concentration, toxicity. **Statins** may increase risk of rhabdomyolysis. **FOOD:** **High-fat meals** may reduce plasma concentration. **Grapefruit products** may increase concentration (potential for myelotoxicity, nephrotoxicity). **HERBAL:** **St. John's wort** may decrease plasma concentration. **LAB VALUES:** May increase serum BUN, creatinine, glucose, triglycerides, lipids. May decrease WBCs, neutrophils, Hgb, platelets.

AVAILABILITY (Rx)

PHARMACOKINETICS

Rapidly absorbed after PO administration. Protein binding: 90%. Distributed extensively into tissues. Metabolized in liver; eliminated in urine and feces. **Half-life:** 24 hrs.

or simvastatin). Mixed hyperlipidemia (in combination with fenofibrate).

PRECAUTIONS

Contraindications: Concurrent use of an HMG-CoA reductase inhibitor (atorvastatin, fluvastatin, lovastatin, pravastatin, simvastatin) in pts with active hepatic disease or unexplained persistent elevations in serum transaminase; pregnancy; breast-feeding. **Cautions:** Severe renal or mild hepatic impairment. Not recommended in those with moderate or severe hepatic impairment.

ACTION

Inhibits cholesterol absorption in brush border of small intestine, leading to decrease in delivery of intestinal cholesterol to liver. **Therapeutic Effect:** Reduces total serum cholesterol, LDL, triglyceride; increases HDL.

PHARMACOKINETICS

Well absorbed following PO administration. Protein binding: greater than 90%. Metabolized in small intestine and liver. Excreted in feces (78%), urine (11%). **Half-life:** 22 hrs.

Protein binding: 80%. Metabolized by glucuronidation and acetylation. Primarily excreted in urine (85%), feces (14%). **Half-life:** 7–11 hrs.

Generic Drugs F

famciclovir
famotidine
febuxostat
felodipine
fenofibrate
fenofibric acid
fentanyl
ferric carboxymaltose
ferrous fumarate
ferrous gluconate
ferrous sulfate
fesoterodine
fexofenadine
fidaxomicin
filgrastim
finasteride
fingolimod
fluconazole
fludarabine
flunisolide
fluorouracil, 5-FU
fluoxetine
fluphenazine
flurazepam
flutamide
fluticasone
fluvastatin
fluvoxamine
folic acid
fondaparinux
formoterol
fosamprenavir
foscarnet
fosinopril
fosphenytoin
frovatriptan
fulvestrant
furosemide

famciclovir

fam-**sye**-klo-veer
(Apo-Famciclovir, Famvir)
Do not confuse Famvir with Femara.

F

CLASSIFICATION

PHARMACOTHERAPEUTIC: Synthetic nucleoside. **CLINICAL:** Antiviral.

USES

Treatment of acute herpes zoster (shingles) in immunocompetent pts, treatment and suppression of recurrent genital herpes in immunocompetent pts, treatment of recurrent mucocutaneous herpes simplex in HIV-infected pts. Treatment of recurrent herpes labialis (cold sores) in immunocompetent pts.

PRECAUTIONS

Contraindications: Hypersensitivity to penciclovir. **Cautions:** Renal impairment. Avoid use in galactose intolerance, severe lactose deficiency, or glucose-galactose malabsorption syndromes.

ACTION

Inhibits HSV-2 polymerase, inhibiting herpes viral DNA synthesis and replication. **Therapeutic Effect:** Suppresses replication of herpes simplex virus, varicella-zoster virus.

PHARMACOKINETICS

Rapidly, extensively absorbed after PO administration. Protein binding: 20%–25%. Rapidly metabolized to penciclovir by enzymes in GI tract, liver, plasma. Eliminated unchanged in urine. Removed by hemodialysis. **Half-life:** 2–3 hrs (increased in severe renal failure).

Category B. Children: Safety and efficacy not established. **Elderly:** Age-related renal impairment may require dosage adjustment.

INTERACTIONS

DRUG: None significant. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase ALT, AST, amylase, bilirubin, lipase.

AVAILABILITY (Rx)

Tablets: 125 mg, 250 mg, 500 mg.

ADMINISTRATION/HANDLING

PO

• Give without regard to meals. • Give with food to decrease GI distress.

INDICATIONS/ROUTES/DOSAGE

Acute Herpes Zoster (Shingles)

PO: ADULTS: 500 mg q8h for 7 days. Begin within 72 hrs of rash onset.

Initial Genital Herpes

PO: ADULTS: 250 mg 3 times/day for 7–10 days.

Recurrent Genital Herpes

PO: ADULTS: 1,000 mg twice a day for 1 day.

Suppression of Recurrent Genital Herpes

PO: ADULTS: 250 mg twice a day for up to 1 yr.

Recurrent Mucotaneous/Genital Herpes Simplex in HIV Pts

PO: ADULTS: 500 mg twice a day for 7 days or 5–10 days.

Herpes Labialis (Cold Sores)

PO: ADULTS, ELDERLY: 1,500 mg as a single dose. Initiate at first sign or symptom.

Dosage in Renal Impairment

Dosage and frequency are modified based on creatinine clearance and disease process.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: H_2 receptor antagonist. **CLINICAL:** Antiulcer, gastric acid secretion inhibitor.

USES

Short-term treatment of active duodenal ulcer. Prevention, maintenance of duodenal ulcer recurrence. Treatment of active benign gastric ulcer, pathologic GI hypersecretory conditions. Short-term treatment of gastroesophageal reflux disease (GERD). OTC formulation for relief of heartburn, acid indigestion, sour stomach. **OFF-LABEL:** *H. pylori* eradication, risk reduction of duodenal ulcer recurrence (part of multidrug regimen), stress ulcer prophylaxis in critically ill pts, relief of gastritis.

PRECAUTIONS

Contraindications: Hypersensitivity to other H_2 antagonists. **Cautions:** Renal/hepatic impairment, elderly, thrombocytopenia.

ACTION

Inhibits histamine action of H_2 receptors of parietal cells. **Therapeutic Effect:** Inhibits gastric acid secretion (fasting, nocturnal, or stimulated by food, caffeine, insulin).

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1 hr	1–4 hrs	10–12 hrs
IV	0.5 hr	0.5–3 hrs	10–12 hrs

Rapidly, incompletely absorbed from GI tract. Protein binding: 15%–20%. Partially metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 2.5–3.5 hrs (increased in renal impairment).

CLASSIFICATION

PHARMACOTHERAPEUTIC: Xanthine oxidase inhibitor. **CLINICAL:** Antigout agent.

USES

Management of hyperuricemia in pts with gout. Not recommended for treatment of asymptomatic hyperuricemia.

PRECAUTIONS

Contraindications: Concomitant use with azathioprine, mercaptopurine. **Cautions:** Severe renal/hepatic impairment, history of heart disease or stroke.

ACTION

Decreases uric acid production by inhibiting the enzyme xanthine oxidase. **Therapeutic Effect:** Reduces uric acid concentrations in serum and urine.

PHARMACOKINETICS

Well absorbed from GI tract. Widely distributed. Protein binding: 99%. Metabolized in liver. Eliminated in urine (49%), feces (45%). Removed by hemodialysis. **Half-life:** 5–8 hrs.

2-wk intervals. Range: 2.5–20 mg/day. **CHILDREN:** Initially, 2.5 mg once daily. **Maximum:** 10 mg/day.

Dosage in Renal Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (22%–18%): Headache, peripheral edema. **Occasional (6%–4%):** Flushing, respiratory infection, dizziness, light-headedness, asthenia. **Rare (less than 3%):** Angina, gingival hyperplasia, paresthesia, abdominal discomfort, anxiety, muscle cramping, cough, diarrhea, constipation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose produces nausea, drowsiness, confusion, slurred speech, hypotension, bradycardia.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess B/P, apical pulse immediately before drug administration (if pulse is 60 or less/min or systolic B/P is less than 90 mm Hg, withhold medication, contact physician).

INTERVENTION/EVALUATION

Assist with ambulation if dizziness occurs. Assess for peripheral edema behind media malleolus (sacral area in bedridden pts). Monitor pulse rate for bradycardia. Assess skin for flushing. Monitor hepatic function. Question for headache, asthenia.

PATIENT/FAMILY TEACHING

• Do not abruptly discontinue medication. • Compliance with therapy regimen is essential to control hypertension. • To avoid hypotensive effect, go from lying to standing slowly. • Avoid tasks that require alertness, motor skills until response to drug is established. • Report palpitations, shortness of breath, pronounced dizziness, nausea. • Swallow tablet whole; do not chew, crush, dissolve, or divide. • Avoid grapefruit products, alcohol. • Report exacerbation of angina.

fenofibrate

TOP 100

fen-o-**fye**-brate
(Antara, Apo-Fenofibrate, Fenoglide, Lipofen, Lofibra, Novo-Fenofibrate, Tricor, Triglide)
Do not confuse Tricor with Fibricor or Tracleer.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Fibric acid derivative. **CLINICAL:** Antihyperlipidemic.

USES

Adjunct to diet for reduction of low-density lipoprotein cholesterol (LDL-C), total cholesterol, triglycerides (types IV and V hyperlipidemia), apo-lipoprotein B, and to increase high-density lipoprotein cholesterol (HDL-C) in pts with primary hypercholesterolemia, mixed dyslipidemia. **OFF-LABEL:** Adjunctive therapy in treatment of hyperuricemia in pts with gout.

PRECAUTIONS

Contraindications: Active hepatic disease, severe renal/hepatic dysfunction (including primary biliary cirrhosis, unexplained persistent hepatic function abnormality), breastfeeding (Fenoglide, Lipofen, Tricor, Triglide). **Cautions:** Anticoagulant therapy (e.g., warfarin), history of hepatic disease, mild to moderate renal impairment, substantial alcohol consumption, statin or colchicine therapy (increased risk of myopathy, rhabdomyolysis).

ACTION

Enhances synthesis of lipoprotein lipase (VLDL). **Therapeutic Effect:** Increases VLDL catabolism, reduces total plasma triglycerides.

ADVERSE EFFECTS/ TOXIC REACTIONS

May increase cholesterol excretion into bile, leading to cholelithiasis. Pancreatitis, hepatitis, thrombocytopenia, agranulocytosis occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain diet history, esp. fat consumption. Obtain serum cholesterol, triglycerides, LFT, blood counts during initial therapy and periodically during treatment. Treatment should be discontinued if hepatic enzyme levels persist greater than 3 times normal limit.

INTERVENTION/EVALUATION

For pts on concurrent therapy with HMG-CoA reductase inhibitors, monitor for complaints of myopathy (muscle pain, weakness). Monitor serum creatine kinase (CK). Monitor serum cholesterol, triglyceride for therapeutic response.

PATIENT/FAMILY TEACHING

• Report severe diarrhea, constipation, nausea. • Report skin rash/irritation, insomnia, muscle pain, tremors, dizziness.

fenofibric acid TOP 100

fen-oh-**fye**-bric as-id
(Fibricor, Trilipix)
Do not confuse Fibricor with Tricor or Trilipix with Trileptal.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Fibric acid derivative. **CLINICAL:** Antihyperlipidemic.

USES

Fibricor, Trilipix: Adjunct to diet for treatment of severely elevated serum triglycerides; adjunct for reduction of LDL-C, total cholesterol, triglycerides, apoprotein B, and increased HDL-C in primary hypercholesterolemia or mixed hyperlipidemia. **Trilipix:** With statin to reduce triglycerides, elevate HDL-C in pts with mixed lipidemia and/or at risk for coronary heart disease.

PRECAUTIONS

Contraindications: Severe renal impairment, primary biliary cirrhosis, active hepatic disease, gallbladder disease, nursing mothers. **Cautions:** Anticoagulant therapy, history of hepatic disease, substantial alcohol consumption. Mild to moderate renal impairment.

ACTION

Increases lipolysis and elimination of triglyceride-rich particles from plasma by activating lipoprotein lipase, reducing lipase activity. **Therapeutic Effect:** Increases VLDL catabolism, decreases plasma triglycerides.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 99%. Does not undergo oxidative metabolism. Excreted primarily in urine. **Half-life:** 20 hrs.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Opioid, narcotic agonist **(Schedule II).**
CLINICAL: Analgesic.

USES

Injection: pain relief, preop medication; adjunct to general or regional anesthesia. **Abstral:** Treatment of breakthrough pain in cancer pts 18 yrs of age and older. **Duragesic:** Management of chronic pain *(transdermal)*. **Actiq:** Treatment of breakthrough pain in chronic cancer or AIDS-related pain. **Fentora:** Breakthrough pain in pts on chronic opioids. **Onsolis:** Breakthrough pain in pts with cancer currently receiving opioids and tolerant to opioid therapy. **Lazanda:** Management of breakthrough pain in cancer. **Subsys:** Treatment of breakthrough cancer pain.

PRECAUTIONS

Contraindications: **Transdermal:** Severe respiratory disease depression, paralytic ileus, intermittent pain. **Transdermal, transmucosal, lozenges, buccal films:** Management of acute or postoperative pain, pts not opioid tolerant. **Cautions:** Bradycardia; renal, hepatic, respiratory disease; head injuries; altered LOC; biliary tract disease; acute pancreatitis; cor pulmonale; significant COPD; increased ICP; use of MAOIs within 14 days; elderly; morbid obesity.

ACTION

Binds to opioid receptors in CNS, reducing stimuli from sensory nerve endings, inhibits ascending pain pathways. **Therapeutic Effect:** Alters pain reception, increases pain threshold.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	1–2 min	3–5 min	0.5–1 hr
IM	7–15 min	20–30 min	1–2 hrs
Transdermal	6–8 hrs	24 hrs	72 hrs
Transmucosal	5–15 min	20–30 min	1–2 hrs

Well absorbed after IM or topical administration. Transmucosal form absorbed through buccal mucosa and GI tract. Protein binding: 80%–85%. Metabolized in liver. Primarily eliminated by biliary system. **Half-life:** 2–4 hrs IV; 17 hrs transdermal; 6.6 hrs transmucosal.

Acute Pain Management

IM/IV: ADULTS, ELDERLY: 25–100 mcg/dose q1–2h as needed. **CHILDREN:** 0.5–2 mcg/kg/dose q1–2h as needed. **INFANTS (IV push):** 1–4 mcg/kg/dose q2–4h.

Continuous IV Infusion

ADULTS, ELDERLY: 1–2 mcg/kg/hr. **CHILDREN:** 0.5–3 mcg/kg/hr.

F

Usual Buccal Dose

ADULTS, ELDERLY: Initially, 100 mcg. Titrate dose, providing adequate analgesia with tolerable side effects.

Usual Buccal Soluble Film Dose

Note: All pts must initiate with 200 mcg. **ADULTS, ELDERLY:** Initially, 200 mcg up to 1,200 mcg. **Maximum:** No more than 4 doses per day, separate by at least 2 hrs.

Usual Nasal Dose

Nasal: ADULTS, ELDERLY: Initially, 100 mcg. Titrate from 100 mcg to 200 mcg to 400 mcg to 800 mcg **(maximum).** Wait at least 2 hrs between doses; no more than 4 doses in 24 hrs.

Usual Sublingual Tablet Dose

ADULTS, ELDERLY: Initially, 100 mcg, then titrate to desired dose/effect. Wait at least 2 hrs between doses; no more than 4 doses in 24 hrs.

Usual Sublingual Spray Dose

ADULTS, ELDERLY: Initially, 100 mcg. May repeat in 30 min if pain not relieved. Must wait at least 4 hours before treating another episode of pain.

Usual Transdermal Dose

ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: Initially, 12–25 mcg/hr. May increase after 3 days.

Usual Transmucosal Dose

ADULTS, CHILDREN: 200–1200 mcg for breakthrough pain. Limit to 4 applications/day.

Dosage in Renal/Hepatic Impairment

Injection: No dose adjustment.
Transdermal: Mild to Moderate Impairment: Reduce dose by 50%.
Severe Impairment: Not recommended.

SIDE EFFECTS

Frequent: IV: Postop drowsiness, nausea, vomiting. **Transdermal (10%–3%):** Headache, pruritus, nausea, vomiting, diaphoresis, dyspnea, confusion, dizziness, drowsiness, diarrhea, constipation, decreased appetite. **Occasional: IV:** Postop confusion, blurred vision, chills, orthostatic hypotension, constipation, difficulty urinating. **Transdermal (3%–1%):** Chest pain, arrhythmias, erythema, pruritus, syncope, agitation, skin irritations.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose or too-rapid IV administration may produce severe respiratory depression, skeletal/thoracic muscle rigidity (may lead to apnea, laryngospasm, bronchospasm, cold/clammy skin, cyanosis, coma). Tolerance to analgesic effect may occur with repeated use. **Antidote:** Naloxone (see Appendix K for dosage).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Resuscitative equipment, opiate antagonist (naloxone 0.5 mcg/kg) should be available for initial use. Establish baseline B/P, respirations. Assess type, location, intensity, duration of pain.

INTERVENTION/EVALUATION

Assist with ambulation. Encourage post-op pt to turn, cough, deep breathe q2h. Monitor respiratory rate, B/P, heart rate, oxygen saturation. Assess for relief of pain.

PATIENT/FAMILY TEACHING

- Avoid alcohol; do not take other medications without consulting physician.
- Avoid tasks that require alertness, motor skills until response to drug is

SIDE EFFECTS

Occasional (7%–2%): Nausea, hypertension, flushing, dizziness. **Rare (less than 2%):** Vomiting, headache, dysgeusia, hypotension, constipation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reaction including angioedema, chills, erythema, hypotension, pruritus, syncope, urticaria, wheezing reported in 1.5% of pts. Anaphylaxis was noted is less than 1% of pts. Transient hypertension reported in 4% of pts. Hemosiderosis (iron overload) may present with joint disorder, gait disturbance, asthenia. Extravasation may cause injection site discoloration.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline Hgb, serum ferritin, phosphate, hepatic function test. Obtain baseline B/P. Assess patency of IV site; do not administer if infiltration is suspected. Question history of hepatic impairment. Question use of oral iron medication.

INTERVENTION/EVALUATION

Monitor Hgb, serum ferritin, phosphate. Monitor for hypersensitivity reaction, hypertension for at least 30 min after administration. Assess IV site for extravasation.

PATIENT/FAMILY TEACHING

• Pain and brown staining may occur at IV site. • Do not take oral iron while receiving intravenous iron (may increase risk of iron overload). • Stools frequently becomes black with iron therapy; this is harmless unless accompanied by red streaking, sticky consistency of stool, abdominal pain, or cramping. • Oral hygiene, hard candy, gum may reduce unpleasant taste caused by therapy. • Report signs of allergic reaction.

ferrous fumarate

fer-us **fue**-ma-rate
(Femiron, Ferro-Sequels, Palafer)

ferrous gluconate

fer-us **gloo**-koe-nate
(Apo-Ferrous Gluconate, Fergon)

ferrous sulfate

fer-us **sul**-fate
(Apo-Ferrous Sulfate, Fer-In-Sol, Fer-Iron, Slow-Fe)

FIXED-COMBINATION(S)

Ferro-Sequels: ferrous fumarate/docusate (stool softener): 150 mg/100 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Enzymatic mineral. **CLINICAL:** Iron preparation.

USES

Prevention, treatment of iron deficiency anemia due to inadequate diet, malabsorption, pregnancy, blood loss.

PRECAUTIONS

Contraindications: Hemochromatosis, hemolytic anemias. **Cautions:** Peptic ulcer, regional enteritis, ulcerative colitis, pts receiving frequent blood transfusions.

ACTION

Essential component in formation of Hgb, myoglobin, enzymes. Promotes effective erythropoiesis and transport, utilization of oxygen. **Therapeutic Effect:** Prevents iron deficiency.

PHARMACOKINETICS

Absorbed in duodenum and upper jejunum. Ten percent absorbed in pts with

Canadian trade name

as vomiting, severe abdominal pain, diarrhea, dehydration, followed by hyperventilation, pallor, cyanosis, cardiovascular collapse.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess nutritional status, dietary history. To prevent mucous membrane and teeth staining with liquid preparation, use dropper or straw and allow solution to drop on back of tongue.

INTERVENTION/EVALUATION

Monitor serum iron, total iron-binding capacity, reticulocyte count, Hgb, ferritin. Monitor daily pattern of bowel activity, stool consistency. Assess for clinical improvement, record relief of iron deficiency symptoms (fatigue, irritability, pallor, paresthesia of extremities, headache).

PATIENT/FAMILY TEACHING

• Expect stool color to darken. • Oral liquid may stain teeth. • If GI discomfort occurs, take after meals or with food. • Do not take within 2 hrs of other medication or eggs, milk, tea, coffee, cereal.

fesoterodine

fes-oh-**ter**-oh-deen
(Toviaz)
Do not confuse fesoterodine with fexofenadine or tolteradine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Muscarinic receptor antagonist. **CLINICAL:** Antispasmodic.

USES

Treatment of overactive bladder with symptoms including urinary incontinence, urgency, frequency.

PRECAUTIONS

Contraindications: Gastric retention, uncontrolled narrow-angle glaucoma, urinary retention. **Cautions:** Severe renal impairment, severe hepatic impairment, clinically significant bladder outflow obstruction (risk of urinary retention), GI obstructive disorders (e.g., pyloric stenosis [risk of gastric retention], treated narrow-angle glaucoma, myasthenia gravis, concurrent therapy with strong CYP3A4 inhibitors, elderly, use in hot weather.

ACTION

Exhibits antimuscarinic activity by interceding via cholinergic muscarinic receptors, thereby mediating urinary bladder contraction. **Therapeutic Effect:** Decreases urinary frequency, urgency.

PHARMACOKINETICS

Well absorbed following PO administration. Protein binding: 50%. Rapidly and extensively hydrolyzed to its active metabolite. Primarily excreted in urine. **Half-life:** 7 hours.

Rapidly absorbed after PO administration. Protein binding: 60%–70%. Does not cross blood-brain barrier. Minimally metabolized. Eliminated in feces (80%), urine (11%). Not removed by hemodialysis. **Half-life:** 14.4 hrs (increased in renal impairment).

and increased risk of recurrent infection. • Report weakness, fatigue, pale skin, dizziness, or red/dark, tarry stools relating to GI bleeding.

filgrastim

TOP 100

fil-**gras**-tim
(Granix, Neupogen)
Do not confuse Neupogen with Epogen, Neulasta, Neumega, or Nutramigen.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Biologic modifier. **CLINICAL:** Granulocyte colony-stimulating factor (G-CSF).

USES

Granix, Neupogen: Decreases infection incidence in pts with malignancies receiving chemotherapy associated with severe neutropenia, fever. **Neupogen:** Reduces neutropenia duration, sequelae in pts with nonmyeloid malignancies having myeloablative therapy followed by bone marrow transplant (BMT). Mobilization of hematopoietic progenitor cells into peripheral blood for collection by apheresis. Treatment of chronic, severe neutropenia. **OFF-LABEL:** Treatment of AIDS-related neutropenia in pts receiving zidovudine, drug-induced neutropenia, treatment of anemia in myelodysplastic syndrome. Treatment of hepatitis C treatment-associated neutropenia.

PRECAUTIONS

Contraindications: (Neupogen) Hypersensitivity to *Escherichia coli*–derived proteins. **Cautions:** Malignancy with myeloid characteristics (due to G-CSF's potential to act as growth factor), gout, psoriasis, 24 hrs before or after cytotoxic chemotherapy, concurrent use of other drugs that may result in lowered platelet count. Neutrophil count greater than 50,000/mm^3, pts with sickle cell disease.

ACTION

Stimulates production, maturation, activation of neutrophils. **Therapeutic Effect:** Increases migration and cytotoxicity of neutrophils.

PHARMACOKINETICS

Readily absorbed after subcutaneous administration. Onset of action: 24 hrs (plateaus in 3–5 days). White counts return to normal in 4–7 days. Not removed by hemodialysis. **Half-life:** 3.5 hrs.

INTERVENTION/EVALUATION

In septic pts, be alert for adult respiratory distress syndrome. Closely monitor those with preexisting cardiac conditions. Monitor B/P (transient decrease in B/P may occur), temperature, CBC with differential, platelet count, serum uric acid, hepatic function tests.

PATIENT/FAMILY TEACHING

- Report fever, chills, severe bone pain, chest pain, palpitations.

finasteride

fin-**as**-ter-ide
(Apo-Finasteride, Propecia, Proscar)
Do not confuse finasteride with furosemide, or Proscar with ProSom, Provera, or Prozac.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Androgen hormone inhibitor. **CLINICAL:** Benign prostatic hyperplasia agent.

USES

Proscar: Reduces risk of acute urinary retention, need for surgery in symptomatic benign prostatic hyperplasia (BPH) alone or in combination with doxazosin (Cardura). **Propecia:** Treatment of male pattern hair loss. **OFF-LABEL:** Treatment of female hirsutism.

PRECAUTIONS

Contraindications: Pregnancy, use in children. **Cautions:** Hepatic Impairment. Pregnant women, those attempting to conceive should avoid contact with crushed or broken tablets; pts with large residual urine volume or severely diminished urine flow.

ACTION

Inhibits 5-alpha reductase, an intracellular enzyme that converts testosterone into dihydrotestosterone (DHT) in prostate gland, resulting in decreased serum DHT. **Therapeutic Effect:** Reduces size of prostate gland.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (reduction of DHT)	8 hrs	—	24 hrs

Rapidly absorbed from GI tract. Protein binding: 90%. Widely distributed. Metabolized in liver. **Half-life:** 6–8 hrs. Onset of clinical effect: 3–6 mos of continued therapy.

IV COMPATIBILITIES

Dexmedetomidine (Precedex), diltiazem (Cardizem), dobutamine (Dobutrex), dopamine (Intropin), heparin, lipids, lorazepam (Ativan), midazolam (Versed), propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

◄ALERT► PO and IV therapy equally effective; IV therapy for pt intolerant of drug or unable to take orally. Oral suspension stable for 14 days at room temperature or refrigerated.

Usual Dosage

PO/IV: ADULTS, ELDERLY: 150 mg once or **loading dose:** 200–800 mg. **Maintenance dose:** 200–800 mg once daily. **CHILDREN AND NEONATES: Loading dose:** 6–12 mg/kg. **Maintenance dose:** 3–12 mg/kg once daily. **Maximum:** 600 mg/day.

Dosage in Renal Impairment

After a loading dose of 400 mg, daily dosage is based on creatinine clearance.

Creatinine Clearance	Dosage
Greater than 50 ml/min	100%
50 ml/min or less	50%
Dialysis	50%
CCRT	400–800 mg as loading dose
CVVH	then 200–800 mg/day
CVVHDF	400–800 mg as loading dose, then 400–800 mg/day

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (4%–1%): Hypersensitivity reaction (chills, fever, pruritus, rash), dizziness, drowsiness, headache, constipation, diarrhea, nausea, vomiting, abdominal pain.

ADVERSE EFFECTS/ TOXIC REACTIONS

Exfoliative skin disorders, serious hepatic effects, blood dyscrasias (eosinophilia, thrombocytopenia, anemia, leukopenia) have been reported rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess infected area. Establish baselines for CBC, serum potassium, hepatic function.

INTERVENTION/EVALUATION

Assess for hypersensitivity reaction (chills, fever). Monitor CBC, BMP, LFT. Report rash, itching promptly. Monitor temperature at least daily. Monitor daily pattern of bowel activity, stool consistency. Assess for dizziness; provide assistance as needed.

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Report dark urine, pale stool, jaundiced skin or sclera of eyes, rash, pruritus. • Pts with oropharyngeal infections should maintain fastidious oral hygiene. • Consult physician before taking any other medication.

fludarabine

HIGH ALERT

floo-**dar**-a-been
(Fludara)

■ **BLACK BOX ALERT** ■ Must be administered by certified chemotherapy personnel. Severe neurologic toxicity reported. Life-threatening hemolytic anemia, autoimmune thrombocytopenic purpura, hemophilia have occurred. Risk of severe myelosuppression (anemia, thrombocytopenia, neutropenia). Concurrent use with pentostatin may produce severe/fatal pulmonary toxicity.

Do not confuse Fludara with FUDR, or fludarabine with cladribine or Flumadine.

morphine, multivitamins, potassium chloride.

INDICATIONS/ROUTES/DOSAGE

Chronic Lymphocytic Leukemia

IV: ADULTS: 25 mg/m^2 daily for 5 consecutive days. Continue for up to 3 additional cycles. Begin each course of treatment every 28 days.

F

Dosage in Renal Impairment

Creatinine Clearance	Dosage
IV	
50–79 ml/min	20 mg/m^2
30–49 ml/min	15 mg/m^2
Less than 30 ml/min	Not recommended

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (60%–11%): Fever, nausea/vomiting, chills. **Occasional (20%–10%):** Fatigue, generalized pain, rash, diarrhea, cough, asthenia, stomatitis, dyspnea, peripheral edema. **Rare (7%–3%):** Anorexia, sinusitis, dysuria, myalgia, paresthesia, headache, visual disturbances.

ADVERSE EFFECTS/ TOXIC REACTIONS

Pneumonia occurs frequently. Severe hematologic toxicity (anemia, thrombocytopenia, neutropenia), GI bleeding may occur. Tumor lysis syndrome may begin with flank pain, hematuria; may also include hypercalcemia, hyperphosphatemia, hyperuricemia, resulting in renal failure. High-dosage therapy may produce acute leukemia, blindness, coma. Neurotoxicity (progressive demyelinating encephalopathy, mental status deterioration) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess baseline CBC, serum creatinine, ALT, AST, electrolytes, uric acid and monitor during treatment. Drug should be discontinued if intractable vomiting, diarrhea, stomatitis, GI bleeding occurs.

INTERVENTION/EVALUATION

Assess for fatigue, visual disturbances, peripheral edema. Assess for onset of pneumonia. Monitor for dyspnea, cough, rapid decrease in WBC count, intractable vomiting, diarrhea, GI bleeding (bright red or tarry stool). Assess oral mucosa for stomatitis. Assess skin for rash. Be alert to possible tumor lysis syndrome (onset of flank pain, hematuria), signs of neurotoxicity.

PATIENT/FAMILY TEACHING

• Avoid crowds, exposure to infection. • Maintain strict oral hygiene. • Promptly report fever, sore throat, signs of local infection, unusual bruising/bleeding from any site. • Report persistent nausea/vomiting.

flunisolide

floo-**niss**-oh-lyde
(Apo-Flunisolide, Nasalide, Rhinalar)
Do not confuse flunisolide with fluocinonide.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Adrenocorticosteroid. **CLINICAL:** Antiasthmatic, anti-inflammatory.

USES

Relieves symptoms of seasonal, perennial rhinitis.

PRECAUTIONS

Contraindications: Hypersensitivity to any corticosteroid, untreated nasal mucosal infection. **Cautions:** Respiratory tuberculosis, untreated systemic infections, ocular herpes simplex.

PATIENT/FAMILY TEACHING

• Report exposure to measles, chickenpox. • Do not change dose/schedule or stop taking drug; must taper off gradually under medical supervision. • Maintain strict oral hygiene. • Rinse mouth with water immediately after inhalation (prevents mouth/throat dryness, oral fungal infection). • Increase fluid intake (decreases lung secretion viscosity). • **Intranasal:** Clear nasal passages before use. • Report if no improvement in symptoms (within 3 wks), sneezing or nasal irritation occurs. • Improvement usually noted in several days.

F

fluorouracil, 5-FU HIGH ALERT

flure-oh-**ue**-ra-sil
(Adrucil, Carac, Efudex, Fluoroplex)

■ **BLACK BOX ALERT** ■ Must be administered by personnel trained in administration/handling of chemotherapeutic agents.

Do not confuse Efudex with Efidac.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antimetabolite. **CLINICAL:** Antineoplastic.

USES

Parenteral: Treatment of carcinoma of: colon, rectum, breast, stomach, pancreas. **Topical:** Treatment of multiple actinic or solar keratoses, superficial basal cell carcinomas. **OFF-LABEL: Parenteral:** Treatment of carcinoma of: bladder, cervical, endometrial, head/neck, anal, esophageal, renal cell, unknown primary cancer.

PRECAUTIONS

Contraindications: Myelosuppression, poor nutritional status, potentially serious infections. **Cautions:** History of high-dose pelvic irradiation, hepatic/renal impairment, palmar-plantar erythrodysesthia syndrome (hand and foot syndrome), previous use of alkylating agents.

ACTION

Blocks formation of thymidylic acid. Cell cycle–specific for S phase of cell division. **Therapeutic Effect:** Inhibits DNA, RNA synthesis. **Topical:** Destroys rapidly proliferating cells.

PHARMACOKINETICS

Widely distributed. Crosses blood-brain barrier. Metabolized in liver. Primarily excreted by lungs as carbon dioxide. Removed by hemodialysis. **Half-life:** 16 min.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC with differential, serum renal function, LFT and monitor during therapy.

INTERVENTION/EVALUATION

Monitor for rapidly falling WBC, platelet count, intractable diarrhea, GI bleeding (bright red or tarry stool). Assess oral mucosa for stomatitis. Drug should be discontinued if intractable diarrhea, stomatitis, GI bleeding occurs. Assess skin for rash.

PATIENT/FAMILY TEACHING

• Maintain strict oral hygiene. • Report signs/symptoms of infection, unusual bruising/bleeding, visual changes, nausea, vomiting, diarrhea, chest pain, palpitations. • Avoid sunlight, artificial light sources; wear protective clothing, sunglasses, sunscreen. • **Topical:** Apply only to affected area. • Do not use occlusive coverings. • Be careful near eyes, nose, mouth. • Wash hands thoroughly after application. • Treated areas may be unsightly for several weeks after therapy.

fluoxetine

floo-**ox**-e-teen
(Apo-Fluoxetine, Novo-Fluoxetine, Prozac, Prozac Weekly, Sarafem)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal thinking and behavior in children, adolescents, young adults 18–24 yrs of age with major depressive disorder, other psychiatric disorders.

Do not confuse fluoxetine with duloxetine, famotidine, fluconazole, fluvastatin, fluvoxamine, fosinopril, furosemide, or paroxetine, or Prozac with Paxil, Prilosec, Prograf, Proscar, or ProSom, or Sarafem with Serophene.

FIXED-COMBINATION(S)

Symbyax: fluoxetine/olanzapine (an antipsychotic): 25 mg/6 mg, 25 mg/12 mg, 50 mg/6 mg, 50 mg/12 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Selective serotonin reuptake inhibitor (SSRI). **CLINICAL:** Antidepressant, antiobsessional agent, antibulimic.

USES

Treatment of major depressive disorder (MDD), obsessive-compulsive disorder (OCD), bulimia nervosa, premenstrual dysphoric disorder (PMDD), panic disorder with or without agoraphobia. Treatment of resistant or bipolar 1 depression (with olanzapine). **OFF-LABEL:** Treatment of fibromyalgia, post-traumatic stress disorder (PTSD), Raynaud's phenomena, social anxiety disorder, selective mutism.

PRECAUTIONS

Contraindications: Use within 14 days of MAOIs. Pts receiving linezolid. Use with thioridazine. **Cautions:** Seizure disorder, cardiac dysfunction (e.g., history of MI), diabetes, pts with risk factors for QT prolongation, concurrent use of medication that increase QT interval, renal/hepatic impairment, pts at high risk for suicide, in pts where weight loss is undesirable, elderly. Pts at risk of acute narrow-angle glaucoma or with increased intraocular pressure.

ACTION

Selectively inhibits serotonin uptake in CNS, enhancing serotonergic function. **Therapeutic Effect:** Relieves depression; reduces obsessive-compulsive, bulimic behavior.

PHARMACOKINETICS

Well absorbed from GI tract. Crosses blood-brain barrier. Protein binding: 94%. Metabolized in liver. Primarily

SIDE EFFECTS

Frequent (greater than 10%): Headache, asthenia, insomnia, anxiety, drowsiness, nausea, diarrhea, decreased appetite. **Occasional (9%–2%):** Dizziness, tremor, fatigue, vomiting, constipation, dry mouth, abdominal pain, nasal congestion, diaphoresis, rash. **Rare (less than 2%):** Flushed skin, light-headedness, impaired concentration.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may produce seizures, nausea, vomiting, excessive agitation, restlessness.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess appearance, behavior, mood, suicidal tendencies. For pts on long-term therapy, baseline renal function, LFT, blood counts should be performed at baseline and periodically thereafter.

INTERVENTION/EVALUATION

Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Monitor mental status, anxiety, social functioning, appetite, nutritional intake. Monitor daily pattern of bowel activity, stool consistency. Assess skin for rash. Monitor serum LFT, glucose, sodium; weight.

PATIENT/FAMILY TEACHING

• Maximum therapeutic response may require 4 or more wks of therapy. • Do not abruptly discontinue medication. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • To avoid insomnia, take last dose of drug before 4 PM.

fluphenazine

floo-**fen**-a-zeen
(Apo-Fluphenazine, Modecate)

■ **BLACK BOX ALERT** ■ Increased mortality in elderly with dementia-related psychosis.

Do not confuse fluphenazine with fluvoxamine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Phenothiazine. **CLINICAL:** Antipsychotic.

USES

Management of psychotic disturbances and schizophrenia. **OFF-LABEL:** Psychosis/agitation related to Alzheimer's dementia.

PRECAUTIONS

Contraindications: Myelosuppression, coma, severe CNS depression, pts receiving large doses of hypnotics, hepatic disease, subcortical brain damage. **Cautions:** Elderly, seizures, Parkinson's disease, severe cardiac disease, renal/hepatic impairment, pts at risk for pneumonia, pts at risk for hypotension, decreased GI motility, urinary retention, BPH, narrow-angle glaucoma, myasthenia gravis, visual problems.

ACTION

Blocks postsynaptic dopaminergic receptors in brain. **Therapeutic Effect:** Decreases psychotic behavior. Produces weak anticholinergic, sedative, antiemetic effects; strong extrapyramidal effects.

PHARMACOKINETICS

Erratic absorption. Protein binding: greater than 90%. Metabolized in liver. Excreted in urine. **Half-life:** 33 hrs (Decanoate: 163–232 hrs).

INTERVENTION/EVALUATION

Monitor B/P for hypotension. Monitor CBC for blood dyscrasias. Monitor for fine tongue movement (may be early sign of tardive dyskinesia). Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Assess for therapeutic response (interest in surroundings, improvement in self-care, increased ability to concentrate, relaxed facial expression).

PATIENT/FAMILY TEACHING

• Full therapeutic effect may take up to 6 wks. • Avoid skin contact with solution (may cause contact dermatitis). • Urine may darken. • Do not abruptly withdraw from long-term drug therapy. • Avoid tasks that require alertness, motor skills until response to drug is established. • Drowsiness generally subsides during continued therapy.

flurazepam

flure-**az**-e-pam
(Apo-Flurazepam, Dalmane)
Do not confuse Dalmane with Dialume, or flurazepam with temazepam.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Benzodiazepine (**Schedule IV**). **CLINICAL:** Sedative-hypnotic.

USES

Short-term treatment of insomnia.

PRECAUTIONS

Contraindications: Respiratory depression, preexisting CNS depression, hypersensitivity to other benzodiazepines, pregnancy, breastfeeding, narrow-angle glaucoma. **Cautions:** Renal/hepatic impairment, depression, chronic pulmonary insufficiency, low albumin, history of drug dependence.

ACTION

Enhances action of inhibitory neurotransmitter gamma-aminobutyric acid (GABA). **Therapeutic Effect:** Produces hypnotic effect due to CNS depression.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	15–20 min	3–6 hrs	7–8 hrs

Well absorbed from GI tract. Protein binding: 97%. Crosses blood-brain barrier. Widely distributed. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 2.3 hrs; metabolite, 40–114 hrs.

removed by hemodialysis. **Half-life:** 6 hrs (increased in elderly).

F

each nostril) once daily. **Maintenance:** 55 mcg (1 spray in each nostril) once daily. **CHILDREN 2–11 YRS:** 55 mcg (1 spray in each nostril) once daily. May increase to 110 mcg (2 sprays each nostril) once daily.

Usual Topical Dosage

Topical: ADULTS, ELDERLY, CHILDREN 3 MOS AND OLDER: Apply sparingly to affected area once or twice a day.

Maintenance Treatment of Asthma

Inhalation Powder *(Arnuity Ellipta):* ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 100–200 mcg once daily.

Maintenance Treatment for Asthma (Previously Treated with Bronchodilators)

Inhalation Powder *(Flovent Diskus):* ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: Initially, 100 mcg twice a day. **Maximum:** 500 mcg/twice a day.
Inhalation *(Oral):* ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 88 mcg twice a day. **Maximum:** 440 mcg twice a day.

Maintenance Treatment for Asthma (Previously Treated with Inhaled Steroids)

Inhalation Powder *(Flovent Diskus):* ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: Initially, 100–250 mcg twice a day. **Maximum:** 500 mcg twice a day.
Inhalation *(Oral):* ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 88–220 mcg twice a day. **Maximum:** 440 mcg twice a day.

Maintenance Treatment for Asthma (Previously Treated with Oral Steroids)

Inhalation Powder *(Flovent Diskus):* ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 500–1,000 mcg twice a day.
Inhalation *(Oral):* ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 440–880 mcg twice a day.

Usual Pediatric Dose (4–11 Yrs)

Flovent Diskus: Initially, 50 mcg twice a day. May increase to 100 mcg twice a day. **Flovent HFA:** Initially, 88 mcg twice daily.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Inhalation: Throat irritation, hoarseness, dry mouth, cough, temporary wheezing, oropharyngeal candidiasis (particularly if mouth is not rinsed with water after each administration). **Intranasal:** Mild nasopharyngeal irritation, nasal burning, stinging, dryness, rebound congestion, rhinorrhea, altered sense of taste. **Occasional: Inhalation:** Oral candidiasis. **Intranasal:** Nasal/pharyngeal candidiasis, headache. **Topical:** Stinging, burning of skin.

ADVERSE EFFECTS/ TOXIC REACTIONS

None known.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Establish baseline history of skin disorder, asthma, rhinitis.

INTERVENTION/EVALUATION

Monitor rate, depth, rhythm, type of respiration; quality/rate of pulse. Assess lung sounds for rhonchi, wheezing, rales. Monitor ABGs. Assess oral mucous membranes for evidence of candidiasis. Monitor growth in pediatric pts. **Topical:** Assess involved area for therapeutic response to irritation.

PATIENT/FAMILY TEACHING

• Pts receiving bronchodilators by inhalation concomitantly with steroid inhalation therapy should use bronchodilator several min before corticosteroid aerosol (enhances penetration of steroid into bronchial tree). • Do not change dose/schedule or stop taking drug; must taper off gradually under medical supervision. • Maintain strict oral hygiene. • Rinse mouth with water immediately after inhalation (prevents mouth/throat dryness, oral fungal infection). • Increase fluid intake (decreases lung secretion viscosity). • **Intranasal:** Clear nasal passages

once daily (extended-release). **PATIENTS REQUIRING MORE THAN 25% DECREASE IN LDL:** 40 mg 1–2 times a day or 80-mg extended-release tablet once a day.

Heterozygous Familial Hypercholesterolemia

PO: CHILDREN 10–16 YRS: Initially, 20 mg/day. May increase q6wks to maximum dose of 80 mg/day, given in 2 divided doses or a single daily dose (extended-release).

Dosage in Renal Impairment

Caution with severe impairment.

Dosage in Hepatic Impairment

Contraindicated with active liver disease.

SIDE EFFECTS

Frequent (8%–5%): Headache, dyspepsia, back pain, myalgia, arthralgia, diarrhea, abdominal cramping, rhinitis. **Occasional (4%–2%):** Nausea, vomiting, insomnia, constipation, flatulence, rash, pruritus, fatigue, cough, dizziness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Myositis (inflammation of voluntary muscle) with or without increased creatine kinase (CK), muscle weakness occur rarely. May progress to frank rhabdomyolysis, renal impairment, renal failure.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for possibility of pregnancy before initiating therapy (Pregnancy Category X). Assess baseline lab results (serum cholesterol, triglycerides, hepatic function test, CPK).

INTERVENTION/EVALUATION

Monitor daily pattern of bowel activity, stool consistency. Assess for headache, dizziness. Assess for rash, pruritus. Monitor serum cholesterol, triglyceride lab results for therapeutic response. Be alert for malaise, muscle cramping, weakness.

PATIENT/FAMILY TEACHING

• Follow special diet (important part of treatment). • Periodic lab tests are essential part of therapy. • Do not break, crush, or open capsules; do not chew, crush, dissolve, or divide tablets. • Promptly report vision changes, unusual bruising, yellowing of skin or eyes, any muscle pain/weakness, esp. if accompanied by fever, malaise.

fluvoxamine

floo-**vox**-a-meen
(Apo-Fluvoxumine, Luvox CR, Novo-Fluvoxamine)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal ideation and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse fluvoxamine with flavoxate or fluoxetine, or Luvox with Lasix, Levoxyl, or Lovenox.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin reuptake inhibitor. **CLINICAL:** Antidepressant, antiobsessive.

USES

Immediate-Release: Treatment of obsessive-compulsive disorder (OCD) in adults and children 8 yrs and older. **Luvox CR:** Treatment of OCD in adults. **OFF-LABEL:** Treatment of anxiety disorders in children, depression, panic disorder, social anxiety disorder (SAD), mild dementia-associated agitation in nonpsychotic pts, post-traumatic stress disorder (PTSD).

PRECAUTIONS

Contraindications: Use within 14 days of MAOIs. Concomitant use with alosetron, pimozide, ramelteon, thioridazine, or tizanidine. Pts receiving linezolid. **Cautions:** Renal/hepatic impairment; elderly; impaired platelet aggregation; concurrent

energy level improves, increasing suicide potential). Assess appearance, behavior, speech pattern, level of interest, mood. Assist with ambulation if dizziness, drowsiness occurs. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

• Maximum therapeutic response may require 4 wks or more of therapy. • Dry mouth may be relieved by sugarless gum, sips of water. • Do not abruptly discontinue medication. • Avoid tasks that require alertness, motor skills until response to drug is established.

folic acid

foe-lik **as**-id
(Apo-Folic, Folacin-800)
Do not confuse folic acid with folinic acid.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Coenzyme.
CLINICAL: Nutritional supplement.

USES

Treatment of megaloblastic and macrocytic anemias due to folate deficiency (e.g., pregnancy, inadequate dietary intake). Supplement to prevent fetal neural tube defects. **OFF-LABEL:** Adjunct cofactor therapy in methanol toxicity.

PRECAUTIONS

Contraindications: None known. **Cautions:** Anemias (aplastic, normocytic, pernicious, refractory) when anemia present with vitamin B_{12} deficiency.

ACTION

Stimulates production of platelets, RBCs, WBCs in folate deficiency anemia. **Therapeutic Effect:** Essential for nucleoprotein synthesis, maintenance of normal erythropoiesis.

PHARMACOKINETICS

PO form almost completely absorbed from GI tract (upper duodenum). Protein binding: High. Metabolized in liver. Excreted in urine. Removed by hemodialysis.

if excreted in breast milk. **Pregnancy Category B. Children:** Safety and efficacy not established. **Elderly:** Age-related renal impairment may increase risk of bleeding.

INTERACTIONS

DRUG: **Anticoagulants, antiplatelet medications, aspirin, drotrecogin alfa, NSAIDs, thrombolytics** may increase risk of bleeding. **HERBAL:** **Cat's claw, dong quai, evening primrose, feverfew, garlic, ginger, ginkgo, ginseng, horse chestnut, red clover, Omega-3** may increase antiplatelet activity. **FOOD:** None known. **LAB VALUES:** May cause reversible increases in serum creatinine, ALT, AST. May decrease Hgb, Hct, platelet count.

AVAILABILITY (Rx)

Injection, Solution: 2.5 mg/0.5 ml, 5 mg/0.4 ml, 7.5 mg/0.6 ml, 10 mg/0.8 ml.

ADMINISTRATION/HANDLING

Subcutaneous

• Parenteral form appears clear, colorless. Discard if discoloration or particulate matter is noted. • Store at room temperature. • Do not expel air bubble from prefilled syringe before injection. • Pinch fold of skin at injection site between thumb and forefinger. Introduce entire length of subcutaneous needle into skin fold during injection. Inject into fatty tissue between left and right anterolateral or left and right posterolateral abdominal wall. • Rotate injection sites.

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ For subcutaneous administration only.

Prevention of Venous Thromboembolism

Subcutaneous: ADULTS WEIGHING 50 KG OR GREATER: 2.5 mg once a day for 5–9 days after surgery (up to 10 days following abdominal surgery; 11 days following hip or knee replacement). Initial dose should be given 6–8 hrs after surgery.

Treatment of Venous Thromboembolism, Pulmonary Embolism

Note: Start warfarin on first treatment day and continue fondaparinux until INR reaches 2 to 3 for at least 24 hr.

Subcutaneous: ADULTS, ELDERLY WEIGHING GREATER THAN 100 KG: 10 mg once daily. **ADULTS, ELDERLY WEIGHING 50–100 KG:** 7.5 mg once daily. **ADULTS, ELDERLY WEIGHING LESS THAN 50 KG:** 5 mg once daily.

Dosage in Renal Impairment

Creatinine clearance 30–50 ml/min: Use caution (50% dose reduction or use of low-dose heparin). **Creatinine clearance less than 30 ml/min:** Contraindicated.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (19%–11%): Anemia, fever, nausea. **Occasional (10%–4%):** Edema, constipation, rash, vomiting, insomnia, increased wound drainage, hypokalemia. **Rare (less than 4%):** Dizziness, hypotension, confusion, urinary retention, injection site hematoma, diarrhea, dyspepsia, headache.

ADVERSE EFFECTS/ TOXIC REACTIONS

Accidental overdose may lead to bleeding complications ranging from local ecchymoses to major hemorrhage. Thrombocytopenia occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess CBC, renal function test.

INTERVENTION/EVALUATION

Periodically monitor CBC, esp. platelet count, stool for occult blood (no need for daily monitoring in pts with normal presurgical coagulation parameters). Assess for any signs of bleeding: bleeding at surgical site, hematuria, blood in stool, bleeding from gums, petechiae,

LAB VALUES: May decrease serum potassium. May increase serum glucose.

AVAILABILITY (Rx)

Inhalation Powder (Foradil): 12 mcg. **Inhalation Solution for Nebulization (Perforomist):** 20 mcg/2 ml.

ADMINISTRATION/HANDLING

F

Inhalation

• Pull off Aerolizer Inhaler cover, twisting mouthpiece in direction of arrow to open. • Place capsule in chamber. Capsule is pierced by pressing and releasing buttons on side of Aerolizer, once only. • Instruct pt to exhale completely; place mouthpiece into mouth, close lips and inhale quickly, deeply through mouth (this causes capsule to spin, dispensing the drug). Pt should hold breath as long as possible before exhaling slowly. • Check capsule to ensure all the powder is gone. If not, pt should inhale again to receive rest of the dose. Rinse mouth with water immediately after inhalation (prevents mouth/throat dryness).

Storage • Maintain capsules in individual blister pack until immediately before use. • Do not swallow capsules. • Do not use with a spacer.

Nebulization

• No diluent necessary. • Protect from heat. • Remove from foil pouch immediately before use. • Do not mix with other medications.

INDICATIONS/ROUTES/DOSAGE

Asthma (not Monotherapy)

Inhalation Powder: ADULTS, ELDERLY, CHILDREN 5 YRS AND OLDER: 12 mcg capsule inhaled q12h.

COPD (Maintenance)

Inhalation Powder: ADULTS, ELDERLY, CHILDREN 5 YRS AND OLDER: 12 mcg capsule q12h.

Inhalation Solution for Nebulization: ADULTS, ELDERLY: 20 mcg q12h. **Maximum dose:** 40 mcg.

Exercise-Induced Bronchospasm

Inhalation Powder: ADULTS, ELDERLY, CHILDREN 5 YRS AND OLDER: 12 mcg capsule inhaled at least 15 min before exercise. Do not repeat for another 12 hrs.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (less than 5%): Tremor, muscle cramps, tachycardia, insomnia, headache, irritability, mouth/throat irritation, diarrhea, nausea, vomiting, dizziness, nasopharyngitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Excessive sympathomimetic stimulation may produce palpitations, extrasystoles, chest pain.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Assess rate, depth, rhythm, type of respiration; quality/rate of pulse. Monitor EKG, serum potassium, ABG determinations. Assess lung sounds for wheezing (bronchoconstriction), rales, pulmonary function tests.

PATIENT/FAMILY TEACHING

• Follow manufacturer guidelines for proper use of inhaler. • Increase fluid intake (decreases lung secretion viscosity). • Rinsing mouth with water immediately after inhalation may prevent mouth/throat irritation. • Avoid excessive use of caffeine derivatives (chocolate, coffee, tea, cola).

fosamprenavir

fos-am-**pren**-a-veer
(Lexiva, Telzir)
Do not confuse Lexiva with Levitra.

plus ritonavir 3 mg/kg/dose. **LESS THAN 11 KG:** 45 mg/kg/dose twice daily plus ritonavir 7 mg/kg/dose.

HIV Infection with Previous Protease Inhibitor Therapy

PO: ADULTS, ELDERLY: 700 mg twice daily plus ritonavir 100 mg twice daily. **CHILDREN 6 MOS OR OLDER AND 20 KG OR GREATER:** 18 mg/kg/dose twice daily plus ritonavir 3 mg/kg/dose. **15–19 KG:** 23 mg/kg/dose twice daily plus ritonavir 3 mg/kg/dose. **11–14 KG:** 30 mg/kg/dose twice daily plus ritonavir 3 mg/kg/dose. **LESS THAN 11 KG:** 45 mg/kg/dose twice daily plus ritonavir 7 mg/kg/dose.

Concurrent Therapy with Efavirenz (600 mg)

PO: ADULTS, ELDERLY: Once-daily regimen: 1,400 mg plus 300 mg ritonavir. **Twice-daily regimen:** 700 mg twice daily plus ritonavir 100 mg twice daily.

Concurrent Therapy with Maraviroc

PO: ADULTS, ELDERLY: 700 mg twice daily, plus ritonavir 100 mg twice daily.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Mild to moderate impairment: Reduce fosamprenavir to 700 mg twice daily (without concurrent ritonavir). **Severe impairment:** Reduce fosamprenavir to 350 mg twice daily (without ritonavir).

SIDE EFFECTS

Frequent (39%–35%): Nausea, rash, diarrhea. **Occasional (19%–8%):** Headache, vomiting, fatigue, depression. **Rare (7%–2%):** Pruritus, abdominal pain, perioral paresthesia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Severe or life-threatening dermatologic reactions, including Stevens-Johnson syndrome, occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline lab testing, esp. LFT, before beginning therapy and at periodic intervals during therapy. Offer emotional support. Obtain full medication history.

INTERVENTION/EVALUATION

Closely monitor for evidence of GI discomfort. Monitor daily pattern of bowel activity, stool consistency. Assess skin for rash. Monitor serum chemistry tests for marked abnormalities, particularly hepatic function, glucose, triglycerides, cholesterol. Assess for opportunistic infections (onset of fever, oral mucosa changes, cough, other respiratory symptoms).

PATIENT/FAMILY TEACHING

• Eat small, frequent meals to offset nausea, vomiting. • Continue therapy for full length of treatment. • Doses should be evenly spaced. • Fosamprenavir is not a cure for HIV infection, nor does it reduce risk of transmission to others. • Pt may continue to experience illnesses, including opportunistic infections. • Diarrhea can be controlled with OTC medication. • Report new-onset rash development.

foscarnet

foss-**kar**-net
(Foscavir)

■ **BLACK BOX ALERT** ■ Renal toxicity occurs to some degree in majority of pts. For use only in immunocompromised pts with cytomegalovirus (CMV) retinitis and mucocutaneous acyclovir-resistant herpes simplex virus (HSV) infection. Seizures due to electrolyte/mineral imbalance may occur.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Phosphonic acid derivative. **CLINICAL:** Antiviral.

INDICATIONS/ROUTES/DOSAGE

Cytomegalovirus (CMV) Retinitis

IV: ADULTS, ELDERLY: Initially, 60 mg/kg q8h or 90 mg/kg q12h for 2–3 wks. **Maintenance:** 90–120 mg/kg/day as a single IV infusion.

Herpes Simplex Infection

IV: ADULTS: 40 mg/kg q8–12h for 2–3 wks or until healed.

Dosage in Renal Impairment

Dosages are individualized based on creatinine clearance. Refer to dosing guide provided by manufacturer.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (65%–30%): Fever, nausea, vomiting, diarrhea. **Occasional (29%–5%):** Anorexia, pain/inflammation at injection site, rigors, malaise, altered B/P, headache, paresthesia, dizziness, rash, diaphoresis, abdominal pain. **Rare (4%–1%):** Back/chest pain, edema, flushing, pruritus, constipation, dry mouth.

ADVERSE EFFECTS/ TOXIC REACTIONS

Nephrotoxicity occurs to some extent in most pts. Seizures, serum mineral/electrolyte imbalances may be life-threatening.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, serum electrolyte levels, renal function test, vital signs. Risk of renal impairment can be reduced by sufficient fluid intake to ensure diuresis prior to and during therapy.

INTERVENTION/EVALUATION

Monitor serum chemistries, renal function tests. Assess for signs of hypocalcemia (perioral paresthesia, paresthesia of extremities), hypokalemia (weakness, muscle cramps, paresthesia of extremities, irritability). Assess for tremors; provide safety measures for potential seizures. Assess for bleeding, anemia, developing superinfections. Obtain periodic ophthalmologic exams.

PATIENT/FAMILY TEACHING

• Report perioral tingling, numbness in extremities, paresthesia during or following infusion (may indicate electrolyte abnormalities). • Tremors should be reported promptly due to potential for seizures.

fosinopril

foe-**sin**-oh-pril
(Apo-Fosinopril)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

Do not confuse fosinopril with Fosamax, or lisinopril, or Monopril with Accupril, minoxidil, moexipril, or ramipril.

CLASSIFICATION

PHARMACOTHERAPEUTIC: ACE inhibitor. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension, used alone or in combination with other antihypertensives. Treatment of HF.

PRECAUTIONS

Contraindications: Idiopathic or hereditary angioedema, history of angioedema from previous treatment with ACE inhibitors. Concomitant use with aliskiren in pts with diabetes. **Cautions:** Renal/hepatic impairment, pts with sodium depletion or on diuretic therapy, dialysis, hypovolemia, hypertrophic cardiomyopathy, hyperkalemia, concomitant use of potassium supplements, unstented unilateral/bilateral renal stenosis.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain B/P immediately before each dose, in addition to regular monitoring (be alert to fluctuations). Renal function tests should be performed before beginning therapy. In pts with renal impairment, autoimmune disease, or taking drugs that affect leukocytes or immune response, CBC, differential count should be performed before therapy begins and q2wks for 3 mos, then periodically thereafter.

INTERVENTION/EVALUATION

If excessive reduction in B/P occurs, place pt in supine position with legs elevated. Assist with ambulation if dizziness occurs. Assess for urinary frequency. Auscultate lung sounds for rales, wheezing in those with HF. Monitor renal function tests, CBC, urinalysis for proteinuria. Observe for angioedema (swelling of face, lips, tongue). Monitor serum potassium in those on concurrent diuretic therapy.

PATIENT/FAMILY TEACHING

• Report any sign of infection (sore throat, fever). • Several wks may be needed for full therapeutic effect of B/P reduction. • Skipping doses or voluntarily discontinuing drug may produce severe, rebound hypertension. • To reduce hypotensive effect, go from lying to standing slowly. • Immediately report swelling of face, lips, tongue, difficulty breathing, vomiting, excessive perspiration, persistent cough. • Avoid potassium salt substitutes.

fosphenytoin

fos-**fen**-i-toyn
(Cerebyx)
Do not confuse Cerebyx with Celebrex or Celexa, or fosphenytoin with fospropofol.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Hydantoin. **CLINICAL:** Anticonvulsant.

USES

Acute treatment, control of generalized convulsive status epilepticus; prevention, treatment of seizures occurring during neurosurgery; short-term substitution for oral phenytoin.

PRECAUTIONS

Contraindications: Adams-Stokes syndrome; hypersensitivity to phenytoin, other hydantoins; second- or third-degree AV block; sinus bradycardia; SA block; occurrence of rash during treatment (do not resume if rash is exfoliative, purpuric, or bullous); treatment of absence seizures; concurrent use of delavirdine. **Cautions:** Porphyria, diabetes, hypothyroidism, hypotension, severe myocardial insufficiency, renal/hepatic disease, hypoalbuminemia.

ACTION

Stabilizes neuronal membranes, limits spread of seizure activity. Decreases sodium, calcium ion influx into neurons. Decreases post-tetanic potentiation, repetitive discharge. **Therapeutic Effect:** Decreases seizure activity.

PHARMACOKINETICS

Completely absorbed after IM administration. Protein binding: 95%–99%. Rapidly and completely hydrolyzed to phenytoin after IM or IV administration. Time of complete conversion to phenytoin: 4 hrs after IM injection; 2 hrs after IV infusion. **Half-life:** 8–15 min (for conversion to phenytoin).

arrhythmias are detected. Assess pt postinfusion (may feel dizzy, ataxic, drowsy). Monitor free and total dilatin levels (2 hrs post IV infusion or 4 hrs post IM injection).

PATIENT/FAMILY TEACHING

• If noncompliance is cause of acute seizures, discuss and address reasons for noncompliance. • Avoid tasks that require alertness, motor skills until response to drug is established.

frovatriptan

froe-va-**trip**-tan
(Frova)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin receptor agonist. **CLINICAL:** Antimigraine.

USES

Treatment of acute migraine headache with or without aura in adults. **OFF-LABEL:** Short-term prevention of menstruation-associated migraines.

PRECAUTIONS

Contraindications: Management of basilar or hemiplegic migraine, cerebrovascular or peripheral vascular disease, coronary artery disease, ischemic heart disease (angina pectoris, history of MI, silent ischemia, Prinzmetal's angina), severe hepatic impairment (Child-Pugh grade C), uncontrolled hypertension, use within 24 hrs of ergotamine-containing preparations or another serotonin receptor agonist. **Cautions:** Mild to moderate hepatic impairment, pt profile suggesting cardiovascular risks. History of seizures or structural brain lesions.

ACTION

Agonist for serotonin in cranial arteries causing vasoconstriction and reduction of inflammation. **Therapeutic Effect:** Relieves migraine headache.

PHARMACOKINETICS

Well absorbed after PO administration. Protein binding: 15%. Metabolized in liver. Primarily eliminated in feces (62%), urine (32%). **Half-life:** 26 hrs (increased in hepatic impairment).

INDICATIONS/ROUTES/DOSAGE

Breast Cancer

IM: ADULTS, ELDERLY: Initially, 500 mg (two 250-mg injections) on days 1, 15, and 29. **Maintenance:** 500 mg once monthly thereafter.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Reduce initial and maintenance dose to 250 mg.

SIDE EFFECTS

Frequent (26%–13%): Nausea, hot flashes, pharyngitis, asthenia, vomiting, vasodilation, headache. **Occasional (12%–5%):** Injection site pain, constipation, diarrhea, abdominal pain, anorexia, dizziness, insomnia, paresthesia, bone/back pain, depression, anxiety, peripheral edema, rash, diaphoresis, fever. **Rare (2%–1%):** Vertigo, weight gain.

ADVERSE EFFECTS/ TOXIC REACTIONS

UTI occurs occasionally. Vaginitis, anemia, thromboembolic phenomena, leukopenia occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Estrogen receptor assay should be done before beginning therapy. Baseline CT should be performed initially and periodically thereafter for evidence of tumor regression.

INTERVENTION/EVALUATION

Monitor serum chemistries, plasma lipids. Be alert to increased bone pain, ensure adequate pain relief. Check for edema, esp. of dependent areas. Monitor for and assist with ambulation if asthenia or dizziness occurs. Assess for headache. Offer antiemetic for nausea/vomiting.

PATIENT/FAMILY TEACHING

- Notify physician if nausea/vomiting, asthenia (loss of strength, energy), hot flashes become unmanageable.

furosemide

TOP 100

fur-**oh**-se-myde
(Apo-Furosemide, Lasix, Novo-Semide)

■ **BLACK BOX ALERT** ■ Large amounts can lead to profound diuresis with water and electrolyte depletion.

Do not confuse furosemide with famotidine, finasteride, fluconazole, fluoxetine, loperamide, or torsemide, or Lasix with Lidex, Lovenox, Luvox, or Luxiq.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Loop diuretic. **CLINICAL:** Diuretic.

USES

Treatment of edema associated with HF and renal/hepatic disease; acute pulmonary edema. Treatment of hypertension, either alone or in combination with other antihypertensives.

PRECAUTIONS

Contraindications: Anuria. **Cautions:** Hepatic cirrhosis, hepatic coma, severe electrolyte depletion, prediabetes, diabetes, systemic lupus erythematosus. Pts with prostatic hyperplasia/urinary stricture.

ACTION

Enhances excretion of sodium, chloride, potassium by direct action at ascending limb of loop of Henle. **Therapeutic Effect:** Produces diuresis, lowers B/P.

in severe edematous states. **CHILDREN:** Initially, 2 mg/kg/dose. May increase by 1–2 mg/kg/dose at 6–8 hr intervals. **Maximum:** 6 mg/kg/dose. **NEONATES:** 1 mg/kg/dose 1–2 times a day.

IV, IM: ADULTS, ELDERLY: 20–40 mg/dose; may increase by 20 mg/dose q1–2h. **Maximum single dose:** 160–200 mg. **CHILDREN:** Initially, 1 mg/kg/dose. May increase by 1 mg/kg/dose no sooner than 2 hrs after previous dose. **Maximum:** 6 mg/kg/dose. **NEONATES:** 1–2 mg/kg/dose q12–24h.

IV Infusion: ADULTS, ELDERLY: Bolus of 20–40 mg, followed by infusion of 10–40 mg/hr; may double q2h. **Maximum:** 80–160 mg/hr. **CHILDREN:** 0.05 mg/kg/hr; titrate to desired effect. **NEONATES:** Initially, 0.2 mg/kg/hr. May increase by 0.1 mg/kg/hr q12–24h. **Maximum:** 0.4 mg/kg/hr.

Dosage in Renal Impairment

Avoid use in oliguric states.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Expected: Increased urinary frequency/volume. **Frequent:** Nausea, dyspepsia, abdominal cramps, diarrhea or constipation, electrolyte disturbances. **Occasional:** Dizziness, light-headedness, headache, blurred vision, paresthesia, photosensitivity, rash, fatigue, bladder spasm, restlessness, diaphoresis. **Rare:** Flank pain.

ADVERSE EFFECTS/ TOXIC REACTIONS

Vigorous diuresis may lead to profound water loss/electrolyte depletion, resulting in hypokalemia, hyponatremia, dehydration. Sudden volume depletion may result in increased risk of thrombosis, circulatory collapse, sudden death. Acute hypotensive episodes may occur, sometimes several days after beginning therapy. Ototoxicity (deafness, vertigo, tinnitus) may occur, esp. in pts with severe renal impairment. Can exacerbate diabetes mellitus, systemic lupus erythematosus, gout, pancreatitis. Blood dyscrasias have been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check vital signs, esp. B/P, pulse, for hypotension before administration. Assess baseline serum electrolytes, esp. for hypokalemia. Assess skin turgor, mucous membranes for hydration status; observe for edema. Assess muscle strength, mental status. Note skin temperature, moisture. Obtain baseline weight. Initiate I&O monitoring.

INTERVENTION/EVALUATION

Monitor B/P, vital signs, serum electrolytes, I&O, weight. Note extent of diuresis. Watch for symptoms of electrolyte imbalance: Hypokalemia may result in changes in muscle strength, tremor, muscle cramps, altered mental status, cardiac arrhythmias; hyponatremia may result in confusion, thirst, cold/clammy skin.

PATIENT/FAMILY TEACHING

- Expect increased frequency, volume of urination.
- Report palpitations, signs of electrolyte imbalances (noted previously), hearing abnormalities (sense of fullness in ears, tinnitus).
- Eat foods high in potassium such as whole grains (cereals), legumes, meat, bananas, apricots, orange juice, potatoes (white, sweet), raisins.
- Avoid sunlight, sunlamps.

Generic Drugs G

gabapentin	gentamicin	golimumab
galantamine	glatiramer	goserelin
ganciclovir	glimepiride	granisetron
gemcitabine	glipiZIDE	griseofulvin
gemfibrozil	glucagon	guaifenesin
gemifloxacin	glyBURIDE	guanfacine

10–15 mg/kg/day in 3 divided doses. May titrate up to 25–35 mg/kg/day (for children 5–12 yrs) and 40 mg/kg/day (for children 3–4 yrs). **Maximum:** 50 mg/kg/day.

Adjunctive Therapy for Neuropathic Pain

PO: ADULTS, ELDERLY: Initially, 100 mg 3 times a day; may increase by 300 mg/day at weekly intervals. **Maximum:** 3,600 mg/day in 3 divided doses. **CHILDREN:** Initially, 5 mg/kg/dose at bedtime, followed by 5 mg/kg/dose for 2 doses on day 2, then 5 mg/kg/dose for 3 doses on day 3. **Maximum:** 300 mg. Range: 8–35 mg/kg/day in 3 divided doses.

Postherpetic Neuralgia

PO: ADULTS, ELDERLY: ***(Neurontin):*** 300 mg once on day 1, 300 mg twice a day on day 2, and 300 mg 3 times a day on day 3 as needed. Range: 1,800–3,600 mg/day. ***(Gralise):*** 300 mg once on day 1; 600 mg once on day 2; 900 mg once daily on days 3–6; 1,200 mg once daily on days 7–10; 1,500 mg once daily on days 11–14; then 1,800 mg once daily.

RLS

PO: ADULTS, ELDERLY (HORIZANT): 600 mg once daily at 5 PM.

Dosage in Renal Impairment

Dosage and frequency are modified based on creatinine clearance:

Creatinine Clearance	Neurontin Dosage (Immediate-release)	Gralise Dosage (Extended-release)	Horizant Dosage	
			RLS	PHN
30–59 ml/min	200–700 mg q12h	600–1,800 mg once/day	300–600 mg/day	Same
16–29 ml/min	200–700 mg once daily	Not recommended	300 mg/day	Same
Less than 16 ml/min	100–300 mg once daily	Not recommended	300 mg q48 h	Same
Hemodialysis	125–350 mg following HD	Not recommended	Not recommended	300–600 mg following HD

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (19%–10%): Fatigue, drowsiness, dizziness, ataxia. **Occasional (8%–3%):** Nystagmus, tremor, diplopia, rhinitis, weight gain. **Rare (less than 2%):** Anxiety, dysarthria, memory loss, dyspepsia, pharyngitis, myalgia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Abrupt withdrawal may increase seizure frequency, increased risk of suicidal behavior/thoughts. Overdosage may result in slurred speech, drowsiness, lethargy, diarrhea.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Review history of seizure disorder (type, onset, intensity, frequency, duration, LOC). Assess location, intensity of neuralgia/neuropathic pain.

INTERVENTION/EVALUATION

Provide safety measures as needed. Monitor seizure frequency/duration, renal function, weight, behavior in children. Monitor for signs/symptoms of depression, suicidal tendencies, other unusual behavior.

Alzheimer's Disease

PO ***(Immediate-Release Tablets, Oral Solution)*****: ADULTS, ELDERLY:** Initially, 4 mg twice a day (8 mg/day). After a minimum of 4 wks (if well tolerated), may increase to 8 mg twice a day (16 mg/day). After another 4 wks, may increase to 12 mg twice daily (24 mg/day). Range: 16–24 mg/day in 2 divided doses.

PO ***(Extended-Release)*****: ADULTS, ELDERLY:** Initially, 8 mg once daily for 4 wks; then increase to 16 mg once daily for 4 wks or longer. If tolerated, may increase to 24 mg once daily. Range: 16–24 mg once daily.

Dosage in Renal/Hepatic Impairment

For moderate impairment, maximum dosage is 16 mg/day. Drug is not recommended for pts with severe impairment.

SIDE EFFECTS

Frequent (17%–7%): Nausea, vomiting, diarrhea, anorexia, weight loss. **Occasional (5%–4%):** Abdominal pain, insomnia, depression, headache, dizziness, fatigue, rhinitis. **Rare (less than 3%):** Tremors, constipation, confusion, cough, anxiety, urinary incontinence.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may cause cholinergic crisis (increased salivation, lacrimation, urination, defecation, bradycardia, hypotension, muscle weakness). Treatment aimed at generally supportive measures, use of anticholinergics (e.g., atropine).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess cognitive, behavioral, functional deficits of pt. Obtain baseline serum renal function, LFT.

INTERVENTION/EVALUATION

Monitor cognitive, behavioral, functional status of pt. Evaluate EKG, periodic rhythm strips in pts with underlying arrhythmias. Assess for evidence of GI disturbances (nausea, vomiting, diarrhea, anorexia, weight loss).

PATIENT/FAMILY TEACHING

• Take with meals (reduces risk of nausea). • Avoid tasks that require alertness, motor skills until response to drug is established. • Report persistent GI disturbances, excessive salivation, diaphoresis, excessive tearing, excessive fatigue, insomnia, depression, dizziness, increased muscle weakness.

ganciclovir

gan-**sye**-kloe-veer
(Cytovene)

■ **BLACK BOX ALERT** ■ Toxicity presents as neutropenia, thrombocytopenia, anemia. Studies suggest carcinogenic and teratogenic effects, inhibition of spermatogenesis.

Do not confuse Cytovene with Cytosar, or ganciclovir with acyclovir.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Synthetic nucleoside. **CLINICAL:** Antiviral.

USES

Parenteral: Treatment of cytomegalovirus (CMV) retinitis in immunocompromised pts (e.g., HIV), prophylaxis of CMV infection in transplant pts. **OFF-LABEL:** CMV retinitis.

PRECAUTIONS

Contraindications: Hypersensitivity to acyclovir, ganciclovir. **Cautions:** Neutropenia, thrombocytopenia, renal impairment, children (long-term safety not determined due to potential for long-term carcinogenic, adverse reproductive effects), pregnancy. Absolute neutrophil count less than 500/mm^3, platelet count less than 25,000/mm^3.

Creatinine Clearance	Dosage IV Induction	IV Maintenance
50–69 ml/min	2.5 mg/kg q12h	2.5 mg/kg q24h
25–49 ml/min	2.5 mg/kg q24h	1.25 mg/kg q24h
10–24 ml/min	1.25 mg/kg q24h	0.625 mg/kg q24h
Less than 10 ml/min	1.25 mg/kg 3 times/wk	0.625 mg/kg 3 times/wk
Hemodialysis (give after HD on HD days)	1.25 mg/kg q48–72h	0.625 mg/kg q48–72h
Peritoneal dialysis	1.25 mg/kg 3 times/wk	0.625 mg/kg 3 times/wk
Continuous renal replacement therapy		
Continuous venovenous hemofiltration	2.5 mg/kg q24h	1.25 mg/kg q24h
Continuous venovenous hemodialysis/ continuous venovenous hemodiafiltration	2.5 mg/kg q12h	2.5 mg/kg q24h

Dosage in Renal Impairment
Dosage and frequency are modified based on creatinine clearance (see table).

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (41%–13%): Diarrhea, fever, nausea, abdominal pain, vomiting. **Occasional (11%–6%):** Diaphoresis, infection, paresthesia, flatulence, pruritus. **Rare (4%–2%):** Headache, stomatitis, dyspepsia, phlebitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hematologic toxicity occurs commonly: leukopenia (41%–29% of pts), anemia (25%–19% of pts). Intraocular implant occasionally results in visual acuity loss, vitreous hemorrhage, retinal detachment. GI hemorrhage occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, BMP, LFT. Perform baseline ophthalmic exam. Obtain specimens for support of differential diagnosis (urine, feces, blood, throat) since retinal infection is usually due to hematogenous dissemination.

INTERVENTION/EVALUATION

Monitor I&O, ensure adequate hydration (minimum 1,500 ml/24 hrs). Diligently evaluate hematology reports for neutropenia, thrombocytopenia, leukopenia. Obtain periodic ophthalmic examinations. Question pt regarding visual acuity, therapeutic improvement, complications. Assess for rash, pruritus.

PATIENT/FAMILY TEACHING

• Ganciclovir provides suppression, not cure, of cytomegalovirus (CMV) retinitis. • Frequent blood tests, eye exams are necessary during therapy due to toxic nature of drug. • Report any new symptom promptly. • May temporarily or permanently inhibit sperm production in men, suppress fertility in women. • Barrier contraception should be used during and for 90 days after therapy due to mutagenic potential.

gemcitabine

HIGH ALERT

jem-**sye**-ta-been
(Gemzar)
Do not confuse gemcitabine with gemtuzumab, Gemzar with Zinecard.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Antimetabolite. **CLINICAL:** Antineoplastic.

IV COMPATIBILITIES

Bumetanide (Bumex), calcium gluconate, dexamethasone (Decadron), diphenhydramine (Benadryl), dobutamine (Dobutrex), dopamine (Intropin), granisetron (Kytril), heparin, hydrocortisone (Solu-Cortef), lorazepam (Ativan), ondansetron (Zofran), potassium chloride.

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Dosage is individualized based on clinical response, tolerance to adverse effects. When used in combination therapy, consult specific protocols for optimum dosage, sequence of drug administration.

Breast Cancer

IV: ADULTS, ELDERLY: (in combination with paclitaxel): 1,250 mg/m^2 over 30 min on days 1 and 8 of each 21-day cycle.

Non–Small-Cell Lung Cancer (NSCLC)

IV: ADULTS, ELDERLY, CHILDREN: (in combination with cisplatin): 1,000 mg/m^2 on days 1, 8, and 15, repeated every 28 days; or 1,250 mg/m^2 on days 1 and 8. Repeat every 21 days.

Ovarian Cancer

IV: ADULTS, ELDERLY: (in combination with carboplatin): 1,000 mg/m^2 on days 1 and 8 of each 21-day cycle.

Pancreatic Cancer

IV: ADULTS: 1,000 mg/m^2 once weekly for up to 7 wks or until toxicity necessitates decreasing dosage or withholding the dose, followed by 1 wk of rest. Subsequent cycles should consist of once-weekly dose for 3 consecutive wks out of every 4 wks. For pts completing cycles at 1,000 mg/m^2, increase dose to 1,250 mg/m^2 as tolerated. Dose for next cycle may be increased to 1,500 mg/m^2.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

Dosage Reduction Guidelines

Pancreatic Cancer, Non–Small-Cell Lung Cancer (NSCLC)

Dosage adjustments should be based on granulocyte count and platelet count, as follows:

Absolute Granulocyte Counts (cells/mm^3)	Platelet Count (cells/mm^3)	% of Full Dose
1,000	100,000	100
500–999	50,000–99,000	75
Less than 500 or	Less than 50,000	Hold

Breast Cancer

Absolute Granulocyte Counts (cells/mm^3)	Platelet Count (cells/mm^3)	% of Full Dose
Equal to or greater than 1,200 and	Greater than 75,000	100
1,000–1,199 or	50,000–75,000	75
700–999 and	Equal to or greater than 50,000	50
Less than 700 or	Less than 50,000	Hold

Ovarian Cancer

Absolute Granulocyte Counts (cells/mm^3)	Platelet Count (cells/mm^3)	% of Full Dose
1,500 or greater and	100,000 or greater	100
1,000–1,499 and/or	75,000–99,999	50
Less than 1,000 and/or	Less than 75,000	Hold

SIDE EFFECTS

Frequent (69%–20%): Nausea, vomiting, generalized pain, fever, mild to moderate pruritic rash, mild to moderate dyspnea, constipation, peripheral edema. **Occasional (19%–10%):** Diarrhea, petechiae, alopecia, stomatitis, infection, drowsiness,

effects of **repaglinide, warfarin. Bile acid–binding resins (e.g., colestipol)** may decrease concentration. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase serum alkaline phosphatase, bilirubin, creatine kinase, LDH, ALT, AST. May decrease Hgb, Hct, leukocyte counts, serum potassium.

AVAILABILITY (Rx)

Tablets: 600 mg.

G

ADMINISTRATION/HANDLING

PO

- Give 30 min before morning and evening meals.

INDICATIONS/ROUTES/DOSAGE

Hyperlipidemia

PO: ADULTS, ELDERLY: 600 mg twice daily 30 min before breakfast and dinner.

Dosage in Renal Impairment

Use cautions.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (20%): Dyspepsia. **Occasional (10%–2%):** Abdominal pain, diarrhea, nausea, vomiting, fatigue. **Rare (less than 2%):** Constipation, acute appendicitis, vertigo, headache, rash, pruritus, altered taste.

ADVERSE EFFECTS/ TOXIC REACTIONS

Cholelithiasis, cholecystitis, acute appendicitis, pancreatitis, malignancy occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain diet history, esp. fat/alcohol consumption. Obtain baseline lab results: serum glucose, triglyceride, cholesterol, LFT.

INTERVENTION/EVALUATION

Monitor LDL, VLDL, serum triglycerides, cholesterol lab results for therapeutic response. Monitor daily pattern of bowel activity, stool consistency. Assess for rash, pruritus. Question for headache, dizziness. Monitor LFT, hematology tests. Assess for abdominal pain, esp. right upper quadrant or epigastric pain suggestive of adverse gallbladder effects. Monitor serum glucose in those receiving insulin, oral antihyperglycemics.

PATIENT/FAMILY TEACHING

- Follow special diet (important part of treatment). • Take before meals. • Periodic lab tests are essential part of therapy. • Report pronounced dizziness, blurred vision, abdominal pain, diarrhea, nausea, vomiting.

gemifloxacin

jem-i-**flox**-a-sin
(Factive)

■ **BLACK BOX ALERT** ■ Increased risk of tendonitis, tendon rupture (with corticosteroids, organ transplant recipients, pts greater than 60 yrs of age).

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Fluoroquinolone. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to *S. pneumoniae, H. influenzae, H. parainfluenzae, M. catarrhalis, M. pneumoniae, C. pneumoniae, K. pneumoniae* including acute bacterial exacerbation of chronic bronchitis, community-acquired pneumonia of mild to moderate severity. **OFF-LABEL:** Acute sinusitis.

PRECAUTIONS

Contraindications: Hypersensitivity to other fluoroquinolones. **Cautions:** Renal impairment, rheumatoid arthritis, history of QT prolongation, hypokalemia, hypomagnesemia, concurrent medications that prolong QT interval, seizure disorder, significant bradycardia, acute myocardial ischemia.

diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

• Take with 8 oz of water, without regard to food. • Drink several glasses of water between meals. • Do not chew, crush, dissolve, or divide tablets; swallow whole. • Complete full course of therapy. • Take 3 hrs before or 2 hrs after supplements containing iron, zinc, magnesium, or antacids.

gentamicin

jen-ta-**mye**-sin
(Gentak)

■ **BLACK BOX ALERT** ■ Aminoglycoside antibiotics may cause neurotoxicity, nephrotoxicity. Risk of ototoxicity directly proportional to dosage, duration of treatment; ototoxicity usually is irreversible, precipitated by tinnitus, vertigo. May cause fetal harm if given during pregnancy.

Do not confuse gentamicin with vancomycin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Aminoglycoside. **CLINICAL:** Antibiotic.

USES

Parenteral: Treatment of infections susceptible to *Pseudomonas, Proteus, Serratia,* and other gram-negative organisms and gram-positive *Staphylococcus* including skin/skin structure, bone, joint, respiratory tract, intra-abdominal, complicated urinary tract, acute pelvic infections; burns; septicemia; meningitis. **Ophthalmic:** Ophthalmic infections caused by susceptible bacteria. **OFF-LABEL:** Surgical (preoperative) prophylaxis.

PRECAUTIONS

Contraindications: Hypersensitivity to other aminoglycosides (cross-sensitivity) or their components. **Cautions:** Elderly, neonates due to renal insufficiency or immaturity; neuromuscular disorders (potential for respiratory depression); vestibular or cochlear impairment; renal impairment, hypocalcemia, myasthenia gravis. Pediatric pts on extracorporeal membrane oxygenation.

ACTION

Irreversibly binds to protein of bacterial ribosomes. **Therapeutic Effect:** Interferes with protein synthesis of susceptible microorganisms. Bactericidal.

PHARMACOKINETICS

Rapid, complete absorption after IM administration. Protein binding: less than 30%. Widely distributed (does not cross blood-brain barrier, low concentrations in CSF). Excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 2–4 hrs (increased in renal impairment, neonates; decreased in cystic fibrosis, burn, or febrile pts).

than 3–5 mg/L or post-HD concentrations less than 2 mg/L).

Continuous Renal Replacement Therapy (CRRT)

Loading dose: 2–3 mg/kg, then 1 mg/kg q24–36h for mild UTI or synergy (redose when concentration less than 1 mg/L); 1–1.5 mg/kg q24–36h for moderate to severe UTI (redose when concentration less than 1.5–2 mg/L; 1.5–2 mg/kg q24–48h for systemic gram-negative infection (redose when concentration less than 3–5 mg/L).

Usual Ophthalmic Dosage

Ophthalmic Ointment: ADULTS, ELDERLY: Apply ½-inch strip to conjunctival sac 2–4 times/day.

Ophthalmic Solution: ADULTS, ELDERLY, CHILDREN: 1–2 drops q2–4h up to 2 drops/hr.

Dosage in Renal Impairment

Conventional Dosing:

Creatinine Clearance	Dosage
Greater than 60 ml/mil	q8h
41–60 ml/min	q12h
20–40 ml/min	q24h
Less than 20 ml/min	Loading dose, then monitor levels to determine dosage interval

Dosage in Hepatic Impairment

Monitor plasma concentrations.

SIDE EFFECTS

Occasional: IM: Pain, induration at injection site. **IV:** Phlebitis, thrombophlebitis, hypersensitivity reactions (fever, pruritus, rash, urticaria). **Ophthalmic:** Burning, tearing, itching, blurred vision. **Rare:** Alopecia, hypertension, fatigue.

ADVERSE EFFECTS/ TOXIC REACTIONS

Nephrotoxicity (increased serum BUN, creatinine; decreased creatinine clearance) may be reversible if drug is stopped at first sign of symptoms. Irreversible ototoxicity (tinnitus, dizziness, diminished hearing), neurotoxicity (headache, dizziness, lethargy, tremor, visual disturbances) occur occasionally. Risk increases with higher dosages, prolonged therapy, or if solution is applied directly to mucosa. Superinfections, particularly with fungi, may result from bacterial imbalance via any route of administration. Ophthalmic application may cause paresthesia of conjunctiva, mydriasis.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Dehydration must be treated before beginning parenteral therapy. Establish baseline hearing acuity. Question for history of allergies, esp. aminoglycosides, sulfites (parabens for topical/ophthalmic routes).

INTERVENTION/EVALUATION

Monitor I&O (maintain hydration), urinalysis (casts, RBCs, WBCs, decrease in specific gravity). Be alert to ototoxic, neurotoxic symptoms (see Adverse Effects/Toxic Reactions). Check IM injection site for induration. Evaluate IV site for phlebitis (heat, pain, red streaking over vein). Assess for rash (**Ophthalmic:** redness, burning, itching, tearing). Be alert for superinfection (genital/anal pruritus, changes in oral mucosa, diarrhea). When treating pts with neuromuscular disorders, assess respiratory response carefully. **Therapeutic serum level:** peak: 4–10 mcg/ml; peak levels are 2–3 times greater with once-daily dosing trough: 0.5–2 mcg/ml. **Toxic serum level:** peak: greater than 10 mcg/ml; trough: greater than 2 mcg/ml.

PATIENT/FAMILY TEACHING

• Discomfort may occur with IM injection. • Blurred vision, tearing may occur briefly after each ophthalmic dose. • Report any hearing, visual, balance, urinary problems, even after therapy is

INTERVENTION/EVALUATION

Observe injection site for reaction. Monitor for fever, chills (evidence of infection). Observe for improvement in neurologic function.

PATIENT/FAMILY TEACHING

• Report difficulty in breathing/swallowing, rash, itching, swelling of lower extremities, fatigue. • Avoid pregnancy.

glimepiride

HIGH ALERT

glye-**mep**-ir-ide
(Amaryl, Apo-Glimepiride, Novo-Glimepiride)
Do not confuse Amaryl with Altace, Amerge, or Reminyl, Avandaryl with Benadryl, or glimepiride with glipizide or glyburide.

FIXED-COMBINATION(S)

Avandaryl: glimepiride/rosiglitazone (an antidiabetic): 1 mg/4 mg, 2 mg/4 mg, 4 mg/4 mg.
Duetact: glimepiride/pioglitazone (an antidiabetic): 2 mg/30 mg, 4 mg/30 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Third-generation sulfonylurea. **CLINICAL:** Antidiabetic agent.

USES

Adjunct to diet, exercise in management of non–insulin-dependent diabetes mellitus (type 2, NIDDM). May use in combination with insulin or metformin in pts whose diabetes is not controlled by diet, exercise in conjunction with a single oral hypoglycemic agent.

PRECAUTIONS

Contraindications: Diabetic complications (diabetic ketoacidosis), Sulfonamide allergy. **Cautions:** Renal/hepatic impairment, stress (fever, trauma, infection), G6PD deficiency, elderly, malnourished.

ACTION

Promotes release of insulin from beta cells of pancreas, decreases glucose output from liver, increases insulin sensitivity at peripheral sites. **Therapeutic Effect:** Lowers serum glucose.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	N/A	2–3 hrs	24 hrs

Completely absorbed from GI tract. Protein binding: greater than 99%. Metabolized in liver. Excreted in urine (60%), feces (40%). **Half-life:** 5–9.2 hrs.

INDICATIONS/ROUTES/DOSAGE

Diabetes Mellitus

PO: ADULTS: Initially, 1–2 mg once a day with breakfast or first main meal. May increase by 1–2 mg q1–2wks, based on serum glucose response. **Maximum:** 8 mg/day. **ELDERLY:** Initially, 1 mg/day. Titrate dose to avoid hypoglycemia.

Dosage in Renal Impairment

Creatinine clearance less than 22 ml/min: Initially, 1 mg/day, then titrate dose based on fasting serum glucose levels.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Rare (less than 3%): Altered taste, dizziness, drowsiness, weight gain, constipation, diarrhea, heartburn, nausea, vomiting, stomach fullness, headache, photosensitivity, peeling of skin, pruritus, rash.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose or insufficient food intake may produce hypoglycemia (esp. with increased glucose demands). GI hemorrhage, cholestatic hepatic jaundice, leukopenia, thrombocytopenia, pancytopenia, agranulocytosis, aplastic or hemolytic anemia occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check serum glucose level. Discuss lifestyle to determine extent of learning, emotional needs. Ensure follow-up instruction if pt or family does not thoroughly understand diabetes management or serum glucose testing technique.

INTERVENTION/EVALUATION

Monitor serum glucose level, food intake. Assess for hypoglycemia (cool/wet skin, tremors, dizziness, anxiety, headache, tachycardia, perioral numbness, hunger, diplopia), hyperglycemia (polyuria, polyphagia, polydipsia, nausea, vomiting, dim vision, fatigue, deep or rapid breathing). Be alert to conditions that alter glucose requirements (fever, increased activity or stress, trauma, surgical procedure).

PATIENT/ FAMILY TEACHING

• Prescribed diet is principal part of treatment; do not skip or delay meals. • Avoid alcohol. • Carry candy, sugar packets, other quick-acting sugar supplements for immediate response to hypoglycemia. • Wear medical alert identification. • Check with physician when glucose demands are altered (fever, infection, trauma, stress, heavy physical activity). • Avoid direct exposure to sunlight.

G

*glipiZIDE

HIGH ALERT

glip-i-zide
(Glucotrol, Glucotrol XL)
Do not confuse glipizide with glimepiride or glyburide, or Glucotrol with Glucophage or Glucotrol XL.

FIXED-COMBINATION(S)

Metaglip: glipizide/metformin (an antidiabetic): 2.5 mg/250 mg, 2.5 mg/500 mg, 5 mg/500 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Second-generation sulfonylurea. **CLINICAL:** Antidiabetic agent.

USES

Adjunct to diet, exercise in management of stable, mild to moderately severe non–insulin-dependent diabetes mellitus (type 2, NIDDM). May be used concomitantly with insulin or metformin to improve glycemic control.

PRECAUTIONS

Contraindications: Diabetic ketoacidosis with or without coma, type 1 diabetes mellitus. **Cautions:** Elderly, malnourished, concomitant use of beta blockers, pts with G6PD deficiency, hepatic/renal impairment.

ACTION

Promotes release of insulin from beta cells of pancreas, decreases glucose output from liver, increases insulin sensitivity at peripheral sites. **Therapeutic Effect:** Lowers serum glucose.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	15–30 min	2–3 hrs	12–24 hrs
Extended-release	2–3 hrs	6–12 hrs	24 hrs

Well absorbed from GI tract. Protein binding: 92%–99%. Metabolized in liver. Excreted in urine. **Half-life:** 2–4 hrs.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check serum glucose level. Discuss lifestyle to determine extent of learning, emotional needs. Ensure follow-up instruction if pt or family does not thoroughly understand diabetes management or serum glucose testing technique.

INTERVENTION/EVALUATION

Monitor serum glucose level, food intake. Assess for hypoglycemia (cool/wet skin, tremors, dizziness, anxiety, headache, tachycardia, perioral numbness, hunger, diplopia), hyperglycemia (polyuria, polyphagia, polydipsia, nausea, vomiting, dim vision, fatigue, deep or rapid breathing). Be alert to conditions that alter glucose requirements (fever, increased activity or stress, trauma, surgical procedure).

PATIENT/ FAMILY TEACHING

• Prescribed diet is principal part of treatment; do not skip or delay meals. • Avoid alcohol. • Carry candy, sugar packets, other quick-acting sugar supplements for immediate response to hypoglycemia. • Wear medical alert identification. • Check with physician when glucose demands are altered (fever, infection, trauma, stress, heavy physical activity). • Avoid direct exposure to sunlight.

glucagon

gloo-ka-gon
(GlucaGen, GlucaGen Diagnostic Kit, Glucagon Emergency Kit)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Glucose elevating agent. **CLINICAL:** Antihypoglycemic, antispasmodic, antidote.

USES

Treatment of severe hypoglycemia in diabetic pts. Diagnostic aid in radiographic examination to temporarily inhibit GI tract movement. **OFF-LABEL:** Hypoglycemia secondary to insulin or oral hypoglycemic therapy. Toxicity associated with beta-blockers, calcium channel blockers.

PRECAUTIONS

Contraindications: Hypersensitivity to glucagon, insulinoma, known pheochromocytoma. **Cautions:** History of insulinoma, pheochromocytoma, prolonged fasting, starvation, adrenal insufficiency, chronic hypoglycemia. Avoid use in pts with hereditary galactose intolerance.

ACTION

Promotes hepatic glycogenolysis, gluconeogenesis. Stimulates cAMP, an enzyme, resulting in increased serum glucose concentration. **Therapeutic Effect:** Increases serum glucose level.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	5–20 min	—	60–90 min
IM	30 min	—	60–90 min
Subcutaneous	30–45 min	—	60–90 min

Metabolized in liver. **Half-life:** 3–10 min.

IV, IM, Subcutaneous

Reconstitution • Reconstitute with 1 ml sterile diluent to provide concentration of 1 mg/ml.

Rate of Administration • Pt usually awakens in 5–20 min. Although 1–2 additional doses may be administered, concern for effects of continuing cerebral hypoglycemia requires consideration of parenteral glucose. • When pt awakens, give supplemental carbohydrate to restore hepatic glycogen and prevent secondary hypoglycemia. If pt fails to respond to glucagon, IV dextrose is necessary.

Storage • Store vial at room temperature. • After reconstitution, is stable for 48 hrs if refrigerated. If reconstituted with Sterile Water for Injection, use immediately. Do not use glucagon solution unless clear.

IV INCOMPATIBILITIES

Do not mix glucagon with any other medications.

INDICATIONS/ROUTES/DOSAGE

Hypoglycemia

◀ALERT▶ Administer IV dextrose if pt fails to respond to glucagon.

IV, IM, Subcutaneous: ADULTS, ELDERLY, CHILDREN WEIGHING MORE THAN 20 KG: 1 mg. May repeat in 20 min. **CHILDREN WEIGHING 20 KG OR LESS:** 0.5 mg. May repeat in 20 min. **NEONATES:** 0.02–0.2 mg/kg/dose. May repeat in 20 min if needed.

Diagnostic Aid

IV: ADULTS, ELDERLY: 0.25–2 mg 10 min prior to procedure. **IM:** 1–2 mg 10 minutes prior to procedure.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional: Nausea, vomiting. **Rare:** Allergic reaction (urticaria, respiratory distress, hypotension).

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may produce persistent nausea/vomiting, hypokalemia (severe fatigue, decreased appetite, palpitations, muscle cramps).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain immediate assessment, including history, clinical signs/symptoms. If presence of hypoglycemic coma is established, give glucagon promptly.

INTERVENTION/EVALUATION

Monitor serum glucose, B/P, pulse, mental status. Monitor response time carefully. Have IV dextrose readily available in event pt does not respond. Assess for possible allergic reaction (urticaria, respiratory difficulty, hypotension). When pt is conscious, give oral carbohydrate.

PATIENT/FAMILY TEACHING

• Recognize significance of identifying symptoms of hypoglycemia: pale, cool skin, anxiety, difficulty concentrating, headache, hunger, nausea, shakiness, diaphoresis, unusual fatigue, unusual weakness, unconsciousness. • If symptoms of hypoglycemia develop, give sugar form first (orange juice, honey, hard candy, sugar cubes, table sugar dissolved in water or juice) followed by cheese and crackers, half a sandwich, glass of milk.

*glyBURIDE

TOP 100 HIGH ALERT

glye-bue-ride

(Apo-Glyburide, DiaBeta, Euglucon, Glynase Pres-Tab, Novo-Glyburide)

Do not confuse DiaBeta with Zebeta, glyburide with glimepiride, glipizide, or Glucotrol.

FIXED-COMBINATION(S)

Glucovance: glyburide/metformin (an antidiabetic): 1.25 mg/250 mg, 2.5 mg/500 mg, 5 mg/500 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Second-generation sulfonylurea. **CLINICAL:** Antidiabetic agent.

USES

Adjunct to diet, exercise in management of stable, mild to moderately severe non–insulin-dependent diabetes mellitus (type 2, NIDDM). May be used concomitantly with insulin or metformin to improve glycemic control. **OFF-LABEL:** Alternative to insulin in women for treatment of gestational diabetes mellitus.

PRECAUTIONS

Contraindications: Diabetic ketoacidosis with or without coma, type 1 diabetes mellitus, concurrent use with bosentan. **Cautions:** Stress, elderly, debilitated, malnourished, hepatic/renal impairment, G6PD deficiency.

ACTION

Promotes release of insulin from beta cells of pancreas, decreases glucose output from liver, increases insulin sensitivity at peripheral sites. **Therapeutic Effect:** Lowers serum glucose level.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	0.25–1 hr	1–2 hrs	12–24 hrs

Well absorbed from GI tract. Protein binding: 99%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 5–16 hrs.

SIDE EFFECTS

Rare (less than 3%): Altered taste, dizziness, drowsiness, weight gain, constipation, diarrhea, heartburn, nausea, vomiting, headache, photosensitivity, peeling of skin, pruritis, rash.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose or insufficient food intake may produce hypoglycemia (esp. in pts with increased glucose demands). Cholestatic jaundice, leukopenia, thrombocytopenia, pancytopenia, agranulocytosis, aplastic or hemolytic anemia occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check serum glucose level. Discuss lifestyle to determine extent of learning, emotional needs. Ensure follow-up instruction if pt or family does not thoroughly understand diabetes management or glucose testing technique.

INTERVENTION/EVALUATION

Monitor serum glucose level, food intake. Assess for hypoglycemia (cool/wet skin, tremors, dizziness, anxiety, headache, tachycardia, perioral numbness, hunger, diplopia); hyperglycemia (polyuria, polyphagia, polydipsia, nausea, vomiting, dim vision, fatigue, deep or rapid breathing). Be alert to conditions that alter glucose requirements (fever, increased activity or stress, trauma, surgical procedure).

PATIENT/ FAMILY TEACHING

• Prescribed diet is principal part of treatment; do not skip or delay meals. • Avoid alcohol. • Carry candy, sugar packets, other quick-acting sugar supplements for immediate response to hypoglycemia. • Wear medical alert identification. • Check with physician when glucose demands are altered (fever, infection, trauma, stress, heavy physical activity). • Avoid direct exposure to sunlight.

golimumab

goe-**lim**-ue-mab
(Simponi, Simponi Aria)
Do not confuse Simponi (subcutaneous) with Simponi Aria (intravenous).

■ **BLACK BOX ALERT** ■ Tuberculosis (TB), invasive fungal infections, other opportunistic infections reported. Discontinue treatment if active infection or sepsis occurs. Test for TB prior to and during treatment, regardless of initial result; if positive, start treatment for TB prior to initiating therapy. Lymphoma, other malignancies reported in pts treated with tumor necrosis factor blockers.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Monoclonal antibody. **CLINICAL:** Immune modulator, antirheumatic, tumor necrosis factor (TNF) blocking agent.

USES

Simponi: Used alone or in combination with methotrexate for the treatment of adult pts with active psoriatic arthritis. Used in combination with methotrexate for the treatment of adult pts with moderately to severely active rheumatoid arthritis. Used alone for the treatment of adult pts with active ankylosing spondylitis. Treatment of moderate to severe ulcerative colitis.
Simponi Aria: Used in combination with methotrexate for treatment of adult pts with moderately to severely active rheumatoid arthritis.

PRECAUTIONS

Contraindications: None known. **Cautions:** Elderly, concomitant immunosuppressants, comorbid conditions predisposing to infections (e.g., diabetes). Do not start during an active infection. Residence or travel from areas of endemic mycosis; tuberculosis, underlying hematologic disorders, preexisting or recent-onset demyelinating disorders (e.g., multiple sclerosis, polyneuropathy),

fine translucent particles since drug is a protein. • Do not use if opaque particles, discoloration, or other foreign particles present. • May store diluted solution at room temperature up to 4 hrs.

IV INCOMPATIBILITIES

Do not infuse concomitantly with other drugs.

INDICATIONS/ROUTES/DOSAGE

Active Psoriatic Arthritis

Subcutaneous: ADULTS, ELDERLY: 50 mg once monthly. Use alone or in combination with methotrexate.

Moderate to Severe Active Rheumatoid Arthritis

Subcutaneous: ADULTS, ELDERLY: (Simponi): 50 mg once monthly. Use in combination with methotrexate.

IV Infusion: ADULTS, ELDERLY: (Simponi Aria): 2 mg/kg at wk 0 and wk 4. Then decrease frequency to every 8 wks. (Use in combination with methotrexate.)

Active Ankylosing Spondylitis

Subcutaneous: ADULTS, ELDERLY: 50 mg once monthly.

Ulcerative Colitis

Subcutaneous: ADULTS, ELDERLY: Initially, 200 mg; then 100 mg 2 wks later, and then 100 mg q4wks thereafter.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (13%): Laryngitis, nasopharyngitis, pharyngitis, rhinitis, upper respiratory tract infection. **Occasional (3%–2%):** Bronchitis, hypertension, rash, pyrexia. **Rare (less than 1%):** Dizziness, paresthesia, constipation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Neutropenia, lymphopenia may increase risk of infection. New-onset psoriasis, exacerbation of preexisting psoriasis have been reported. Serious infections including sepsis, pneumonia, cellulitis, TB, invasive fungal infections reported. May increase risk of lymphoma, melanoma, new malignancies. New onset or exacerbation of CNS demyelinating disorders, including multiple sclerosis, or worsening of HF have occurred. Viral reactivation of herpes zoster, HIV, hepatitis B may occur. Pts who receive TNF blockers have risk of autoantibody formation (immunogenicity). Hypersensitivity reactions including anaphylaxis reported. May induce lupus-like symptoms (butterfly rash, new joint pain, peripheral edema, UV sensitivity).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline LFT, CBC, vital signs, urine pregnancy. Obtain B-type natriuretic peptide (BNP) level and review echocardiogram for pts with history of HF. Do not initiate therapy if active infection suspected. Evaluate for active TB and test for latent infection prior to and during treatment. Induration of 5 mm or greater with tuberculin skin test should be considered a positive result when assessing for latent TB. Antifungal therapy should be considered for those who reside or travel to regions where mycoses are endemic. Question history of anemia, HF, CNS disorders, hepatic impairment, HIV, malignancies. Assess skin for moles, lesions. Receive full medication history including vitamins, herbal products.

INTERVENTION/EVALUATION

Monitor CBC, LFT every 4–8 wks, then periodically. Screen pts for TB (night sweats, hemoptysis, weight loss, fever) regardless of baseline tuberculin skin test result. Monitor hepatitis B carriers during treatment and several mos after treatment. If any viral reactivation occurs, interrupt treatment and consider antiviral therapy. Discontinue treatment if acute infection, opportunistic infection, sepsis occur and initiate appropriate antimicrobial therapy.

abdominal wall. Push needle in until barrel hub touches pt's skin. Withdraw needle 1 cm to create a space to discharge goserelin. Fully depress plunger. • Withdraw needle, bandage site.

INDICATIONS/ROUTES/DOSAGE

Prostatic Carcinoma, Advanced

Subcutaneous: ADULTS OLDER THAN 18 YRS, ELDERLY: 3.6 mg every 28 days or 10.8 mg q12wks subcutaneously into upper abdominal wall.

Prostate Carcinoma, Locally Confined

Subcutaneous: ADULTS, ELDERLY: (in combination with an antiestrogen and radiotherapy, begin 8 wks prior to radiotherapy): 3.6 mg once. Report in 28 days with 10.8 mg or 3.6 mg q28days for 4 doses.

Breast Carcinoma, Endometriosis

Subcutaneous: ADULTS: 3.6 mg every 28 days subcutaneously into upper abdominal wall.

Endometrial Thinning

Subcutaneous: ADULTS: 3.6 mg subcutaneously into upper abdominal wall as a single dose or in 2 doses 4 wks apart.

Endometriosis

Subcutaneous: ADULTS: 3.6 mg every 28 days for 6 mos.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (60%–13%): Headache, hot flashes, depression, diaphoresis, sexual dysfunction, impotence, lower urinary tract symptoms. **Occasional (10%–5%):** Pain, lethargy, dizziness, insomnia, anorexia, nausea, rash, upper respiratory tract infection, hirsutism, abdominal pain. **Rare:** Pruritus.

ADVERSE EFFECTS/ TOXIC REACTIONS

Arrhythmias, HF, hypertension occur rarely. Ureteral obstruction, spinal cord compression observed (immediate orchiectomy may be necessary).

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Monitor pt closely for worsening signs/symptoms of prostatic cancer, esp. during first mo of therapy.

PATIENT/FAMILY TEACHING

• Use nonhormonal methods of contraception during therapy. • Report suspected pregnancy or regular menstruation persists. • Breakthrough menstrual bleeding may occur if dose is missed.

granisetron

gra-**nis**-e-tron
(Granisol, Kytril, Sancuso)
Do not confuse granisetron with dolasetron, ondansetron, or palonosetron.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin receptor antagonist (5-HT_3). **CLINICAL:** Antiemetic.

USES

Prevention of nausea/vomiting associated with emetogenic cancer therapy and cancer radiation therapy. Prevention, treatment of postop nausea, vomiting. **OFF-LABEL: PO:** Breakthrough treatment of chemotherapy-associated nausea/vomiting.

PRECAUTIONS

Contraindications: None known. **Cautions:** Hypersensitivity to other 5-HT_3 receptor antagonists, congenital QT prolongation, concomitant administration of medications that prolong QT interval, following abdominal surgery or in chemotherapy-induced nausea, vomiting (may mask progressive ileus or gastric distention), hepatic disease.

Postop Nausea/Vomiting
IV: ADULTS, ELDERLY: 1 mg as a single postop dose. **CHILDREN OLDER THAN 4 YRS:** 20–40 mcg/kg. **Maximum:** 1 mg.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (21%–14%): Headache, constipation, asthenia. **Occasional (8%–6%):** Diarrhea, abdominal pain. **Rare (less than 2%):** Altered taste, fever.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reaction, hypertension, hypotension, arrhythmias (sinus bradycardia, atrial fibrillation, AV block, ventricular ectopy), EKG abnormalities occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess hydration status. Ensure that granisetron is given within 30 min of starting chemotherapy.

INTERVENTION/EVALUATION

Monitor for therapeutic effect. Assess for headache. Monitor for dehydration due to recurrent vomiting. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

- Granisetron is effective shortly following administration; prevents nausea/vomiting.
- Transitory taste disorder may occur.

griseofulvin

gris-e-oh-**ful**-vin
(Grifulvin V, Gris-PEG)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antifungal antibiotic. **CLINICAL:** Antifungal.

USES

Treatment of susceptible tinea (ringworm) infections of the skin, hair caused by susceptible species of *Microsporum, Epidermophyton,* or *Trichophyton*.

PRECAUTIONS

Contraindications: Hepatocellular failure, porphyria, pregnancy. **Cautions:** Exposure to sun/ultraviolet light (photosensitivity), hypersensitivity to penicillins.

ACTION

Inhibits fungal cell mitosis by disrupting mitotic spindle structure. **Therapeutic Effect:** Fungistatic.

PHARMACOKINETICS

Ultramicrosize is almost completely absorbed. Absorption is significantly enhanced after a fatty meal. Metabolized in liver. Minimal excretion in urine. **Half-life:** 9–22 hrs.

ACTION

Stimulates respiratory tract secretions by decreasing adhesiveness, viscosity of mucus. **Therapeutic Effect:** Promotes removal of viscous mucus.

PHARMACOKINETICS

Well absorbed from GI tract. Metabolized in liver. Excreted in urine. **Half-life:** 1 hr.

prolonged administration of high dosage may produce extreme fatigue (may last for wks). Prolonged administration to children may produce suppression of weight and/or height patterns. AV block, bradycardia, arrhythmias occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline vital signs, serum chemistries. Measure pulse, B/P prior to initiation of therapy, following dose increases, and periodically during therapy.

INTERVENTION/EVALUATION

Assist with ambulation if sedation, dizziness, fatigue, lethargy occur. Be alert to mood changes. Assess for nausea, headache. Monitor B/P, serum chemistries, particularly renal/hepatic function for change from baseline. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • Dry mouth may be relieved with sugarless gum, sips of water. • Advise pts to avoid becoming dehydrated, overheated. • Do not substitute for immediate-release guanfacine tablets. • Swallow whole; do not chew, crush, dissolve, or divide. • Do not take with high-fat meal.

Generic Drugs H

haloperidol	hydrocodone	hydroxyurea
heparin	hydrocortisone	hydrOXYzine
hydrALAZINE	hydromorphone	hyoscyamine
hydrochlorothiazide	hydroxychloroquine	

PHARMACOKINETICS

Readily absorbed from GI tract. Protein binding: 92%. Metabolized in liver. Excreted in urine. Not removed by hemodialysis. **Half-life:** 20 hrs.

piggyback over 30 min. • For IV infusion, up to 25 mg/hr has been used (titrated to pt response).

Storage • Discard if precipitate forms, discoloration occurs. • Store at room temperature; do not freeze. • Protect from light.

IM

Parenteral Administration • Pt should remain recumbent for 30–60 min to minimize hypotensive effect. • Prepare Decanoate IM injection using 21-gauge needle. • Do not exceed maximum volume of 3 ml per IM injection site. • Inject slow, deep IM into upper outer quadrant of gluteus maximus.

PO

• Give without regard to meals. • Scored tablets may be crushed. • Dilute oral concentrate with water or juice. • Avoid skin contact with oral concentrate; may cause contact dermatitis.

IV INCOMPATIBILITIES

Allopurinol (Aloprim), amphotericin B complex (Abelcet, AmBisome, Amphotec), cefepime (Maxipime), fluconazole (Diflucan), foscarnet (Foscavir), heparin, nitroprusside (Nipride), piperacillin/tazobactam (Zosyn).

IV COMPATIBILITIES

Dobutamine (Dobutrex), dopamine (Intropin), fentanyl (Sublimaze), hydromorphone (Dilaudid), lidocaine, lorazepam (Ativan), midazolam (Versed), morphine, nitroglycerin, norepinephrine (Levophed), propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Usual Dosage

IM *(Lactate)*: ADULTS, ELDERLY: 2–5 mg q4–8h as needed. **CHILDREN 6–12 YRS:** 1–3 mg/dose q4–8h as needed. **Maximum:** 0.15 mg/kg/day. ***(Decanoate)*: ADULTS, ELDERLY:** 10–20 times stabilized oral dose, given at 4-wk intervals. **PO: ADULTS, ELDERLY:** 0.5–5 mg 2–3 times/day. **Maximum:** 30 mg/day. **CHILDREN 3–12 YRS (15–40 KG):** 0.25–0.5 mg/day. May increase by 0.25–0.5 mg q5–7days. **Maximum:** 0.15 mg/kg/day.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Blurred vision, constipation, orthostatic hypotension, dry mouth, swelling or soreness of female breasts, peripheral edema. **Occasional:** Allergic reaction, difficulty urinating, decreased thirst, dizziness, diminished sexual function, drowsiness, nausea, vomiting, photosensitivity, lethargy.

ADVERSE EFFECTS/ TOXIC REACTIONS

Extrapyramidal symptoms (EPS) appear to be dose related and typically occur in first few days of therapy. Marked drowsiness/lethargy, excessive salivation, fixed stare may be mild to severe in intensity. Less frequently noted are severe akathisia (motor restlessness), acute dystonias: torticollis (neck muscle spasm), opisthotonos (rigidity of back muscles), oculogyric crisis (rolling back of eyes). Tardive dyskinesia (tongue protrusion, puffing of cheeks, chewing/puckering of the mouth) may occur during long-term therapy or after drug discontinuance and may be irreversible. Elderly female pts have greater risk of developing this reaction.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess behavior, appearance, emotional status, response to environment, speech pattern, thought content.

INTERVENTION/EVALUATION

Monitor B/P, heart rate. Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Monitor for rigidity, tremor, mask-like facial expression, fine tongue movement.

5,000 units/ml, 10,000 units/ml, 20,000 units/ml. **Premix Solution for Infusion:** 25,000 units/250 ml infusion, 25,000 units/500 ml infusion.

ADMINISTRATION/HANDLING

◄ALERT► Do **not** give by IM injection (pain, hematoma, ulceration, erythema).

(chills, fever, pruritus, urticaria, asthma, rhinitis, lacrimation, headache).

ADVERSE EFFECTS/ TOXIC REACTIONS

Bleeding complications ranging from local ecchymoses to major hemorrhage occur more frequently in high-dose therapy, intermittent IV infusion, women 60 yrs and older. **Antidote:** Protamine sulfate 1–1.5 mg IV for every 100 units heparin subcutaneous within 30 min of overdose, 0.5–0.75 mg for every 100 units heparin subcutaneous if within 30–60 min of overdose, 0.25–0.375 mg for every 100 units heparin subcutaneous if 2 hrs have elapsed since overdose, 25–50 mg if heparin was given by IV infusion.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Cross-check dose with co-worker. Determine aPTT before administration and 24 hrs following initiation of therapy, then q24–48hrs for first wk of therapy or until maintenance dose is established. Follow with aPTT determinations 1–2 times weekly for 3–4 wks. In long-term therapy, monitor 1–2 times a mo.

INTERVENTION/EVALUATION

Monitor aPTT (therapeutic range at 1.5–2.5 times normal) diligently. Assess CBC, platelet count, ALT, AST. Monitor urine and stool for occult blood. Assess for decrease in B/P, increase in pulse rate, complaint of abdominal/back pain, severe headache (may be evidence of hemorrhage). Question for increase in amount of discharge during menses. Assess peripheral pulses; skin for ecchymosis, petechiae. Check for excessive bleeding from minor cuts, scratches. Assess gums for erythema, gingival bleeding. Assess urine output for hematuria. Avoid IM injections due to potential for hematomas. When converting to warfarin (Coumadin) therapy, monitor PT results (will be 10%–20% higher while heparin is given concurrently).

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ACTION

Direct vasodilating effects on arterioles. **Therapeutic Effect:** Decreases B/P, systemic vascular resistance.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	20–30 min	N/A	Up to 8 hrs
IV	5–20 min	N/A	1–4 hrs

Well absorbed from GI tract. Widely distributed. Protein binding: 85%–90%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 3–7 hrs (increased in renal impairment).

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Occasional: Headache, anorexia, nausea, vomiting, diarrhea, palpitations, tachycardia, angina pectoris. **Rare:** Constipation, ileus, edema, peripheral neuritis (paresthesia), dizziness, muscle cramps, anxiety, hypersensitivity reactions (rash, urticaria, pruritus, fever, chills, arthralgia), nasal congestion, flushing, conjunctivitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

High dosage may produce lupus erythematosus–like reaction (fever, facial rash, muscle/joint aches, glomerulonephritis, splenomegaly). Severe orthostatic hypotension, skin flushing, severe headache, myocardial ischemia, cardiac arrhythmias may develop. Profound shock may occur with severe overdosage.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain B/P, pulse immediately before each dose, in addition to regular monitoring (be alert to fluctuations).

INTERVENTION/EVALUATION

Monitor B/P, pulse, ANA titer. Monitor for headache, palpitations, tachycardia. Assess for peripheral edema of hands, feet. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

• To reduce hypotensive effect, go from lying to standing slowly. • Report muscle/joint aches, fever (lupus-like reaction), flu-like symptoms. • Limit alcohol use.

hydrochlorothiazide

hye-dro-**klor**-oh-**thy**-ah-zide
(Apo-Hydro 🍁, Microzide, Novo-Hydrazide 🍁)

Do not confuse Microzide with Maxzide.

FIXED-COMBINATION(S)

Accuretic: hydrochlorothiazide/quinapril (an angiotensin-converting enzyme [ACE] inhibitor): 12.5 mg/10 mg, 12.5 mg/20 mg, 25 mg/20 mg. **Aldactazide:** hydrochlorothiazide/spironolactone (a potassium-sparing diuretic): 25 mg/25 mg, 50 mg/50 mg. **Aldoril:** hydrochlorothiazide/methyldopa (an antihypertensive): 15 mg/250 mg, 25 mg/250 mg, 30 mg/500 mg, 50 mg/500 mg. **Amturnide:** hydrochlorothiazide/aliskiren (renin inhibitor)/amlodipine (calcium channel blocker): 12.5 mg/150 mg/5 mg, 12.5 mg/300 mg/5 mg, 25 mg/300 mg/5 mg, 12.5 mg/300 mg/10 mg, 25 mg/300 mg/10 mg. **Apresazide:** hydrochlorothiazide/hydralazine (a vasodilator): 25 mg/25 mg, 50 mg/50 mg, 50 mg/100 mg. **Atacand HCT:** hydrochlorothiazide/candesartan (an angiotensin II receptor antagonist): 12.5 mg/16 mg, 12.5 mg/32 mg. **Avalide:** hydrochlorothiazide/irbesartan (an angiotensin II receptor antagonist): 12.5 mg/150 mg, 12.5 mg/300 mg, 25 mg/300 mg. **Benicar HCT:** hydrochlorothiazide/olmesartan (an angiotensin II receptor antagonist): 12.5 mg/20 mg, 12.5 mg/40 mg, 25 mg/40 mg. **Capozide:** hydrochlorothiazide/captopril (an ACE inhibitor): 15 mg/25 mg, 15 mg/50 mg, 25 mg/25 mg, 25 mg/50 mg. **Diovan HCT:** hydrochlorothiazide/valsartan (an angiotensin II receptor antagonist): 12.5 mg/80 mg, 12.5 mg/160 mg. **Dutoprol:** hydrochlorothiazide/metoprolol (a beta blocker): 12.5 mg/25 mg, 12.5 mg/50 mg, 12.5 mg/100 mg. **Dyazide/Maxide:** hydrochlorothiazide/triamterene

H

*"Tall Man" lettering 🍁 Canadian trade name

(a potassium-sparing diuretic): 25 mg/37.5 mg, 25 mg/50 mg, 50 mg/75 mg. **Exforge HCT:** hydrochlorothiazide/amlodipine (a calcium channel blocker)/valsartan (an angiotensin II receptor blocker): 12.5 mg/5 mg/160 mg, 25 mg/5 mg/160 mg, 12.5 mg/10 mg/160 mg, 25 mg/10 mg/160 mg, 25 mg/10 mg/320 mg. **Hyzaar:** hydrochlorothiazide/losartan (an angiotensin II receptor antagonist): 12.5 mg/50 mg, 12.5 mg/100 mg, 25 mg/100 mg. **Inderide:** hydrochlorothiazide/propranolol (a beta-blocker): 25 mg/40 mg, 25 mg/80 mg, 50 mg/80 mg, 50 mg/120 mg, 50 mg/160 mg. **Lopressor HCT:** hydrochlorothiazide/metoprolol (a beta-blocker): 25 mg/50 mg, 25 mg/100 mg, 50 mg/100 mg. **Lotensin HCT:** hydrochlorothiazide/bepridil (a calcium channel blocker): 6.25 mg/5 mg, 12.5 mg/10 mg, 12.5 mg/20 mg, 25 mg/20 mg. **Micardis HCT:** hydrochlorothiazide/telmisartan (an angiotensin II receptor antagonist): 12.5 mg/40 mg, 12.5 mg/80 mg. **Moduretic:** hydrochlorothiazide/amiloride (a potassium-sparing diuretic): 50 mg/5 mg. **Normozide:** hydrochlorothiazide/labetalol (a beta-blocker): 25 mg/100 mg, 25 mg/300 mg. **Prinzide/Zestoretic:** hydrochlorothiazide/lisinopril (an ACE inhibitor): 12.5 mg/10 mg, 12.5 mg/20 mg, 25 mg/20 mg. **Tekturna HCT:** hydrochlorothiazide/aliskiren (a renin inhibitor): 12.5 mg/150 mg, 25 mg/300 mg. **Teveten HCT:** hydrochlorothiazide/eprosartan (an angiotensin II receptor antagonist): 12.5 mg/600 mg, 25 mg/600 mg. **Timolide:** hydrochlorothiazide/timolol (a beta-blocker): 25 mg/10 mg. **Tribenzor:** hydrochlorothiazide/olmesartan/amlodipine: 12.5 mg/20 mg/5 mg, 12.5 mg/40 mg/5 mg, 25 mg/40 mg/5 mg, 12.5 mg/40 mg/10 mg, 25 mg/40 mg/10 mg. **Uniretic:** hydrochlorothiazide/moexipril (an ACE inhibitor): 12.5 mg/7.5 mg, 25 mg/15 mg. **Vaseretic:** hydrochlorothiazide/enalapril (an ACE inhibitor): 12.5 mg/5 mg, 25 mg/10 mg. **Ziac:** hydrochlorothiazide/bisoprolol (a beta-blocker): 6.25 mg/5 mg, 6.25 mg/10 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Sulfonamide derivative. **CLINICAL:** Thiazide diuretic, antihypertensive.

USES

Treatment of mild to moderate hypertension, edema in HF, hepatic cirrhosis, renal dysfunction (e.g., nephrotic syndrome). **OFF-LABEL:** Treatment of lithium-induced diabetes insipidus.

PRECAUTIONS

Contraindications: Anuria, history of hypersensitivity to sulfonamides or thiazide diuretics. **Cautions:** Severe renal/hepatic impairment, diabetes mellitus, elderly or debilitated, history of gout, moderate to high serum cholesterol, hypercalcemia.

ACTION

Inhibits sodium reabsorption in distal renal tubules, causing excretion of sodium, potassium, hydrogen ions, water. **Therapeutic Effect:** Promotes diuresis; reduces B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (diuretic)	2 hrs	4–6 hrs	6–12 hrs

Variably absorbed from GI tract. Primarily excreted unchanged in urine. Not removed by hemodialysis. **Half-life:** 5.6–14.8 hrs.

INTERVENTION/EVALUATION

Continue to monitor B/P, vital signs, electrolytes, I&O, daily weight. Note extent of diuresis. Watch for changes from initial assessment (hypokalemia may result in weakness, tremor, muscle cramps, nausea, vomiting, altered mental status, tachycardia; hyponatremia may result in confusion, thirst, cold/clammy skin). Be esp. alert for potassium depletion in pts taking digoxin (cardiac arrhythmias). Potassium supplements are frequently ordered. Check for constipation (may occur with exercise diuresis).

PATIENT/FAMILY TEACHING

• Expect increased frequency, volume of urination. • To reduce hypotensive effect, go from lying to standing slowly. • Eat foods high in potassium, such as whole grains (cereals), legumes, meat, bananas, apricots, orange juice, potatoes (white, sweet), raisins. • Protect skin from sun, ultraviolet light (photosensitivity may occur).

hydrocodone

TOP 100 HIGH ALERT

hye-droe-**koe**-done
(Hycodan, Hysingla ER, Robidone, Zohydro ER)
Do not confuse Hycodan with Vicodin.

FIXED-COMBINATION(S)

Anexsia: hydrocodone/acetaminophen (a non-narcotic analgesic): 5 mg/500 mg, 7.5 mg/650 mg, 10 mg/650 mg. **Duocet:** hydrocodone/acetaminophen: 5 mg/500 mg. **Hycet:** hydrocodone/acetaminophen: 7.5 mg/325 mg per 15 ml. **Hycodan:** hydrocodone/homatropine (an anticholinergic): 5 mg/1.5 mg. **Hycotuss, Vitussin:** hydrocodone/guaifenesin (an expectorant): 5 mg/100 mg. **Lorcet:** hydrocodone/acetaminophen: 7.5 mg/650 mg, 10 mg/650 mg. **Lortab:** hydrocodone/acetaminophen: 2.5 mg/500 mg, 5 mg/500 mg, 7.5 mg/500 mg, 10 mg/500 mg. **Lortab Elixir:** hydrocodone/acetaminophen: 2.5 mg/167 mg per 5 ml. **Lortab with ASA:** hydrocodone/aspirin: 5 mg/500 mg. **Norco:** hydrocodone/acetaminophen: 10 mg/325 mg. **Reprexain CIII:** hydrocodone/ibuprofen (an NSAID): 5 mg/200 mg. **Rezira:** hydrocodone/pseudoephedrine (a nasal decongestant): 5 mg/60 mg per 5 ml. **Tussend:** hydrocodone/pseudoephedrine (a sympathomimetic)/guaifenesin (an expectorant): 2.5 mg/30 mg/100 mg per 5 ml. **Vicodin:** hydrocodone/acetaminophen: 5 mg/500 mg. **Vicodin ES:** hydrocodone/acetaminophen: 7.5 mg/750 mg. **Vicodin HP:** hydrocodone/acetaminophen: 10 mg/650 mg. **Vicoprofen:** hydrocodone/ibuprofen (an NSAID): 7.5 mg/200 mg. **Xodol:** hydrocodone/acetaminophen: 5 mg/300 mg. **Zutripto:** hydrocodone/chlorpheniramine (an antihistamine)/pseudoephedrine (a nasal decongestant): 5 mg/4 mg/60 mg. **Zydone:** hydrocodone/acetaminophen: 5 mg/400 mg, 7.5 mg/400 mg, 10 mg/400 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Opioid agonist **(Schedule III). CLINICAL:** Narcotic analgesic, antitussive.

USES

Relief of moderate to moderately severe pain, nonproductive cough. **Hysingla ER, Zohydro ER:** Around-the-clock management of moderate to severe chronic pain.

PRECAUTIONS

Contraindications: Significant respiratory depression, acute or severe bronchial asthma or hypercarbia, paralytic ileus. **Cautions:** Adrenal insufficiency, biliary tract disease, pancreatitis, CNS depression/coma, acute alcoholism, hypothyroidism; severe renal, hepatic or

Dosage in Hepatic Impairment
Use caution.

SIDE EFFECTS

Frequent: Lethargy, hypotension, diaphoresis, facial flushing, dizziness, drowsiness. **Occasional:** Urine retention, blurred vision, constipation, dry mouth, headache, nausea, vomiting, difficult/painful urination, euphoria, dysphoria.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose results in respiratory depression, skeletal muscle flaccidity, cold/clammy skin, cyanosis, extreme drowsiness progressing to seizures, stupor, coma. Tolerance to analgesic effect, physical dependence may occur with repeated use. Prolonged duration of action, cumulative effect may occur in those with hepatic/renal impairment. **Antidote:** Naloxone (see Appendix K).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain vital signs. If respirations are 12/min or less (20/min or less in children), withhold medication, contact physician. **Analgesic:** Assess onset, type, location, duration of pain. Effect of medication is reduced if full pain recurs before next dose. **Antitussive:** Assess type, severity, frequency of cough.

INTERVENTION/EVALUATION

Palpate bladder for urinary retention. Monitor daily pattern of bowel activity, stool consistency. Initiate deep breathing and coughing exercises, particularly in pts with pulmonary impairment. Assess for clinical improvement; record onset of relief of pain, cough.

PATIENT/FAMILY TEACHING

• Go from lying to standing slowly to avoid orthostatic hypotension. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • Tolerance or dependence may occur with prolonged use at high dosages. • Report nausea, vomiting, constipation, shortness of breath, difficulty breathing. • May take with food.

hydrocortisone

hye-droe-**kor**-ti-sone
(Anusol HC, Caldecort, Colocort, Cortaid, Cortef, Cortenema, Cortizone-10, Preparation H Hydrocortisone, Proctocort, Solu-Cortef, Westcort).
Do not confuse hydrocortisone with hydrochlorothiazide, hydrocodone, or hydroxychloroquine, Cortef with Coreg, or Solu-Cortef with Solu-Medrol.

FIXED-COMBINATION(S)

Cortisporin: hydrocortisone/neomycin/polymyxin (an anti-infective): 5 mg/10,000 units/5 mg, 10 mg/10,000 units/5 mg. **Liposivir:** hydrocortisone/acyclovir (an antiviral): 1%/5%.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Adrenal corticosteroid. **CLINICAL:** Glucocorticoid.

USES

Systemic: Management of adrenocortical insufficiency, antiinflammatory, immunosuppressive. **Topical:** Inflammatory dermatoses, adjunctive treatment of ulcerative colitis, atopic dermatitis, inflamed hemorrhoids. **OFF-LABEL:** Management of septic shock. Treatment of thyroid storm.

PRECAUTIONS

Contraindications: Fungal, tuberculosis, viral skin lesions; serious infections, IM administration in idiopathic thrombocytopenia purpura. **Cautions:** Thyroid dysfunction, cirrhosis, hypertension,

Topical

• Gently cleanse area before application. • Use occlusive dressings only as ordered. • Apply sparingly; rub into area thoroughly.

IV INCOMPATIBILITIES

Ciprofloxacin (Cipro), diazepam (Valium), midazolam (Versed), phenytoin (Dilantin).

IV COMPATIBILITIES

Amphotericin, calcium gluconate, cefepime (Maxipime), digoxin (Lanoxin), diltiazem (Cardizem), diphenhydramine (Benadryl), dopamine (Intropin), insulin, lidocaine, lorazepam (Ativan), magnesium sulfate, morphine, norepinephrine (Levophed), procainamide (Pronestyl), potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Acute Adrenal Insufficiency

IV: ADULTS, ELDERLY: 100 mg IV bolus, then 300 mg/day in divided doses q8h. **CHILDREN:** 1–2 mg/kg IV bolus, then 150–250 mg/day in divided doses q6–8h. **INFANTS:** 1–2 mg/kg/dose IV bolus, then 25–150 mg/day in divided doses q6–8h.

Anti-Inflammation, Immunosuppression

IV, IM: ADULTS, ELDERLY: 15–240 mg q12h. **CHILDREN:** 1–5 mg/kg/day in divided doses q12h.

PO: ADULTS, ELDERLY: 15–240 mg q12h. **CHILDREN:** 2.5–10 mg/kg/day in divided doses q6–8h.

Physiologic Replacement

PO: CHILDREN: 8–10 mg/m^2/day in 3 divided doses.

Status Asthmaticus

IV: ADULTS, ELDERLY, CHILDREN: 1–2 mg/kg/dose q6h for 24 hrs. **Maintenance:** 0.5–1 mg/kg q6h.

Adjunctive Treatment of Ulcerative Colitis

Rectal *(Enema)*: ADULTS, ELDERLY: 100 mg at bedtime for 21 nights or until clinical and proctologic remission occurs (may require 2–3 mos of therapy). **Rectal: ADULTS, ELDERLY:** 1 applicator 1–2 times a day for 2–3 wks, then every second day until therapy ends.

Usual Topical Dosage: ADULTS, ELDERLY: Apply sparingly 2–4 times a day.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Insomnia, heartburn, anxiety, abdominal distention, diaphoresis, acne, mood swings, increased appetite, facial flushing, delayed wound healing, increased susceptibility to infection, diarrhea or constipation. **Occasional:** Headache, edema, change in skin color, frequent urination. **Topical:** Pruritus, redness, irritation. **Rare:** Tachycardia, allergic reaction (rash, hives), psychological changes, hallucinations, depression. **Topical:** Allergic contact dermatitis, purpura. **Systemic:** Absorption more likely with use of occlusive dressings or extensive application in young children.

ADVERSE EFFECTS/ TOXIC REACTIONS

Long-term therapy: Hypocalcemia, hypokalemia, muscle wasting (esp. arms, legs), osteoporosis, spontaneous fractures, amenorrhea, cataracts, glaucoma, peptic ulcer, HF. **Abrupt withdrawal after long-term therapy:** Nausea, fever, headache, sudden severe joint pain, rebound inflammation, fatigue, weakness, lethargy, dizziness, orthostatic hypotension.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline weight, B/P, serum glucose, cholesterol, electrolytes. Review results of initial tests (tuberculosis [TB] skin test, X-rays, EKG).

INTERVENTION/EVALUATION

Assess for edema. Be alert to infection (reduced immune response): sore

opiates during labor. Regular use of opiates during pregnancy may produce withdrawal symptoms in the neonate (irritability, excessive crying, tremors, hyperactive reflexes, fever, vomiting, diarrhea, yawning, sneezing, seizures). **Pregnancy Category C (D if used for prolonged periods or at high dosages at term). Children:** Those younger than 2 yrs may be more susceptible to respiratory depression. **Elderly:** May be more susceptible to respiratory depression, may cause paradoxical excitement. Age-related renal impairment, prostatic hypertrophy or obstruction may increase risk of urinary retention; dosage adjustment recommended.

INTERACTIONS

DRUG: **Alcohol, other CNS depressants** may increase CNS, respiratory depression, hypotension. **HERBAL:** **Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depression. **FOOD:** None known. **LAB VALUES:** May increase serum amylase, lipase.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution (Dilaudid HP): 250 mg. **Injection, Solution (Dilaudid):** 1 mg/ml, 2 mg/ml, 4 mg/ml, 10 mg/ml. **Liquid, Oral:** 1 mg/ml. **Suppository (Dilaudid):** 3 mg. **Tablets (Dilaudid):** 2 mg, 4 mg, 8 mg.

USES

Suppression and treatment of acute attacks of malaria. Treatment of systematic lupus erythematosus, rheumatoid arthritis (RA). **OFF-LABEL:** Porphyria, treatment of Q fever.

PRECAUTIONS

Contraindications: Long-term therapy for children, psoriasis, retinal or visual field changes. **Cautions:** Alcoholism, hepatic disease, G6PD deficiency, porphyria. Concurrent medications that are hepatotoxic. Children are esp. susceptible to hydroxychloroquine fatalities.

ACTION

Concentrates in parasite acid vesicles, interfering with parasite protein (DNA/RNA) synthesis. Inhibits movement of neutrophils, and chemotaxis of eosinophils. **Therapeutic Effect:** Inhibits parasite growth.

PHARMACOKINETICS

Variable rate of absorption. Widely distributed in body tissues (eyes, kidneys, liver, lungs). Protein binding: 45%. Partially metabolized in liver. Partially excreted in urine. **Half-life:** 32 days (in plasma), 50 days (in blood).

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	15–30 min	N/A	4–6 hrs

Well absorbed from GI tract and after parenteral administration. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 3–7 hrs (increased in elderly).

PO

- May give without regard to food.
- Shake oral suspension well.
- Scored tablets may be crushed; do not break, crush, or open capsule.

INDICATIONS/ROUTES/DOSAGE

Anxiety

PO: ADULTS, ELDERLY: 50–100 mg 4 times a day. **Maximum:** 600 mg/day. **CHILDREN 6 YRS AND OLDER:** 50–100 mg/day in divided doses. **CHILDREN YOUNGER THAN 6 YRS:** 50 mg/day in divided doses.

Nausea/Vomiting

IM: ADULTS, ELDERLY: 25–100 mg/dose q4–6h.

Pruritus

PO: ADULTS, ELDERLY: 25 mg 3–4 times a day. **CHILDREN 6 YRS AND OLDER:** 50–100 mg/day in divided doses. **CHILDREN YOUNGER THAN 6 YRS:** 50 mg/day in divided doses.

Preop Sedation

PO: ADULTS, ELDERLY: 50–100 mg. **CHILDREN:** 0.6 mg/kg/dose.
IM: ADULTS, ELDERLY: 25–100 mg. **CHILDREN:** 1.1 mg/kg/dose.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Side effects are generally mild, transient. **Frequent:** Drowsiness, dry mouth, marked discomfort with IM injection. **Occasional:** Dizziness, ataxia, asthenia, slurred speech, headache, agitation, increased anxiety. **Rare:** Paradoxical reactions (hyperactivity, anxiety in children; excitement, restlessness in elderly or debilitated pts) generally noted during first 2 wks of therapy, particularly in presence of uncontrolled pain.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reaction (wheezing, dyspnea, chest tightness) may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Anxiety: Offer emotional support. Assess motor responses (agitation, trembling, tension), autonomic responses (cold/clammy hands, diaphoresis). **Antiemetic:** Assess for dehydration (poor skin turgor, dry mucous membranes, longitudinal furrows in tongue).

INTERVENTION/EVALUATION

For pts on long-term therapy, renal function, LFT, blood counts should be performed periodically. Monitor lung sounds for signs of hypersensitivity reaction. Monitor serum electrolytes in pts with severe vomiting. Assess for paradoxical reaction, particularly during early therapy. Assist with ambulation if drowsiness, light-headedness occur.

PATIENT/FAMILY TEACHING

- Marked discomfort may occur with IM injection.
- Sugarless gum, sips of water may relieve dry mouth.
- Drowsiness usually diminishes with continued therapy.
- Avoid tasks that require alertness, motor skills until response to drug is established.

hyoscyamine

hye-oh-**sye**-a-meen
(Anaspaz, Hyosyne, Levbid, Levsin, Levsin S/L, Nu-Lev, Symax SL, Symax SR)
Do not confuse Anaspaz with Anaprox, or Levbid with Lithobid or Lopid.

FIXED COMBINATIONS

Donnatal: hyoscyamine/atropine (anticholinergic)/phenobarbital (sedative)/scopolamine (anticholinergic): 0.1037 mg/0.0194 mg/16.2 mg/0.0065 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Anticholinergic. **CLINICAL:** Antimuscarinic, antispasmodic.

vision, bloated feeling, urinary hesitancy, drowsiness (with high dosage), headache, intolerance to light, loss of taste, anxiety, flushing, insomnia, impotence, mental confusion or excitement (particularly in elderly, children), temporary light-headedness (with parenteral form), local irritation (with parenteral form). **Rare:** Dizziness, faintness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may produce temporary paralysis of ciliary muscle, pupillary dilation, tachycardia, palpitations, hot/dry/flushed skin, absence of bowel sounds, hyperthermia, increased respiratory rate, EKG abnormalities, nausea, vomiting; rash over face/upper trunk, CNS stimulation, psychosis (agitation, restlessness, rambling speech, visual hallucinations, paranoid behavior, delusions) followed by depression.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Before giving medication, instruct pt to void (reduces risk of urinary retention).

INTERVENTION/EVALUATION

Monitor daily pattern of bowel activity, stool consistency. Palpate bladder for urinary retention. Monitor changes in B/P, temperature. Assess skin turgor, mucous membranes to evaluate hydration status (encourage adequate fluid intake), bowel sounds for peristalsis. Be alert for fever (increased risk of hyperthermia).

PATIENT/FAMILY TEACHING

• May cause dry mouth; maintain proper oral hygiene habits (lack of saliva may increase risk of cavities). • Report rash, eye pain, difficulty in urinating, constipation. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid hot baths, saunas.

Generic Drugs I

ibandronate
ibritumomab
ibrutinib
ibuprofen
icatibant
icosapent
idarubicin
idelalisib
ifosfamide
iloperidone
iloprost
imatinib
imipenem/cilastatin
imipramine
immune globulin IV (IGIV)
indacaterol
indapamide
indomethacin
infliximab
insulin
interferon alfa-2b
interferon beta-1a
interferon beta-1b
interferon gamma-1b
interleukin-2 (aldesleukin)
ipilimumab
ipratropium
irbesartan
irinotecan
iron dextran
iron sucrose
isoniazid
isosorbide dinitrate
isosorbide mononitrate
isotretinoin
isradipine
itraconazole
ivacaftor
ixabepilone

in breast milk. Breastfeeding not recommended. **Pregnancy Category C. Children:** Safety and efficacy not established. **Elderly:** No age-related precautions noted.

INTERACTIONS

DRUG: **Antacids containing aluminum, calcium, magnesium; vitamin D** decrease absorption. **Aspirin, NSAIDs** may increase GI irritation. **HERBAL:** None significant. **FOOD:** **Beverages (other than plain water), dietary supplements, food** interfere with absorption. **LAB VALUES:** May decrease serum alkaline phosphatase. May increase serum cholesterol.

AVAILABILITY (Rx)

Injection Solution: 3 mg/3 ml syringe. **Tablets:** 150 mg.

ADMINISTRATION/HANDLING

PO

• Give 60 min before first food or beverage of the day, on an empty stomach with 6–8 oz plain water (not mineral water) while pt is standing or sitting in upright position. • Pt cannot lie down for 60 min following drug administration. • Instruct pt to swallow whole; do not break, crush, dissolve, or divide tablet (potential for oropharyngeal ulceration).

SIDE EFFECTS

Frequent (13%–6%): Back pain, dyspepsia, peripheral discomfort, diarrhea, headache, myalgia. **IV:** Abdominal pain, dyspepsia, constipation, nausea, diarrhea. **Occasional (4%–3%):** Dizziness, arthralgia, asthenia. **Rare (2% or less):** Vomiting, hypersensitivity reaction.

ADVERSE EFFECTS/ TOXIC REACTIONS

Upper respiratory infection occurs occasionally. Overdose results in hypocalcemia, hypophosphatemia, significant GI disturbances.

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NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Hypocalcemia, vitamin D deficiency must be corrected before beginning therapy. Obtain laboratory baselines, esp. serum chemistries, renal function. Obtain results of bone density study.

INTERVENTION/EVALUATION

Monitor electrolytes, esp. serum calcium, phosphate. Monitor renal function tests.

PATIENT/FAMILY TEACHING

• Expected benefits occur only when medication is taken with full glass (6–8 oz) of plain water, first thing in the morning and at least 60 min before first food, beverage, medication of the day. Any other beverage (mineral water, orange juice, coffee) significantly reduces absorption of medication. • Do not chew, crush, dissolve, or divide tablets; swallow whole. • Do not lie down for at least 60 min after taking medication (potentiates delivery to stomach, reduces risk of esophageal irritation). • Report swallowing difficulties, pain when swallowing, chest pain, new/worsening heartburn. • Consider weight-bearing exercises; modify behavioral factors (e.g., cigarette smoking, alcohol consumption). • Calcium and vitamin D supplements should be taken if dietary intake inadequate.

ibritumomab

HIGH ALERT

eye-bri-**toom**-oh-mab
(Zevalin)

■ **BLACK BOX ALERT** ■ Severe, potentially fatal infusion reactions (angioedema, hypoxia, marked hypotension, myocardial infarction) reported, usually within 30–130 min of rituximab infusion (cotherapy). Prolonged, severe cytopenia occurs in most pts. Severe cutaneous, mucocutaneous reactions (including fatalities) have been reported. Must be administered by personnel trained in administration/handling of radioisotopes.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Monoclonal antibody. **CLINICAL:** Antineoplastic.

USES

Treatment of non-Hodgkin's lymphoma (NHL) in combination with rituximab in pts with relapsed or refractory low-grade, follicular, or CD20-positive transformed B-cell non-Hodgkin's lymphoma. Pts with previously untreated follicular NHL who achieve a partial or complete response to first-line chemotherapy.

PRECAUTIONS

Contraindications: None known. **Cautions:** Platelet count less than 100,000 cells/mm^3, neutrophil count less than 1,500 cells/mm^3, history of failed stem cell collection.

ACTION

Combines targeting power of monoclonal antibodies (MAbs) with cancer-killing ability of radiation. **Therapeutic Effect:** Targets CD antigen (present in greater than 90% of pts with B-cell non-Hodgkin's lymphoma), inducing cellular damage.

PHARMACOKINETICS

Tumor uptake is greater than normal tissue in non-Hodgkin's lymphoma. Most of dose cleared by binding to tumor. Minimally excreted in urine. **Half-life:** 27–30 hrs.

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cough, burning with urination, body aches, chills may indicate acute infection. • Avoid pregnancy. • Report any black/tarry stools, bruising, nausea, RUQ abdominal pain, yellowing of skin or eyes, palpitations, nose bleeds, blood in urine or stool, decreased urine output. • Avoid alcohol. • Do not take herbal products. • Do not ingest grapefruit products. • Severe diarrhea may lead to dehydration. • Contact physician before any planned surgical/dental procedures. • Immediately report neurological changes: confusion, one-sided paralysis, difficulty speaking, partial blindness. • Do not receive live vaccines. • Do not break, crush, or open capsule.

ibuprofen

eye-bue-**pro**-fen
(Advil, Advil Children's, Advil Infants', Advil Junior, Advil Migraine, Apo-Ibuprofen, Caldolor, Ibu-200, Motrin, Motrin Children's, Motrin IB, Motrin Infants', Motrin Junior Strength, NeoProfen, Novo-Profen)

■ **BLACK BOX ALERT** ■ Increased risk of serious cardiovascular thrombotic events, including myocardial infarction, CVA. Increased risk of severe GI reactions, including ulceration, bleeding, perforation.
Do not confuse Motrin with Neurontin.

FIXED-COMBINATION(S)

Children's Advil Cold: ibuprofen/pseudoephedrine (a nasal decongestant): 100 mg/15 mg per 5 ml. **Combunox:** ibuprofen/oxycodone (a narcotic analgesic): 400 mg/5 mg. **Duexis:** ibuprofen/famotidine (an H_2 antagonist): 800 mg/26.6 mg. **Reprexain CIII:** ibuprofen/hydrocodone (a narcotic analgesic): 200 mg/5 mg. **Vicoprofen:** ibuprofen/hydrocodone (a narcotic analgesic): 200 mg/7.5 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: NSAID.
CLINICAL: Antirheumatic, analgesic, antipyretic, antidysmenorrheal, vascular headache suppressant.

USES

Treatment of fever, juvenile rheumatoid arthritis (JRA), osteoarthritis, minor to moderate pain, primary dysmenorrhea. **Caldolor:** Mild to moderate pain; severe pain in combination with an opioid analgesic; fever. **NeoProfen:** Induces closure in clinically significant patent ductus arteriosus (PDA) in premature infants weighing between 500 and 1,500 g who are no more than 32 wks gestational age when usual medical management is ineffective. **OFF-LABEL:** Treatment of gout, acute migraine headaches, migraine prophylaxis, cystic fibrosis, ankylosing spondylitis.

PRECAUTIONS

Contraindications: History of hypersensitivity to aspirin, NSAIDs. Treatment of perioperative pain in coronary artery bypass graft (CABG) surgery. **NeoProfen:** Infants with proven or suspected untreated infection, elevated total bilirubin, congenital heart disease in whom patency of the patent ductus arteriosus is necessary for satisfactory pulmonary or systemic blood flow (e.g., pulmonary atresia), bleeding, thrombocytopenia, coagulation defects, suspected necrotizing enterocolitis, significant renal impairment. **Cautions:** Pts with fluid retention, HF, coagulation disorders, concurrent use with aspirin, anticoagulants, steroids; history of GI disease (e.g., bleeding, ulcers); smoking; use of alcohol; elderly, debilitated, hepatic/renal impairment; asthma.

ACTION

Inhibits prostaglandin synthesis. **Therapeutic Effect:** Produces analgesic, antiinflammatory effects; decreases fever.

Maximum: 1,200 mg/day. **CHILDREN 6 MOS–11 YRS:** 4–10 mg/kg q6–8h prn. **Maximum:** 40 mg/kg/day.
IV: ADULTS, ELDERLY: 400–800 mg q6h prn. **Maximum:** 3.2 g/day.

Primary Dysmenorrhea
PO: ADULTS: 200–400 mg q4–6h prn. **Maximum:** 1,200 mg/day.

Juvenile Rheumatoid Arthritis (JRA)
PO: CHILDREN: 30–50 mg/kg/day in 3–4 divided doses. **Maximum:** 2.4 g/day.

Patent Ductus Arteriosus (PDA)
IV: INFANTS: Initially, 10 mg/kg then 2 doses of 5 mg/kg, after 24 hrs and 48 hrs. All doses based on birth weight.

Dosage in Renal Impairment
Hold if anuria or oliguria evident.

Dosage in Hepatic Impairment
Avoid use in severe impairment.

SIDE EFFECTS

Occasional (9%–3%): Nausea, vomiting, dyspepsia, dizziness, rash. **Rare (less than 3%):** Diarrhea or constipation, flatulence, abdominal cramps or pain, pruritus, increased B/P.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may result in metabolic acidosis. Rare reactions with long-term use include peptic ulcer, GI bleeding, gastritis, severe hepatic reaction (cholestasis, jaundice), nephrotoxicity (dysuria, hematuria, proteinuria, nephrotic syndrome), severe hypersensitivity reaction (particularly in pts with systemic lupus erythematosus or other collagen diseases). **NeoProfen:** Hypoglycemia, hypocalcemia, respiratory failure, UTI, edema, atelectasis may occur. **Caldolor:** Abdominal pain, anemia, cough, dizziness, dyspnea, edema, hypertension, nausea, vomiting have been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain, inflammation. Inspect appearance of affected joints for immobility, deformities, skin condition. Assess temperature.

INTERVENTION/EVALUATION

Monitor for evidence of nausea, dyspepsia. Monitor CBC, renal function, LFT. Assess skin for rash. Observe for bleeding, bruising, occult blood loss. Evaluate for therapeutic response: relief of pain, stiffness, swelling; increased joint mobility; reduced joint tenderness; improved grip strength. Monitor for fever.

PATIENT/FAMILY TEACHING

• Avoid aspirin, alcohol during therapy (increases risk of GI bleeding). • If GI upset occurs, take with food, milk, antacids. • May cause dizziness. • Report ringing in ears, persistent stomach pain, respiratory difficulty, unusual bruising/bleeding, swelling of extremities, chest pain/palpitations.

icatibant

eye-**kat**-i-bant
(Firazyr)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Bradykinin B_2 receptor antagonist. **CLINICAL:** Angioedema agent.

USES

Treatment of acute attacks hereditary angioedema (HAE).

PRECAUTIONS

Contraindications: None known. **Cautions:** Airway obstruction during acute laryngeal HAE attack may occur.

ACTION

Inhibits bradykinin from binding to B_2 receptor. Inhibits effects of HAE, an

• Symptoms that do not improve or recur will require additional interval doses. • Do not use more than 3 doses in 24 hrs. • Educate pt about common injection site reactions. Seek medical attention in health care facility if laryngeal symptoms occur after administration of icatibant.

icosapent

eye-**koe**-sa-pent
(Vascepa)
Do not confuse icosapent with icatibant or Vascepa with Vaseretic.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Omega-3 fatty acid. **CLINICAL:** Antihypertriglyceride agent.

USES

Adjunct to diet to reduce serum triglyceride levels in adult pts with serum hypertriglyceridemia (500 mg/dL or greater).

PRECAUTIONS

Contraindications: None known. **Cautions:** Known sensitivity or allergy to fish, shellfish; hepatic impairment, coagulopathy, pts receiving therapeutic anticoagulation.

ACTION

Potential mechanisms of action include increased B-oxidation, decreased lipogenesis in liver, increased plasma lipoprotein lipase activity. **Therapeutic Effect:** Reduces hepatic very-low density lipoprotein triglyceride (VLOL-TG) synthesis.

PHARMACOKINETICS

Absorbed in small intestine; enters systemic circulation via thoracic duct lymphatic system. Protein binding: 99%. Metabolized in liver. **Half-life:** 89 hrs.

preparation/administration of medication. If powder/solution comes in contact with skin, wash thoroughly. Avoid small veins, swollen/edematous extremities, areas overlying joints/tendons.

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ritonavir) may increase concentration/effect. **HERBAL:** **St John's wort** may decrease concentration/effect. **FOOD:** None known. **LAB VALUES:** May increase serum ALT, AST, bilirubin, GGT; triglycerides. May decrease Hgb, neutrophils, platelets, serum sodium. May increase or decrease lymphocytes, serum glucose.

AVAILABILITY (Rx)

Tablets: 100 mg, 150 mg.

ADMINISTRATION/HANDLING

PO

• Give without regard to meals. • Swallow tablets whole.

INDICATIONS/ROUTES/DOSAGE

Chronic Lymphocytic Leukemia, Follicular B-cell Non-Hodgkin's Lymphoma, Small Lymphocytic Lymphoma

PO: ADULTS/ELDERLY: 150 mg twice daily.

Dose Modification

Elevated ALT, AST

3–5 Times Upper Limit of Normal (ULN): Maintain dose. **5–20 Times ULN:** Monitor serum ALT, AST weekly. Withhold until ALT, AST less than 1 times ULN, then resume at 100 mg twice daily. **Greater Than 20 Times ULN:** Permanently discontinue.

Elevated Bilirubin

1.5–3 Times ULN: Monitor serum bilirubin weekly. Maintain dose.

3–10 Times ULN: Monitor serum bilirubin weekly. Withhold until bilirubin less than 1 times ULN, then resume at 100-mg dose.

Greater Than 10 Times ULN: Permanently discontinue.

Diarrhea

Moderate Diarrhea: Maintain dose.

Severe Diarrhea or Hospitalization: Withhold until resolved, then resume at 100-mg dose. **Life-Threatening Diarrhea:** Permanently discontinue.

Neutropenia

ANC 1,000–1,500 cells/mm^3: Maintain dose. **ANC 500–1,000 cells/mm^3:** Monitor ANC weekly and maintain dose. **ANC Less Than 500 cells/mm^3:** Permanently discontinue.

Thrombocytopenia

Platelets 50,000–75,000/mm^3: Maintain dose. **Platelets 25,000–50,000/mm^3:** Monitor platelet count weekly and maintain dose. **Platelets Less Than 25,000/mm^3:** Monitor platelet count weekly. Withhold until platelets greater than 25,000 mm^3, then resume at 100-mg dose.

Pneumonitis

Any Symptoms: Permanently discontinue.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Use caution.

SIDE EFFECTS

Pts with CLL

Frequent (35%–21%): Pyrexia, nausea, diarrhea, chills. **Occasional (10%–5%):** Headache, vomiting, generalized pain, arthralgia, stomatitis, gastric reflux, nasal congestion.

Pts with Non-Hodgkin's Lymphoma

Frequent (47%–21%): Diarrhea, fatigue, nausea, cough, pyrexia, abdominal pain, rash. **Occasional (17%–10%):** Dyspnea, decreased appetite, vomiting, asthenia, night sweats, insomnia, headache, peripheral edema.

ADVERSE EFFECTS/TOXIC REACTIONS

Thrombocytopenia, neutropenia, leukopenia, lymphopenia are expected responses to therapy, but more severe reactions, including bone marrow failure, febrile neutropenia, may occur. Fatal and/or serious events including hepatotoxicity (14% of pts), severe diarrhea or colitis (14% of pts), hypersensitivity reactions (including anaphylaxis), pneumonitis, intestinal perforation were reported. Neutropenia occurred in 31% of pts, which may greatly

ACTION

Inhibits DNA, RNA protein synthesis by cross-linking with DNA, RNA strands, preventing cell growth. Cell cycle–phase nonspecific. **Therapeutic Effect:** Interferes with DNA, RNA function.

PHARMACOKINETICS

Metabolized in liver. Protein binding: Negligible. Crosses blood-brain barrier (to a limited extent). Primarily excreted in urine. Removed by hemodialysis. **Half-life:** 11–15 hrs (high dose); 4–7 hrs (low dose).

Elderly: More susceptible to postural hypotension. Increased risk of cerebrovascular events, mortality, including stroke in elderly pts with psychosis.

INTERACTIONS

DRUG: **Alcohol, CNS depressants** may increase CNS depression. **Strong CYP3A4 inhibitors (e.g., clarithromycin, ketoconazole)** or **strong CYP2D6 inhibitors (e.g., fluoxetine, paroxetine)** may increase concentration. **Medications causing prolongation of QT interval (amiodarone, dofetilide, sotalol)** may increase effects on cardiac conduction, leading to malignant arrhythmias (torsade de pointes). **HERBAL:** **Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depression. **St. John's wort** may decrease concentration. **FOOD:** None known. **LAB VALUES:** May increase serum prolactin levels.

AVAILABILITY (Rx)

Tablets: 1 mg, 2 mg, 4 mg, 6 mg, 8 mg, 10 mg, 12 mg.

ADMINISTRATION/HANDLING

PO

• Give without regard to food. • Tablets may be crushed.

INDICATIONS/ROUTES/DOSAGE

Schizophrenia

PO: ADULTS: To avoid orthostatic hypotension, begin with 1 mg twice daily, then adjust dosage to 2 mg twice daily, 4 mg twice daily, 6 mg twice daily, 8 mg twice daily, 10 mg twice daily, and 12 mg twice daily on days 2, 3, 4, 5, 6, and 7, respectively, to reach target daily dose of 12–24 mg, given twice daily. **Note:** Reduce dose by 50% when receiving strong CYP2D6 or CYP3A4 inhibitors or poor metabolizers of CYP2D6 (see Interactions).

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Not recommended.

SIDE EFFECTS

Frequent (20%–12%): Dizziness, drowsiness, tachycardia. **Occasional (10%–4%):** Nausea, dry mouth, nasal congestion, weight increase, diarrhea, fatigue, orthostatic hypotension. **Rare (3%–1%):** Arthralgia, musculoskeletal stiffness, abdominal discomfort, nasopharyngitis, tremor, hypotension, rash, ejaculatory failure, dyspnea, blurred vision, lethargy.

ADVERSE EFFECTS/ TOXIC REACTIONS

Extrapyramidal disorders, including tardive dyskinesia (protrusion of tongue, puffing of cheeks, chewing/puckering of the mouth), occur in 4% of pts. Upper respiratory infection occurs in 3% of pts. QT interval prolongation may produce torsade de pointes, a form of ventricular tachycardia. Neuroleptic malignant syndrome (e.g., hyperpyrexia, muscle rigidity, altered mental status, irregular pulse or B/P) has been noted.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess pt's behavior, appearance, emotional status, response to environment, speech pattern, thought content. EKG should be obtained to assess for QT prolongation before instituting medication.

INTERVENTION/EVALUATION

Monitor for orthostatic hypotension; assist with ambulation. Monitor for fine tongue movement (may be first sign of tardive dyskinesia, possibly irreversible). Monitor serum potassium, magnesium in pts at risk for electrolyte disturbances. Assess for therapeutic response (greater interest in surroundings, improved self-care, increased ability to concentrate, relaxed facial expression).

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Be alert to symptoms of orthostatic hypotension; slowly go from lying to standing. • Report if feeling faint,

ADVERSE EFFECTS/ TOXIC REACTIONS

Hemoptysis, pneumonia occur occasionally. HF, renal failure, dyspnea, chest pain occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess B/P, pulse.

INTERVENTION/EVALUATION

Monitor pulse, B/P during therapy. Assess for signs of pulmonary venous hypertension.

PATIENT/FAMILY TEACHING

• Follow manufacturer guidelines for proper administration of medication using supplied inhalation system. • Discard any remaining solution in the medication chamber after each inhalation session.

imatinib

TOP 100 HIGH ALERT

im-**at**-in-ib
(Gleevec)
Do not confuse imatinib with dasatininb, erlotinib, lapatinib, nilotinib, sorafenib, or sunitinib.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Protein tyrosine kinase inhibitor. **CLINICAL:** Antineoplastic.

USES

Newly diagnosed chronic-phase Philadelphia chromosome positive chronic myeloid leukemia (Ph+ CML) in children and adults. Pts in blast crisis, accelerated phase, or chronic phase Ph+ CML who have already failed interferon therapy. Adults with relapsed or refractory Ph+ acute lymphoblastic leukemia (ALL). Adults with myelodysplastic/myeloproliferative disease (MDS/MPD) associated with platelet-derived growth factor receptor (PDGFR) gene rearrangements. Adults with aggressive systemic mastocytosis (ASM) without mutation of the D816V c-Kit or unknown mutation status of the c-Kit. Adults with hypereosinophilic syndrome (HES) and/or chronic eosinophilic leukemia (CEL) with positive, negative, or unknown FIP1L1-PDGFR fusion kinase. Adults with dermatofibrosarcoma protuberans (DFSP) that is unresectable, recurrent, and/or metastatic. Pts with malignant gastrointestinal stromal tumors (GIST) that are unresectable and/or metastatic. Prevention of cancer recurrence in pts following surgical removal of GIST. Treatment in children with Ph+ acute lymphoblastic leukemia (ALL) (Ph+ALL). **OFF-LABEL:** Treatment of desmoid tumors (soft tissue sarcoma). Post stem cell transplant (allogenic), follow-up treatment in recurrent CML. Treatment of advanced or metastatic melanoma.

PRECAUTIONS

Contraindications: None known. **Cautions:** Hepatic/renal impairment, thyroidectomy pts, hypothyroidism, gastric surgery pts. Pts in whom fluid accumulation is poorly tolerated (e.g., HF, hypertension, pulmonary disease).

ACTION

Inhibits Bcr-Abl tyrosine kinase, an enzyme created by Philadelphia chromosome abnormality found in pts with chronic myeloid leukemia (CML). **Therapeutic Effect:** Suppresses tumor growth during the three stages of CML: blast crisis, accelerated phase, chronic phase. Induces apoptosis.

PHARMACOKINETICS

Well absorbed after PO administration. Protein binding: 95%. Metabolized in liver. Eliminated in feces (68%), urine (13%). **Half-life:** 18 hrs; metabolite, 40 hrs.

SIDE EFFECTS

Frequent (68%–24%): Nausea, diarrhea, vomiting, headache, fluid retention, rash, musculoskeletal pain, muscle cramps, arthralgia. **Occasional (23%–10%):** Abdominal pain, cough, myalgia, fatigue, fever, anorexia, dyspepsia, constipation, night sweats, pruritus, dizziness, blurred vision, somnolence. **Rare (less than 10%):** Nasopharyngitis, petechiae, asthenia, epistaxis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Severe fluid retention (pleural effusion, pericardial effusion, pulmonary edema, ascites), hepatotoxicity occur rarely. Neutropenia, thrombocytopenia are expected responses to the therapy. Respiratory toxicity is manifested as dyspnea, pneumonia. Heart damage (left ventricular dysfunction, HF) may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, serum chemistries, renal function test. Monitor LFT before beginning treatment, monthly thereafter.

INTERVENTION/EVALUATION

Assess periorbital area, lower extremities for early evidence of fluid retention. Monitor for unexpected, rapid weight gain. Offer antiemetics to control nausea, vomiting. Monitor daily pattern of bowel activity, stool consistency. Monitor CBC weekly for first mo, biweekly for second mo, periodically thereafter for evidence of neutropenia, thrombocytopenia; assess hepatic function tests for hepatotoxicity. Monitor renal function, serum electrolytes. Duration of neutropenia or thrombocytopenia ranges from 2–4 wks.

PATIENT/FAMILY TEACHING

• Avoid crowds, those with known infection. • Avoid contact with anyone who recently received live virus vaccine; do not receive vaccinations. • Take with food and a full glass of water. • Avoid grapefruit products. • Report chest pain, swelling of extremities, weight gain greater than 5 lb, easy bruising/bleeding. • Avoid tasks that require alertness, motor skills until response to drug is established.

imipenem/cilastatin

im-i-**pen**-em/sye-la-**stat**-in (Primaxin)

Do not confuse imipenem with doripenem, ertapenem, or meropenem, or Primaxin with Premarin or Primacor.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Fixed-combination carbapenem. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to gram-negative (ESBL *Escherichia coli* and *Klebsiella, Enterobacter* spp. PsAs), gram-positive (MSSA, *Streptococcus* spp.), anaerobic organisms including respiratory tract, skin/skin structure, gynecologic, bone, joint, intra-abdominal, complicated or uncomplicated UTIs; endocarditis (caused by *S. aureus*); polymicrobic infections; septicemia; serious nosocomial infections. **OFF-LABEL:** Hepatic abscess, neutropenic fever, melioidosis.

PRECAUTIONS

Contraindications: None known. **Cautions:** CNS disorders (e.g., brain lesions and history of seizures), sensitivity to penicillins, renal impairment, elderly.

ACTION

Imipenem: Penetrates bacterial cell membrane, inhibiting cell wall synthesis. **Cilastatin:** Competitively inhibits the enzyme dehydropeptidase, preventing renal metabolism of imipenem. **Therapeutic Effect:** Produces bacterial cell death.

SIDE EFFECTS

Occasional (3%): Diarrhea, nausea, vomiting. **Rare (1%):** Rash.

ADVERSE EFFECTS/ TOXIC REACTIONS

Antibiotic-associated colitis, other superinfections (abdominal cramps, severe watery diarrhea, fever) may result from altered bacterial balance in GI tract. Anaphylactic reactions have been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of allergies, particularly to beta-lactams, penicillins, cephalosporins. Inquire about history of seizures.

INTERVENTION/EVALUATION

Monitor renal, hepatic, hematologic function tests. Evaluate for phlebitis (heat, pain, red streaking over vein), pain at IV injection site. Assess for GI discomfort, nausea, vomiting. Monitor daily pattern of bowel activity, stool consistency. Assess skin for rash. Be alert to tremors, possible seizures.

imipramine

i-**mip**-ra-meen
(Apo-Imipramine, Novo-Pramine, Tofranil, Tofranil-PM)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal ideation and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse imipramine with amitriptyline, desipramine, or Norpramin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tricyclic antidepressant. **CLINICAL:** Antidepressant, antineuritic, antipanic, antineuralgic, antinarcoleptic adjunct, anticataplectic, antibulimic.

USES

Treatment of depression. Treatment of nocturnal enuresis in children older than 6 yrs. **OFF-LABEL:** Treatment of ADHD, post-traumatic stress disorder (PTSD), neurogenic pain, panic disorder.

PRECAUTIONS

Contraindications: Acute recovery period after MI, use within 14 days of MAOIs, concurrent use with linezolid or methylene blue. **Cautions:** Prostatic hypertrophy; history of urinary retention, history of bowel obstruction; glaucoma, diabetes mellitus, history of seizures, hyperthyroidism; cardiac, hepatic, renal disease; increased intraocular pressure, pts with high risk for suicide. Decreased GI motility, paralytic ileus, visual problems, respiratory disease, elderly. **Pregnancy Category D.**

ACTION

Blocks reuptake of neurotransmitters (norepinephrine, serotonin) at presynaptic membranes, increasing concentration at postsynaptic receptor sites. **Therapeutic Effect:** Relieves depression, controls nocturnal enuresis.

INTERACTIONS

DRUG: Alcohol, other CNS depressants may increase hypotensive effects, CNS, respiratory depression. **Cimetidine, fluoxetine** may increase concentration, risk of toxicity. **Phenytoin, barbiturates** may decrease concentration. **HERBAL: Kava kava, SAMe, St. John's wort, valerian** may increase risk of serotonin syndrome, CNS depression. **St. John's wort** may decrease concentration. **FOOD: Grapefruit products** may increase concentration/toxicity. **LAB VALUES:** May alter serum glucose, EKG readings. **Therapeutic serum level:** 225–300 ng/ml; **toxic serum level:** greater than 500 ng/ml.

AVAILABILITY (Rx)

Capsules (Tofranil-PM): 75 mg, 100 mg, 125 mg, 150 mg. **Tablets (Tofranil):** 10 mg, 25 mg, 50 mg.

oliguria, acute renal failure, osmotic nephrosis, particularly pts with any degree of renal insufficiency, diabetes mellitus, volume depletion, sepsis, and those older than age 65 yrs. Thrombosis may occur.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Immune globulin, blood product. **CLINICAL:** Immunizing agent.

USES

Treatment of pts with primary humoral immunodeficiency syndromes, acute/chronic immune idiopathic thrombocytopenic purpura (ITP), prevention of coronary artery aneurysms associated with Kawasaki disease, prevention of recurrent bacterial infections in pts with hypogammaglobulinemia associated with B-cell chronic lymphocytic leukemia (CLL). Treatment of chronic inflammatory demyelinating polyneuropathies. Provide passive immunity in pts with hepatitis A, measles, rubella, varicella. **OFF-LABEL:** Guillain-Barré syndrome; myasthenia gravis; prevention of acute infections in immunosuppressed pts; prevention, treatment of infection in high-risk, preterm, low birth-weight neonates; treatment of multiple sclerosis, HIV-associated thrombocytopenia.

PRECAUTIONS

Contraindications: Selective IgA deficiency, hyperprolinemia (Hizentra, Privigen), severe thrombocytopenia, coagulation disorders where IM injections contraindicated. **Cautions:** Cardiovascular disease, history of thrombosis, renal impairment.

ACTION

Replacement therapy for primary/secondary immunodeficiencies and IgG antibodies against bacteria, viral antigens; interferes with receptors on cells of reticuloendothelial system for autoimmune cytopenias/idiopathic thrombocytopenia purpura (ITP); increases antibody titer and antigen-antibody reaction potential. **Therapeutic Effect:** Provides passive immunity replacement for immunodeficiencies, increases antibody titer.

PHARMACOKINETICS

Evenly distributed between intravascular and extravascular space. **Half-life:** 21–23 days.

PATIENT/FAMILY TEACHING

• Explain rationale for therapy. • Report sudden weight gain, fluid retention, edema, decreased urine output, shortness of breath.

indacaterol

in-da-**ka**-ter-ol
(Arcapta Neohaler, Onbrez Breezhaler)

■ **BLACK BOX ALERT** ■ Long-acting $beta_2$-adrenergic agonists (LABAs) have an increased risk of asthma-related deaths. Not indicated for treatment of asthma.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Long-acting $beta_2$-adrenergic agonist. **CLINICAL:** Bronchodilator.

USES

Long-term maintenance treatment of airflow obstruction in pts with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and emphysema.

PRECAUTIONS

◄ALERT► Not indicated for the treatment of asthma.

Contraindications: Monotherapy in treatment of asthma. **Cautions:** Pts with cardiovascular disease (coronary insufficiency, arrhythmias, hypertension, history of hypersensitivity to sympathomimetics), seizure disorders, hyperthyroidism, hypokalemia, diabetes mellitus. May cause paradoxical bronchospasm, severe asthma.

ACTION

Stimulates $beta_2$-adrenergic receptors in lungs, resulting in relaxation of bronchial smooth muscle. **Therapeutic Effect:** Relieves bronchospasm, reduces airway resistance, improves bronchodilation.

PHARMACOKINETICS

Extensive activation of systemic beta-adrenergic receptors; acts primarily in lungs. Protein binding: 94%–95%. Metabolized in liver by hydroxylation. Steady-state level: 12–15 days. Primarily excreted in feces. **Half-life:** 45–126 hrs.

PRECAUTIONS

Contraindications: Anuria, sulfonamide-derived drugs. **Cautions:** History of hypersensitivity to sulfonamides or thiazide diuretics. Severe renal disease, hepatic impairment, pre-diabetes, diabetes mellitus, elderly, severe hyponatremia, elevated serum cholesterol.

ACTION

Diuretic: Blocks reabsorption of water, sodium, potassium at cortical diluting segment of distal renal tubule. **Antihypertensive:** Reduces plasma, extracellular fluid volume, and peripheral vascular resistance by direct effect on blood vessels. **Therapeutic Effect:** Promotes diuresis, reduces B/P.

PHARMACOKINETICS

Almost completely absorbed following PO administration. Protein binding: 71%–79%. Metabolized in liver. Eliminated in urine. **Half-life:** 14–18 hrs.

INTERACTIONS

DRUG: May decrease effects of **antihypertensives, diuretics. Aspirin, other salicylates** may increase risk of GI side effects, bleeding. **Bone marrow depressants** may increase risk of hematologic reactions. May increase risk of bleeding with **heparin, anticoagulants, thrombolytics.** May increase concentration, risk of toxicity of **lithium.** May increase risk of **cyclosporine, methotrexate** toxicity. **HERBAL:** **Cat's claw, dong quai, evening primrose, feverfew, garlic, ginkgo, ginseng, horse chestnut, red clover** may increase antiplatelet activity. **FOOD:** None known. **LAB VALUES:** May prolong bleeding time. May alter serum glucose. May increase serum BUN, creatinine, potassium, ALT, AST. May decrease serum sodium, platelet count, leukocytes.

AVAILABILITY (Rx)

Capsules: 25 mg, 50 mg. **(Tivorbex):** 20 mg, 40 mg. **Injection, Powder for Reconstitution (Indocin IV):** 1 mg. **Oral Suspension (Indocin):** 25 mg/5 ml. **Suppository:** 50 mg.

PRECAUTIONS

Contraindications: Moderate to severe HF (doses greater than 5 mg/kg should be avoided). Sensitivity to murine proteins, sepsis, serious active infection. **Cautions:** Hematological abnormalities, history of COPD, preexisting or recent onset CNS demyelinating disorders, seizures, mild HF, history of recurrent infections, conditions predisposing pt to infections (e.g., diabetes), pts exposed to tuberculosis, elderly.

ACTION

Binds to tumor necrosis factor (TNF), inhibiting functional activity of TNF (induction of proinflammatory cytokines, enhanced leukocytic migration, activation of neutrophils/eosinophils). **Therapeutic Effect:** Prevents disease and allows diseased joints to heal.

PHARMACOKINETICS

Absorbed into GI tissue; primarily distributed in vascular compartment. **Half-life:** 8–9.5 days.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Exogenous insulin. **CLINICAL:** Antidiabetic.

USES

Treatment of insulin-dependent type 1 diabetes mellitus; non–insulin-dependent type 2 diabetes mellitus (NIDDM) to improve glycemic control. **OFF-LABEL: Insulin aspart, insulin lispro, insulin regular:** Gestational diabetes, mild to moderate diabetic ketoacidosis, mild to moderate hyperosmolar hyperglycemic state. **Insulin NPH:** Gestational diabetes.

PRECAUTIONS

Contraindications: Hypersensitivity, hypoglycemia. **Cautions:** Pts at risk for hypokalemia; renal/hepatic impairment, elderly. Afrezza: Must be used with a long-acting insulin in type 1 diabetes. Not recommended for use in diabetic ketoacidosis or in smokers.

ACTION

Acts via specific receptor to regulate metabolism of carbohydrates, protein, and fats. Acts on liver, skeletal muscle, and adipose tissue. **Liver:** Stimulates hepatic glycogen synthesis, synthesis of fatty acids. **Muscle:** Increases protein, glycogen synthesis. **Adipose tissue:** Stimulates lipoproteins to provide free fatty acids, triglyceride synthesis. **Therapeutic Effect:** Controls serum glucose levels.

PHARMACOKINETICS

Rapid-Acting

	Onset (min)	Peak (hrs)	Duration (hrs)
Aspart (Novolog)	10–20	1–3	3–5
Glulisine (Apidra)	5–15	0.75–1.25	2–4
Lispro (Humalog)	15–30	0.5–2.5	3–6.5

Short-Acting

	Onset (min)	Peak (hrs)	Duration (hrs)
Regular (Humulin R)	30–60	1–5	6–10
Regular (Novolin R)	30–60	1–5	6–10

Intermediate-Acting

	Onset (hrs)	Peak (hrs)	Duration (hrs)
NPH (Humulin N)	1–2	6–14	16–24+
NPH (Novolin N)	1–2	6–14	16–24+

Long-Acting

	Onset (hrs)	Peak (hrs)	Duration (hrs)
Detemir (Levemir)	3–4 hrs	3–9 hrs	6–23 hrs
Glargine (Lantus)	3–4 hrs	No peak	24

insulins. • After first use, stable at room temperature for 28 days. • Administer once daily at same time. Meal timing is not applicable.

Subcutaneous

• Check serum glucose concentration before administration; dosage highly individualized. • Subcutaneous injections may be given in thigh, abdomen, upper arm, buttocks, upper back if there is adequate adipose tissue. • Rotation of injection sites is essential; maintain careful record. • Prefilled syringes should be stored in vertical or oblique position to avoid plugging; plunger should be pulled back slightly and syringe rocked to remix solution before injection.

IV INCOMPATIBILITIES

Diltiazem (Cardizem), dopamine (Intropin), nafcillin (Nafcil).

IV COMPATIBILITIES

Amiodarone (Cordarone), ampicillin/sulbactam (Unasyn), cefazolin (Ancef), digoxin (Lanoxin), dobutamine (Dobutrex), famotidine (Pepcid), gentamicin, heparin, magnesium sulfate, metoclopramide (Reglan), midazolam (Versed), milrinone (Primacor), morphine, nitroglycerin, potassium chloride, propofol (Diprivan), vancomycin (Vancocin).

INDICATIONS/ROUTES/DOSAGE

Note: Insulin requirments vary dramatically between pts requiring dosage adjustment.

Type 1 Diabetes: Multiple daily injections, guided by glucose monitoring or continuous subcutaneous insulin infusions, is standard of care.

Initial dose: 0.5–1 unit/kg/day in divided doses. **Maintenance:** 0.5–1.2 units/kg/day in divided doses.

Type 2 Diabetes: Goal is to achieve HbA_{1c} less than 7% using safe medication titration.

Dosage in Renal Impairment

Creatinine Clearance	Dose
10–50 ml/min	75% normal dose
Less than 10 ml/min	25–50% normal dose

Dosage in Hepatic Impairment

Insulin requirement may be reduced.

SIDE EFFECTS

Occasional: Localized redness, swelling, itching (due to improper insulin injection technique), allergy to insulin cleansing solution. **Infrequent:** Somogyi effect (rebound hyperglycemia) with chronically excessive insulin dosages. Systemic allergic reaction (rash, angioedema, anaphylaxis), lipodystrophy (depression at injection site due to breakdown of adipose tissue), lipohypertrophy (accumulation of subcutaneous tissue at injection site due to inadequate site rotation). **Rare:** Insulin resistance.

ADVERSE EFFECTS/ TOXIC REACTIONS

Severe hypoglycemia (due to hyperinsulinism) may occur with insulin overdose, decrease/delay of food intake, excessive exercise, pts with brittle diabetes. Diabetic ketoacidosis may result from stress, illness, omission of insulin dose, long-term poor insulin control.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check blood glucose level. Discuss lifestyle to determine extent of learning, emotional needs. If given IV, obtain serum chemistries (esp. serum potassium).

INTERVENTION/EVALUATION

Assess for hypoglycemia (refer to pharmacokinetics table for peak times and duration): cool, wet skin, tremors, dizziness, headache, anxiety, tachycardia, numbness in mouth, hunger, diplopia. Assess sleeping pt for restlessness, diaphoresis. Check for hyperglycemia: polyuria (excessive urine output), polyphagia (excessive food intake), polydipsia (excessive thirst),

INTERACTIONS

DRUG: **Bone marrow depressants** may increase myelosuppression. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase PT, aPTT, LDH, serum alkaline phosphatase, ALT, AST. May decrease Hgb, Hct, leukocyte, platelet counts.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution: 10 million units, 18 million units, 50 million units.

ADMINISTRATION/HANDLING

INTERACTIONS

DRUG: **Alcohol, hepatotoxic drugs** may increase risk of hepatic injury. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase serum glucose, BUN, alkaline phosphatase, bilirubin, calcium, ALT, AST. May decrease Hgb, neutrophil, platelet, WBC counts.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution (Avonex): 30 mcg. **Injection Solution (Prefilled Syringe):** 22 mcg/0.5 ml (Rebif), 30 mcg/0.5 ml (Avonex Prefilled Syringe), 44 mcg/0.5 ml (Rebif). **Titration Pack (Prefilled Syringe [Rebif]):** 8.8 mcg/0.2 ml, 22 mcg/0.5 ml.

ADMINISTRATION/HANDLING

IM (Avonex) Syringe

• Refrigerate syringe. • Allow to warm to room temperature before use. • May store up to 7 days at room temperature.

IM (Avonex) Vial

• Refrigerate vials (may store at room temperature up to 30 days). • Following reconstitution, may refrigerate again but use within 6 hrs if refrigerated. • Reconstitute 30-mcg *MicroPin* (6.6 million international units) vial with 1.1 ml diluent (supplied by manufacturer). • Gently swirl to dissolve medication; do not shake. • Discard if discolored or particulate forms. • Discard unused portion (contains no preservative).

Subcutaneous (Rebif)

• Refrigerate. May store at room temperature up to 30 days. Avoid heat, light. • Administer at same time of day 3 days each wk. Separate doses by at least 48 hrs.

INDICATIONS/ROUTES/DOSAGE

Relapsing Multiple Sclerosis

IM *(Avonex)*: ADULTS: 30 mcg once weekly.

Subcutaneous *(Rebif)*: ADULTS: (Target dose 44 mcg 3 times/wk): Initially, 8.8 mcg 3 times/wk for 2 wks, then 22 mcg 3 times/wk for 2 wks, then 44 mcg 3 times/wk thereafter. **(Target dose 22 mcg 3 times/wk):** Initially, 4.4 mcg 3 times/wk for 2 wks, then 11 mcg 3 times/wk for 2 wks, then 22 mcg 3 times/wk thereafter.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment (Rebif)

Use with caution in pts with history of active hepatic disease or ALT more than 2.5 times upper limit of normal (ULN).

SIDE EFFECTS

Frequent (67%–11%): Headache, flu-like symptoms, myalgia, upper respiratory tract infection, depression with suicidal ideation, generalized pain, asthenia, chills, sinusitis, infection. **Occasional (9%–4%):** Abdominal pain, arthralgia, chest pain, dyspnea, malaise, syncope. **Rare (3%):** Injection site reaction, hypersensitivity reaction.

ADVERSE EFFECTS/ TOXIC REACTIONS

Anemia occurs in 8% of pts. Hepatic failure has been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, blood chemistries including LFT. Assess home situation for support of therapy.

INTERVENTION/EVALUATION

Assess for headache, flu-like symptoms, myalgia. Periodically monitor lab results, re-evaluate injection technique. Assess for depression, suicidal ideation.

PATIENT/FAMILY TEACHING

• Do not change schedule, dosage without consulting physician. • Follow guidelines for reconstitution of product and administration, including aseptic technique. • Use puncture-resistant container for used needles, syringes; dispose of used needles, syringes properly. • Injection

diaphoresis, vomiting. **Occasional (15%–4%):** Malaise, drowsiness, alopecia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Seizures occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, blood chemistries (including LFT). Assess home situation for support of therapy.

INTERVENTION/EVALUATION

Periodically monitor lab results, reevaluate injection technique. Assess for nausea (high incidence). Monitor sleep pattern. Monitor daily pattern of bowel activity, stool consistency. Assist with ambulation if dizziness occurs. Monitor food intake.

PATIENT/FAMILY TEACHING

• Report flu-like symptoms (fever, chills, fatigue, muscle aches); occur commonly but decrease over time. • Wear sunscreen, protective clothing if exposed to sunlight, ultraviolet light until tolerance known.

interferon gamma-1b

in-ter-**feer**-on
(Actimmune)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Biologic response modifier. **CLINICAL:** Immunologic agent.

USES

Reduces frequency, severity of serious infections due to chronic granulomatous disease. Delays time to disease progression in pts with severe, malignant osteopetrosis.

PRECAUTIONS

Contraindications: Hypersensitivity to *Escherichia coli*–derived products. **Cautions:** Seizure disorders, compromised CNS function, preexisting cardiac disease (e.g., ischemia, HF, arrhythmias), hepatic disease, myelosuppression.

ACTION

Exact mechanism unknown. Enhances oxidative metabolism of macrophages, antibody-dependent cellular cytotoxicity; activates natural killer cells. **Therapeutic Effect:** Decreases signs/symptoms of serious infections in chronic granulomatous disease.

PHARMACOKINETICS

Slowly absorbed after subcutaneous administration. **Half-life:** 3–6 hrs.

longer than 72 hrs, repetitive or difficult-to-control seizures; retreatment in pts who experience any of the following toxicities: angina, MI, recurrent chest pain with EKG changes, sustained ventricular tachycardia, uncontrolled or unresponsive cardiac rhythm disturbances. **Extreme Caution:** Pts with normal thallium stress tests and pulmonary function tests who have history of cardiac or pulmonary disease. **Cautions:** Pts with fixed requirements for large volumes of fluid (e.g., those with hypercalcemia), history of seizures, renal/hepatic impairment, autoimmune disease, inflammatory disorders.

ACTION

Promotes proliferation, differentiation, recruitment of T and B cells, lymphokine-activated and natural killer cells, thymocytes. **Therapeutic Effect:** Enhances cytolytic activity in lymphocytes.

PHARMACOKINETICS

Primarily distributed into plasma, lymphocytes, lungs, liver, kidney, spleen. Metabolized to amino acids in cells lining the kidneys. **Half-life:** 80–120 min.

ACTION

Augments T-cell activation and proliferation. Binds to cytotoxic T-lymphocyte-associated antigen 4 (CTLA-4) and blocks interaction of CTLA-4 with its ligands. **Therapeutic Effect:** Inhibits tumor cell growth.

PHARMACOKINETICS

Metabolized in liver. Steady state reached by third dose. **Half-life:** 14.7 days.

INTERVENTION/EVALUATION

Monitor vital signs, hepatic function, thyroid panel before each dose. Continue focused assessment and screen for life-threatening immune-mediated adverse reactions. If adverse reactions occur, immediately notify physician and initiate proper treatment. Report suspected pregnancy. Obtain CBC, blood cultures for fever, suspected infection. EKG for palpitations, chest pain, difficulty breathing, dizziness. If prednisone therapy initiated, monitor capillary blood glucose and screen for side effects.

PATIENT/FAMILY TEACHING

• Inform pt that serious and fatal adverse reactions indicate inflammation to certain systems: intestines (diarrhea, dark/tarry stools, abdominal pain), liver (yellowing of the skin, dark-colored urine, right upper quadrant pain, bruising), skin (rash, mouth sores, blisters, ulcers), nerves (weakness, numbness, tingling, difficulty breathing, paralysis), hormonal glands (headaches, weight gain, palpitations, changes in mood or behavior, dizziness), eyes (blurry vision, double vision, eye pain/redness). • Prednisone therapy may be started if adverse reactions occur. • May cause fetal harm, stillbirth, premature delivery. • Blood levels will be drawn before each dose. • Report any chest pain, palpitations, fever, swollen glands, stomach pain, vomiting, or any sign of adverse reactions.

ipratropium TOP 100

ip-ra-**troe**-pee-um
(Atrovent, Atrovent HFA, Novo-Ipramide, Nu-Ipratropium, PMS-Ipratropium)
Do not confuse Atrovent with Alupent or Serevent, or ipratropium with tiotropium.

FIXED-COMBINATION(S)

Combivent, DuoNeb: ipratropium/albuterol (a bronchodilator): *Aerosol:* 18 mcg/90 mcg per actuation. *Solution:* 0.5 mg/2.5 mg per 3 ml.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Anticholinergic. **CLINICAL:** Bronchodilator.

USES

Inhalation, Nebulization: Maintenance treatment of bronchospasm due to COPD, bronchitis, emphysema, asthma. Not indicated for immediate bronchospasm relief. **Nasal Spray:** Symptomatic relief of rhinorrhea associated with the common cold and allergic/nonallergic rhinitis.

PRECAUTIONS

Contraindications: History of hypersensitivity to atropine. **Cautions:** Narrow-angle glaucoma, prostatic hypertrophy, bladder neck obstruction, myasthenia gravis.

ACTION

Blocks action of acetylcholine at parasympathetic sites in bronchial smooth muscle. **Therapeutic Effect:** Causes bronchodilation, inhibits nasal secretions.

PHARMACOKINETICS

Route	Onset	Peak	Duration
Inhalation	1–3 min	1.5–2 hrs	Up to 4 hrs
Nasal	5 min	1–4 hrs	4–8 hrs

Minimal systemic absorption after inhalation. Metabolized in liver (systemic absorption). Primarily eliminated in feces. **Half-life:** 1.5–4 hrs (nasal).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Offer emotional support (high incidence of anxiety due to difficulty in breathing, sympathomimetic response to drug).

INTERVENTION/EVALUATION

Monitor rate, depth, rhythm, type of respiration; quality, rate of pulse. Assess lung sounds for rhonchi, wheezing, rales. Monitor ABGs. Observe lips, fingernails for cyanosis (blue or dusky color in light-skinned pts; gray in dark-skinned pts). Observe for retractions (clavicular, sternal, intercostal), hand tremor. Evaluate for clinical improvement (quieter, slower respirations, relaxed facial expression, cessation of retractions). Monitor for improvement of rhinorrhea.

PATIENT/ FAMILY TEACHING

• Increase fluid intake (decreases lung secretion viscosity). • Do not take more than 2 inhalations at any one time (excessive use may produce paradoxical bronchoconstriction, decreased bronchodilating effect). • Rinsing mouth with water immediately after inhalation may prevent mouth and throat dryness. • Avoid excessive use of caffeine derivatives (chocolate, coffee, tea, cola, cocoa).

irbesartan

ir-be-**sar**-tan
(Apo-Irbesartan*, Avapro)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

Do not confuse Avapro with Anaprox.

FIXED-COMBINATION(S)

Avalide: irbesartan/hydrochlorothiazide (a diuretic): 150 mg/12.5 mg, 300 mg/12.5 mg, 300 mg/25 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Angiotensin II receptor antagonist. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension alone or in combination with other antihypertensives. Treatment of diabetic nephropathy in pts with type 2 diabetes. **OFF-LABEL:** Slow rate of progression of aortic root dilation in children with Marfan's syndrome.

PRECAUTIONS

Contraindications: Concomitant use with aliskiren in pts with diabetes. **Cautions:** Impaired renal function, unstented unilateral or bilateral renal artery stenosis, pts who are intravascularly volume depleted.

ACTION

Blocks vasoconstriction, aldosterone-secreting effects of angiotensin II, inhibiting binding of angiotensin II to AT_1 receptors. **Therapeutic Effect:** Produces vasodilation, decreases peripheral resistance, decreases B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	—	1–2 hrs	Greater than 24 hrs

Rapidly, completely absorbed after PO administration. Protein binding: 90%. Metabolized in liver. Recovered primarily in feces and, to a lesser extent, in urine. Not removed by hemodialysis. **Half-life:** 11–15 hrs.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: DNA topoisomerase inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of metastatic carcinoma of colon or rectum. **OFF-LABEL:** Non–small-cell lung cancer; small-cell lung cancer; CNS tumor; cervical, gastric, pancreatic, ovarian, esophageal cancer; Ewing's sarcoma; brain tumor.

PRECAUTIONS

Contraindications: None known. **Cautions:** Pt previously receiving pelvic, abdominal irradiation (increased risk of myelosuppression), pts older than 65 yrs, hepatic dysfunction, hyperbilirubinemia, renal impairment.

ACTION

Interacts with topoisomerase I, an enzyme that relieves torsional strain in DNA by inducing reversible single-strand breaks. Prevents religation of these single-stranded breaks resulting in damage to double-strand DNA, cell death. **Therapeutic Effect:** Produces cytotoxic effect on cancer cells.

PHARMACOKINETICS

Metabolized in liver. Protein binding: 95% (metabolite). Excreted in urine and eliminated by biliary route. **Half-life:** 6–12 hrs; metabolite, 10–20 hrs.

PHARMACOKINETICS

Readily absorbed after IM administration. Most absorption occurs within 72 hrs; remainder within 3–4 wks. Bound to protein to form hemosiderin, ferritin, or transferrin. No physiologic system of elimination. Small amounts lost daily in shedding of skin, hair, nails and in feces, urine, perspiration. **Half-life:** 5–20 hrs.

AVAILABILITY (Rx)

Injection Solution: 20 mg of elemental iron/ml in 2.5-ml, 5-ml, 10-ml vials.

ADMINISTRATION/HANDLING

◀ALERT▶ Administer directly into dialysis line during hemodialysis.

concurrent INH therapy and inform physician promptly). Assess for paresthesia of extremities (pts esp. at risk for neuropathy may be given pyridoxine prophylactically: malnourished, elderly, diabetics, pts with chronic hepatic disease [including alcoholics]). Be alert for fever, skin eruptions (hypersensitivity reaction).

PATIENT/FAMILY TEACHING

• Do not skip doses; continue taking isoniazid for full length of therapy (6–24 mos). • Take preferably 1 hr before or 2 hrs following meals (with food if GI upset). • Avoid alcohol during treatment. • Do not take any other medications, including antacids, without consulting physician. • Must take isoniazid at least 1 hr before antacid. • Avoid tuna, sauerkraut, aged cheeses, smoked fish (consult list of tyramine-containing foods) that may cause hypertensive reaction (red/itching skin, palpitations, light-headedness, hot or clammy feeling, headache). • Report any new symptom, immediately for vision difficulties, nausea/vomiting, dark urine, yellowing of skin/eyes (jaundice), fatigue, paresthesia of extremities.

I

isosorbide dinitrate

eye-soe-**sor**-bide
(ISDN, Dilatrate-SR, Isordil, Novo-Sorbide)

isosorbide mononitrate

(Apo-ISMO, Imdur)
Do not confuse Imdur with Imuran, Inderal, or K-Dur, Isordil with Inderal, Isuprel, or Plendil.

FIXED-COMBINATION(S)

BiDil: isosorbide dinitrate/hydralazine (a vasodilator): 20 mg/37.5 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Nitrate.
CLINICAL: Antianginal.

USES

Dinitrate: Prevention and treatment of angina. **Mononitrate:** Prevention of angina pectoris. **OFF-LABEL:** Esophageal spastic disorders, HF.

PRECAUTIONS

Contraindications: Hypersensitivity to nitrates, concurrent use of sildenafil, tadalafil, vardenafil. **Cautions:** Inferior wall MI, head trauma, increased intracranial pressure (ICP), orthostatic hypotension, blood volume depletion from diuretic therapy, systolic B/P less than 90 mm Hg, hypertrophic cardiomyopathy.

ACTION

Stimulates intracellular cyclic guanosine monophosphate. **Therapeutic Effect:** Relaxes vascular smooth muscle of arterial, venous vasculature. Decreases preload, afterload, cardiac oxygen demand.

PHARMACOKINETICS

Route	Onset	Peak	Duration
Dinitrate			
Sublingual	3 min	N/A	1–2 hrs
PO	45–60 min	N/A	up to 8 hrs
Mononitrate			
PO (extended-release)	30–60 min	N/A	12–24 hrs

Dinitrate poorly absorbed and metabolized in liver to its active metabolite isosorbide mononitrate. Mononitrate well absorbed after PO administration. Primarily excreted in urine. **Half-life:** Dinitrate, 1–4 hrs; mononitrate, 4 hrs.

Canadian trade name

sustained-release forms. • Take sublingual tablets while sitting down. • Go from lying to standing slowly (prevents dizziness effect). • Take oral form on empty stomach (however, if headache occurs during management therapy, take medication with meals). • Dissolve sublingual tablet under tongue; do not swallow. • Avoid alcohol (intensifies hypotensive effect). • If alcohol is ingested soon after taking nitrates, possible acute hypotensive episode (marked drop in B/P, vertigo, pallor) may occur. • Report signs/symptoms of hypotension, angina.

isotretinoin

eye-so-**tret**-i-noyn
(Absorica, Myorisan, Accutane, Amnesteem, Claravis, Sotret, Zenatane)

■ **BLACK BOX ALERT** ■ High risk of teratogenic effects; Pregnancy Category X. Obtain two negative pregnancy tests prior to treatment. All pts (male and female) must register and be active in the IPLEDGE™ risk management program.

Do not confuse Accutane with Accolate or Accupril, Claravis with Cleviprex, or isotretinoin with tretinoin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Keratinization stabilizer. **CLINICAL:** Antiacne, antirosacea agent.

USES

Treatment of severe, recalcitrant cystic acne unresponsive to conventional acne therapies. **OFF-LABEL:** Treatment of children with metastatic neuroblastoma or leukemia not responding to conventional therapy.

PRECAUTIONS

Contraindications: Hypersensitivity to isotretinoin, parabens (component of capsules), vitamin A supplements, pregnancy, breastfeeding. **Cautions:** Hepatic dysfunction, diabetes, hypertriglyceridemia; history of childhood osteoporosis; osteomalacia, other disorders of bone metabolism; psychiatric disorders.

ACTION

Reduces sebaceous gland size, inhibiting gland activity. **Therapeutic Effect:** Produces antikeratinizing, anti-inflammatory effects.

ACTION

Inhibits calcium movement across cardiac, vascular smooth-muscle cell membranes. Potent peripheral vasodilator (does not depress SA, AV nodes). **Therapeutic Effect:** Produces relaxation of coronary vascular smooth muscle; produces coronary vasodilation. Increases myocardial oxygen delivery in pts with vasospastic angina.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (immediate-release hypertension)	1 hr	2–3 hrs	Greater than 12 hrs

Well absorbed from GI tract. Protein binding: 95%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 8 hrs.

ADMINISTRATION/HANDLING

PO

• Give capsules and tablets with food (increases absorption). • Give solution on empty stomach.

INDICATIONS/ROUTES/DOSAGE

Usual Dosage Range

PO: ADULTS, ELDERLY: 100–800 mg/day. **ADOLESCENTS:** 100–600 mg/day. Doses greater than 200 mg given in 2 divided doses. Length of therapy ranges from 1 day to more than 6 mos.

Blastomycosis, Histoplasmosis

PO: ADULTS, ELDERLY: Initially, 200 mg 3 times/day for 3 days, then 400 mg/day in 2 divided doses for 6–12 mos (6–12 wks for histoplasmosis).

Aspergillosis (Invasive)

PO: ADULTS, ELDERLY: 600 mg/day in 3 divided doses for 3–4 days, then 200–400 mg/day in 2 divided doses.

Esophageal Candidiasis

PO: ADULTS, ELDERLY: Swish 100–200 mg (10–20 ml) in mouth for several seconds, then swallow once daily for a minimum of 3 wks. Continue for 2 wks after resolution of symptoms. **Maximum:** 200 mg/day.

Oropharyngeal Candidiasis

PO: ADULTS, ELDERLY: 200 mg (10 ml) oral solution, swish and swallow once a day for 7–14 days.

Onychomycosis (Fingernail)

PO: ADULTS, ELDERLY: 200 mg twice daily for 7 days, off for 21 days, repeat 200 mg twice a day for 7 days.

Onychomycosis (Toenail)

PO: ADULTS, ELDERLY: 200 mg once daily for 12 wks.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (11%–9%): Nausea, rash. **Occasional (5%–3%):** Vomiting, headache, diarrhea, hypertension, peripheral edema, fatigue, fever. **Rare (2% or less):** Abdominal pain, dizziness, anorexia, pruritus.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hepatitis (anorexia, abdominal pain, unusual fatigue/weakness, jaundiced skin/sclera, dark urine) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Determine baseline temperature, LFT. Assess allergies. Receive full medication history (numerous contrainidications/cautions).

INTERVENTION/EVALUATION

Assess for signs, symptoms of hepatic dysfunction. Monitor LFT in pts with preexisting hepatic impairment.

PATIENT/ FAMILY TEACHING

• Take capsules with food, liquids if GI distress occurs. • Therapy will continue for at least 3 mos, until lab tests, clinical presentation indicate infection is controlled. • Immediately report unusual fatigue, yellow skin, dark urine, pale stool, anorexia, nausea, vomiting. • Avoid grapefruit products.

ivacaftor

eye-va-**kaf**-tor
(Kalydeco)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Cystic fibrosis transmembrane conductance regulator potentiator. **CLINICAL:** Cystic fibrosis agent.

USES

Treatment of cystic fibrosis in pts age 6 yrs and older who have a G551D

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

If the pt's genotype is unknown, an FDA-cleared CF mutation test should be used to detect presence of the G551D mutation. Assess hepatic function prior to and periodically during therapy.

INTERVENTION/EVALUATION

Patients who develop increased ALT, AST levels should be closely monitored until the abnormalities resolve. Dosing should be interrupted if transaminases (ALT or AST) are greater than 5 times upper limit normal. Transaminases should be obtained every 3 mos during the first year of treatment, and annually thereafter.

PATIENT/FAMILY TEACHING

• Always take medication with fatty food. • Avoid grapefruit products and Seville oranges. • Adhere to routine laboratory testing as a part of treatment regimen. • Report headache, diarrhea, rash, signs and symptoms of respiratory infection.

ixabepilone

ix-ab-**ep**-i-lone
(Ixempra)

■ **BLACK BOX ALERT** ■ Combination therapy with capecitabine is contraindicated in pts with ALT or AST greater than 2.5 times upper limit of normal (ULN) or bilirubin greater than 1 times ULN. Increased risk of toxicity, neutropenia-related mortality.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Epothilone microtubule inhibitor, antimitotic agent. **CLINICAL:** Antineoplastic.

USES

Combination therapy with capecitabine for treatment of metastatic or locally advanced breast cancer in pts after failure of anthracycline, taxane therapy. As monotherapy, treatment of metastatic or locally advanced breast cancer in pts after failure of anthracycline, taxane, and capecitabine therapy. **OFF-LABEL:** Treatment of endometrial cancer.

PRECAUTIONS

Contraindications: Severe hypersensitivity reaction to Cremophor, baseline neutrophil count less than 1,500/mm^3, platelet count less than 100,000 cells/mm^3. **Combination Capecitabine Therapy:** ALT or AST greater than 2.5 times normal range, bilirubin greater than 1 times normal range. **Cautions:** Diabetes mellitus, existing moderate to severe neuropathy, history of cardiovascular disease. **Monotherapy:** ALT or AST greater than 5 times normal range, bilirubin greater than 3 times normal range.

ACTION

Binds directly on microtubules during active stage of G2 and M phases of cell cycle, preventing formation of microtubules, an essential part of the process of separation of chromosomes. **Therapeutic Effect:** Blocks cells in mitotic phase of cell division, leading to cell death.

PHARMACOKINETICS

Metabolized in liver. Protein binding: 77%. Excreted in feces (65%), urine (21%). **Half-life:** 52 hrs.

Hematologic

Neutrophils Less Than 500/mm³ for 7 Days or Longer: Reduce dose by 20%. **Neutropenic Fever:** Reduce dose by 20%. **Platelets Less Than 25,000/mm³ (Less Than 50,000/mm³ with Bleeding):** Reduce dose by 20%.

Neuropathy

Grade 2 for 7 Days or Longer or Grade 3 for Less Than 7 Days: Reduce dose by 20%. **Grade 3 for 7 Days or Longer:** Discontinue treatment. **Grade 3 (Other Than Neuropathy):** Reduce dose by 20%. **Grade 4:** Discontinue treatment.

SIDE EFFECTS

Common (62%): Peripheral sensory neuropathy. **Frequent (56%–46%):** Fatigue, asthenia, myalgia, arthralgia, alopecia, nausea. **Occasional (29%–11%):** Vomiting, stomatitis, mucositis, diarrhea, musculoskeletal pain, anorexia, constipation, abdominal pain, headache. **Rare (9%–5%):** Skin rash, nail disorder, edema, hand-foot syndrome (blistering/rash/peeling of skin on palms of hands, soles of feet), pyrexia, dizziness, pruritus, gastroesophageal reflux disease (GERD), hot flashes, taste disorder, insomnia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Neuropathy occurs early during treatment; 75% of new onset or worsening neuropathy occurred during first 3 cycles. Diabetics may be at increased risk for severe neuropathy manifested as grade 4 neutropenia. Neutropenia, leukopenia occurs commonly; anemia, thrombocytopenia occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question possibility of pregnancy. Obtain baseline CBC, serum chemistries, LFT before treatment begins as baseline and monitor for hepatotoxicity, peripheral neuropathy (most frequent cause of drug discontinuation).

INTERVENTION/EVALUATION

Monitor for symptoms of neuropathy (burning sensation, hyperesthesia, hypoesthesia, paresthesia, discomfort, neuropathic pain). Assess hands and feet for erythema. Monitor CBC for evidence of neutropenia, thrombocytopenia; LFT for hepatotoxicity. Assess mouth for stomatitis, mucositis.

PATIENT/FAMILY TEACHING

• Avoid crowds, those with known infection. • Avoid contact with those who have recently received live virus vaccine. • Do not have immunizations without physician's approval (drug lowers resistance). • Promptly report fever over 100.5°F, chills, numbness, tingling, burning sensation, erythema of hands/feet.

Generic Drugs K		
ketoconazole	ketoprofen	ketorolac

PHARMACOKINETICS

Well absorbed from GI tract following PO administration. Protein binding: 93%–96%. Metabolized in liver. Primarily excreted in bile. Negligible systemic absorption following topical absorption. Ketoconazole is not detected in plasma after shampooing, topical administration. **Half-life:** 8 hrs.

anticholinergics, H_2 blockers at least 2 hrs following dosing.

Shampoo

• Apply to wet hair, massage for 1 min, rinse thoroughly, reapply for 3 min, rinse.

Topical

• Apply, rub gently into affected/surrounding area.

INDICATIONS/ROUTES/DOSAGE

Usual Dosage

PO: ADULTS, ELDERLY: 200–400 mg/day. **Maximum:** 800 mg/day in 2 divided doses. **CHILDREN 2 YRS AND OLDER:** 3.3–6.6 mg/kg/day.

Topical: ADULTS, ELDERLY: Apply to affected area 1–2 times/day for 2–4 wks.

Shampoo: ADULTS, ELDERLY: Use twice weekly for 4 wks, allowing at least 3 days between shampooing. Use intermittently to maintain control.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (10%–3%): Nausea, vomiting. **Rare (less than 2%):** Abdominal pain, diarrhea, headache, dizziness, photophobia. **Topical:** Burning, irritation, pruritus.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hematologic toxicity (thrombocytopenia, hemolytic anemia, leukopenia) occurs occasionally. Hepatotoxicity may occur within first wk to several mos after starting therapy. Anaphylaxis occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Confirm culture or histologic test for accurate diagnosis; therapy may begin before results known. Receive full medication history and screen for contraindications.

INTERVENTION/EVALUATION

Monitor LFT; be alert for hepatotoxicity: dark urine, pale stools, jaundice, fatigue, anorexia, nausea, or vomiting (unrelieved by giving medication with food). Monitor CBC for hematologic toxicity. Monitor daily pattern of bowel activity, stool consistency. Assess for dizziness, provide assistance as needed. Evaluate skin for rash, urticaria, pruritus. **Topical:** Check for localized burning, pruritus, irritation.

PATIENT/FAMILY TEACHING

• Prolonged therapy (wks or mos) is usually necessary. • Avoid alcohol. • May cause dizziness; avoid tasks that require alertness, motor skills until response to drug is established. • Take antacids, antiulcer medications at least 2 hrs after ketoconazole. • Report dark urine, pale stool, yellow skin or eyes, vomiting, increased irritation in topical use, onset of other new symptoms. • **Topical:** Rub well into affected areas. • Avoid contact with eyes. • Keep skin clean, dry; wear light clothing for ventilation. • Separate personal items in direct contact with affected area. • **Shampoo:** Initially, use 2 times a wk for 4 wks with at least 3 days between shampooing; frequency then determined by response to medication.

ketoprofen

kee-toe-**proe**-fen
(Apo-Keto)

■ **BLACK BOX ALERT** ■ Increased risk of serious cardiovascular thrombotic events, including myocardial infarction, CVA. Increased risk of severe GI reactions, including ulceration, bleeding, perforation.

CLASSIFICATION

PHARMACOTHERAPEUTIC: NSAID.
CLINICAL: Antirheumatic, analgesic, antidysmenorrheal, vascular headache suppressant.

vomiting, visual disturbances, fluid retention.

ADVERSE EFFECTS/ TOXIC REACTIONS

Peptic ulcer, GI bleeding, gastritis, severe hepatic reaction (cholestasis, jaundice) occur rarely. Nephrotoxicity (dysuria, hematuria, proteinuria, nephrotic syndrome), severe hypersensitivity reaction (bronchospasm, angioedema) occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain/inflammation. Inspect appearance of affected joints for immobility, deformities, skin condition.

INTERVENTION/EVALUATION

Monitor for evidence of nausea, dyspepsia. Monitor for therapeutic response: relief of pain, improved range of motion, grip strength, mobility. Monitor renal function, LFT, occult blood loss, mental status.

PATIENT/FAMILY TEACHING

• Avoid aspirin, alcohol (increases risk of GI bleeding). • If GI upset occurs, take with food, milk. • Swallow capsule whole; do not chew, crush, dissolve, or open.

ketorolac

kee-**toe**-role-ak
(Acular, Acular LS, Acuvail, Apo-Ketorolac, Novo-Ketorolac, Sprix, Toradol)

■ **BLACK BOX ALERT** ■ Increased risk of serious cardiovascular thrombotic events, including myocardial infarction, CVA. Increased risk of severe GI reactions, including ulceration, bleeding, perforation.

Do not confuse Acular with Acthar or Ocular, ketorolac with Ketalar, or Toradol with Foradil, Inderal, Tegretol, or tramadol.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: NSAID.
CLINICAL: Analgesic, intraocular anti-inflammatory.

USES

PO, injection, nasal: Short-term (5 days or less) relief of mild to moderate pain. **Ophthalmic:** Relief of ocular itching due to seasonal allergic conjunctivitis. Treatment postop for inflammation following cataract extraction, pain following incisional refractive surgery. **OFF-LABEL:** Prevention, treatment of ocular inflammation (ophthalmic form).

PRECAUTIONS

Contraindications: Intracranial bleeding, hemorrhagic diathesis, high risk of bleeding, concomitant use of probenecid or pentoxifylline, labor and delivery, breastfeeding, advanced renal impairment, active peptic ulcer disease, chronic inflammation of GI tract, GI bleeding/ulceration, history of hypersensitivity to aspirin, NSAIDs. Perioperative pain in setting of CABG surgery. **Cautions:** Hepatic impairment, history of GI tract disease, asthma, coagulation disorders, receiving anticoagulants, fluid retention, HF, renal impairment, inflammatory bowel disease, smoking, use of alcohol, elderly, debilitated.

ACTION

Inhibits prostaglandin synthesis, reduces prostaglandin levels in aqueous humor. **Therapeutic Effect:** Reduces intensity of pain stimulus, reduces intraocular inflammation.

PHARMACOKINETICS

Readily absorbed from GI tract after IM administration. Protein binding: 99%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis.

MORE THAN 50 KG: 30 mg. **ADULTS 65 YRS AND OLDER, WITH RENAL IMPAIRMENT, WEIGHING LESS THAN 50 KG:** 15 mg. **CHILDREN 2–16 YRS:** 0.5 mg/kg. **Maximum:** 15 mg.
IM: ADULTS YOUNGER THAN 65 YRS, CHILDREN 17 YRS AND OLDER, WEIGHING MORE THAN 50 KG: 60 mg. **ADULTS 65 YRS AND OLDER, WITH RENAL IMPAIRMENT, WEIGHING LESS THAN 50 KG:** 30 mg. **CHILDREN 2–16 YRS:** 1 mg/kg. **Maximum:** 30 mg.

Allergic Conjunctivitis

Ophthalmic: ADULTS, ELDERLY, CHILDREN 3 YRS AND OLDER: 1 drop 4 times/day.

Cataract Extraction

Ophthalmic: ADULTS, ELDERLY: 1 drop 4 times/day. Begin 24 hrs after surgery and continue for 2 wks.

Refractive Surgery

Ophthalmic: ADULTS, ELDERLY: 1 drop 4 times/day for 3 days.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (17%–12%): Headache, nausea, abdominal cramps/pain, dyspepsia (heartburn, indigestion, epigastric pain). **Occasional (9%–3%):** Diarrhea. **Nasal:** Nasal discomfort, rhinalgia, increased lacrimation, throat irritation, rhinitis. **Ophthalmic:** Transient stinging, burning. **Rare (3%–1%):** Constipation, vomiting, flatulence, stomatitis. **Ophthalmic:** Ocular irritation, allergic reactions (manifested by pruritus, stinging), superficial ocular infection, keratitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Peptic ulcer, GI bleeding, gastritis, severe hepatic reaction (cholestasis, jaundice) occur rarely. Nephrotoxicity (glomerular nephritis, interstitial nephritis, nephrotic syndrome) may occur in pts with preexisting renal impairment. Acute hypersensitivity reaction (fever, chills, joint pain) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain. Obtain baseline renal/hepatic function tests.

INTERVENTION/EVALUATION

Monitor renal function, LFT, urinary output. Monitor daily pattern of bowel activity, stool consistency. Observe for occult blood loss. Assess for therapeutic response: relief of pain, stiffness, swelling; increased joint mobility; reduced joint tenderness; improved grip strength. Monitor for bleeding (may also occur with ophthalmic route due to systemic absorption).

PATIENT/ FAMILY TEACHING

• Avoid aspirin, alcohol. • Report abdominal pain, bloody stools, or vomiting blood. • If GI upset occurs, take with food, milk. • **Ophthalmic:** Transient stinging, burning may occur upon instillation. • Do not administer while wearing soft contact lenses.

Generic Drugs L

labetalol
lacosamide
lactulose
lamivudine
lamotrigine
lansoprazole
lapatinib
leflunomide
lenalidomide
letrozole
leucovorin calcium (folinic acid, citrovorum factor)
leuprolide
levalbuterol
levetiracetam
levocetirizine
levofloxacin
levomilnacipran
levothyroxine
lidocaine
linaclotide
linagliptin
linezolid
liraglutide
lisdexamfetamine
lisinopril
lithium
lomitapide
lomustine
loperamide
lopinavir/ritonavir
loratadine
lorazepam
lorcaserin
losartan
lovastatin
lubiprostone
lucinactant
lurasidone
lymphocyte immune globulin N

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	0.5–2 hrs	2–4 hrs	8–12 hrs
IV	2–5 min	5–15 min	2–4 hrs

Completely absorbed from GI tract. Protein binding: 50%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 2.5–8 hrs.

Rate of Administration • For IV push, administer at a rate of 10 mg/min. • For IV infusion, administer at rate of 2 mg/min initially. Rate is adjusted according to B/P. • Monitor B/P immediately before and q5–10min during IV administration (maximum effect occurs within 5 min).
Storage • Store at room temperature. • After dilution, IV solution is stable for 72 hrs. • Solution appears clear, colorless to light yellow. • Discard if discolored or precipitate forms.

PO
• Give without regard to food. • Tablets may be crushed.

IV INCOMPATIBILITIES

Amphotericin B complex (Abelcet, AmBisome, Amphotec), ceftaroline (Teflaro), ceftriaxone (Rocephin), furosemide (Lasix), heparin, nafcillin (Nafcil).

IV COMPATIBILITIES

Amiodarone (Cordarone), calcium gluconate, dexmedetomidine (Precedex), diltiazem (Cardizem), dobutamine (Dobutrex), dopamine (Intropin), enalapril (Vasotec), fentanyl (Sublimaze), hydromorphone (Dilaudid), lidocaine, lorazepam (Ativan), magnesium sulfate, midazolam (Versed), milrinone (Primacor), morphine, nitroglycerin, norepinephrine (Levophed), potassium chloride, potassium phosphate, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Hypertension
PO: ADULTS: Initially, 100 mg twice a day. Adjust in increments of 100 mg twice a day q2–3days. **Maintenance:** 100–400 mg twice a day. **Maximum:** 2.4 g/day. **ELDERLY:** Initially, 100 mg 1–2 times a day. May increase as needed. **Maintenance:** 100–200 mg twice daily. **CHILDREN:** 1–3 mg/kg/day in 2 divided doses. **Maximum:** 10–12 mg/kg/day up to 1,200 mg/day.

Severe Hypertension, Hypertensive Crisis
IV: ADULTS: Initially, 20 mg. Additional doses of 40–80 mg may be given at 10-min intervals, up to total dose of 300 mg.
IV Infusion: ADULTS: Initially, 2 mg/min up to total dose of 300 mg. **CHILDREN:** 0.4–1 mg/kg/hr. **Maximum:** 3 mg/kg/hr.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (20%–11%): Drowsiness, dizziness, excessive fatigue. **Occasional (10% or less):** Dyspnea, peripheral edema, depression, anxiety, constipation, diarrhea, nasal congestion, weakness, diminished sexual function, transient scalp tingling, insomnia, nausea, vomiting, abdominal discomfort. **Rare:** Altered taste, dry eyes, increased urination, paresthesia.

ADVERSE EFFECTS/ TOXIC REACTIONS

May precipitate, aggravate HF due to decreased myocardial stimulation. Abrupt withdrawal may precipitate myocardial ischemia, producing chest pain, diaphoresis, palpitations, headache, tremor. May mask signs, symptoms of acute hypoglycemia (tachycardia, B/P changes) in diabetic pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess baseline renal function, LFT. Assess B/P, apical pulse immediately before drug administration (if pulse is 60/min or less or systolic B/P is lower than 90 mm Hg, withhold medication, contact physician).

INTERVENTION/EVALUATION

Monitor B/P for hypotension. Assess pulse for quality, irregular rate, bradycardia. Monitor EKG for cardiac arrhythmias. Monitor daily pattern of bowel activity, stool consistency. Assist with ambulation if dizziness occurs. Assess for evidence of HF: dyspnea (particularly on exertion or lying down), night cough,

IV COMPATIBILITIES

0.9% NaCl, D_5W, lactated Ringer's.

INDICATIONS/ROUTES/DOSAGE

Note: IV dose is same as oral dose.

Partial-Onset Seizures

PO: ADULTS, CHILDREN 17 YRS AND OLDER: Initially, 50 mg twice daily (100 mg/day). May increase by 100 mg/day at weekly intervals, given as 2 daily divided doses up to maintenance dose of 200–400 mg/day, based on pt response, tolerability.
IV: ADULTS, CHILDREN 17 YRS AND OLDER: May be given undiluted or mixed in compatible diluent and given as 30- to 60-min infusion.

Switch from IV to PO

When switching from IV to PO form, use same equivalent daily dosage and frequency as IV administration.

Switch from PO to IV

When switching from PO to IV form, initial total daily IV dosage should be equivalent to total daily dosage and frequency of PO form and should be infused IV over 30–60 min.

Severe Renal Impairment (Creatinine Clearance 30 ml/min or Less, Pts With End-Stage Renal Disease)

PO/IV: ADULTS, ELDERLY, CHILDREN 17 YRS AND OLDER: Maximum: 300 mg/day.
Hemodialysis: Supplement dose of up to 50% may be given after 4-hr HD treatment.

Mild to Moderate Hepatic Impairment

PO/IV: ADULTS, ELDERLY, CHILDREN 17 YRS AND OLDER: Maximum: 300 mg/day.

SIDE EFFECTS

Frequent (31%–13%): Dizziness, headache. **Occasional (11%–5%):** Nausea, double vision, vomiting, fatigue, blurred vision, ataxia, tremor, nystagmus. **Rare (4%–2%):** Vertigo, diarrhea, gait disturbances, memory impairment, depression, pruritus, injection site discomfort.

ADVERSE EFFECTS/ TOXIC REACTIONS

Increased risk of suicidal ideation, behavior. Dose-dependent prolongations in PR interval noted. Leukopenia, anemia, thrombocytopenia occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Review history of seizure disorder (intensity, frequency, duration, level of consciousness). Initiate seizure precautions. Renal function, LFT, CBC should be performed before therapy begins and periodically during therapy.

INTERVENTION/EVALUATION

Observe for recurrence of seizure activity. Assess for clinical improvement (decrease in intensity/frequency of seizures). Assist with ambulation if dizziness occurs. Assess for suicidal ideation, depression, behavioral changes. Drug should be withdrawn gradually (over a minimum of 1 wk) to minimize potential for increased seizure frequency.

PATIENT/FAMILY TEACHING

• Strict maintenance of drug therapy is essential for seizure control. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • Report depression, suicidal ideation, unusual behavioral changes.

lactulose

lak tyoo lose
(Acilac, Apo-Lactulose, Constulose, Enulose, Generlac, Kristalose, Laxilose)
Do not confuse lactulose with lactose.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Lactose derivative. **CLINICAL:** Hyperosmotic laxative, ammonia detoxicant.

ADVERSE EFFECTS/ TOXIC REACTIONS

Severe diarrhea indicates overdose. Long-term use may result in laxative dependence, chronic constipation, loss of normal bowel function.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Encourage adequate fluid intake. Assess bowel sounds for peristalsis. Monitor daily pattern of bowel activity, stool consistency; record time of evacuation. Assess for abdominal disturbances. Monitor serum electrolytes in pts with prolonged, frequent, excessive use of medication.

PATIENT/FAMILY TEACHING

• Evacuation occurs in 24–48 hrs of initial dose. • Institute measures to promote defecation: increase fluid intake, exercise, high-fiber diet.

lamivudine

la-**miv**-yoo-deen
(Epivir, Epivir-HBV, Heptovir)

■ **BLACK BOX ALERT** ■ Serious, sometimes fatal lactic acidosis, severe hepatomegaly with steatosis (fatty liver) have occurred. Pts must be monitored for chronic hepatitis B for several months following therapy.

Do not confuse Epivir with Combivir, or lamivudine with lamotrigine.

FIXED-COMBINATION(S)

Combivir: lamivudine/zidovudine (an antiviral): 150 mg/300 mg. **Epzicom:** lamivudine/abacavir (an antiviral): 300 mg/600 mg. **Triumeq:** lamivudine/abacavir (antiretroviral)/dolutegravir (integrase inhibitor): 300 mg/600 mg/50 mg. **Trizivir:** lamivudine/zidovudine/abacavir (an antiviral): 150 mg/300 mg/300 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Nucleoside reverse transcriptase inhibitor.
CLINICAL: Antiviral.

USES

Epivir: Treatment of HIV infection in combination with at least two other antiretroviral agents. **Epivir-HBV:** Treatment of chronic hepatitis B associated with evidence of hepatitis B viral replication and active liver inflammation. **OFF-LABEL:** Prophylaxis in health care workers at risk of acquiring HIV after occupational exposure to virus. Use as part of multidrug regimen.

PRECAUTIONS

Contraindications: None known. **Cautions:** Use in children with history of pancreatitis or risk factors for developing pancreatitis. Use in combination with interferon alfa with or without ribavirin in HIV/HBV coinfected pts, renal/hepatic impairment.

ACTION

Inhibits HIV reverse transcriptase by viral DNA chain termination. Inhibits RNA-, DNA-dependent DNA polymerase, an enzyme necessary for HIV, hepatitis B replication. **Therapeutic Effect:** Slows HIV replication, reduces progression of HIV infection, chronic hepatitis B.

PHARMACOKINETICS

Rapidly, completely absorbed from GI tract. Protein binding: less than 36%. Widely distributed (crosses blood-brain barrier). Primarily excreted unchanged in urine. Not removed by hemodialysis or peritoneal dialysis. **Half-life: Children:** 2 hrs. **Adults:** 5–7 hrs.

as needed. Assess for dizziness, sleep pattern. If pancreatitis in children occurs, movement aggravates abdominal pain; sitting up, flexing at the waist may relieve the pain.

PATIENT/FAMILY TEACHING

• Continue therapy for full length of treatment. • Doses should be evenly spaced. • Lamivudine is not a cure for HIV infection, nor does it reduce risk of transmission to others. • Avoid tasks requiring alertness, motor skills until response to drug is established. • Avoid alcohol. • Closely monitor for symptoms of pancreatitis (severe, steady abdominal pain often radiating to the back, clammy skin, hypotension; nausea/vomiting may accompany abdominal pain).

lamotrigine

la-**moe**-tri-jeen
(Apo-Lamotrigine, Lamictal, Lamictal ODT, Lamictal XR)

■ **BLACK BOX ALERT** ■ Severe, potentially life-threatening skin rashes have been reported, including Stevens-Johnson syndrome. Risk increased with coadministration with valproic acid and rapid-dose titration.

Do not confuse Lamictal with Lamisil or Lomotil, or lamotrigine with labetalol or lamivudine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Phenyltriazine. **CLINICAL:** Anticonvulsant.

USES

Immediate-Release: Adjunctive therapy in adults and children with generalized tonic-clonic seizures and partial seizures, treatment of adults and children with generalized seizures of Lennox-Gastaut syndrome. Conversion to monotherapy in adults treated with another enzyme-inducing antiepileptic drug (EIAED) (e.g., valproic acid, carbamazepine, phenytoin, phenobarbital, primidone). Long-term maintenance treatment of bipolar disorder. Treatment of pts 2 yrs and older with primary generalized tonic-clonic seizures. **Extended-release:** Adjunctive therapy for primary generalized tonic-clonic and partial-onset seizures in pts 13 yrs and older. Conversion to monotherapy in pt 13 yrs and older with partial seizures receiving treatment with a single antiepileptic drug (AED).

PRECAUTIONS

Contraindications: None known. **Cautions:** Hepatic, impairment; pts at high risk of suicide, pts taking estrogen-containing oral contraceptives, pts with previous history of adverse hematologic reaction.

ACTION

May block voltage-sensitive sodium channels, stabilizing neuronal membranes, regulating presynaptic transmitter release of excitatory amino acids. **Therapeutic Effect:** Produces anticonvulsant activity. Delays time to occurrence of acute mood episodes (mania, depression, hypomania).

Conversion to Monotherapy for Pts Receiving Valproic Acid

PO: ADULTS, ELDERLY, CHILDREN 16 YRS AND OLDER: Titrate lamotrigine to 200 mg/day, maintaining valproic acid dose. Maintain lamotrigine dose and decrease valproic acid to 500 mg/day, no greater than 500 mg/day/wk, then maintain 500 mg/day for 1 wk. Increase lamotrigine to 300 mg/day and decrease valproic acid to 250 mg/day. Maintain for 1 wk, then discontinue valproic acid and increase lamotrigine by 100 mg/day each wk until maintenance dose of 500 mg/day reached.

Bipolar Disorder

PO: ADULTS, ELDERLY: Initially, 25 mg/day for 2 wks, then 50 mg/day for 2 wks, then 100 mg/day for 1 wk, then 200 mg/day beginning with wk 6.

Bipolar Disorder in Pts Receiving EIAEDs

PO: ADULTS, ELDERLY: 50 mg/day for 2 wks, then 100 mg/day for 2 wks, then 200 mg/day for 1 wk, then 300 mg/day for 1 wk, then up to usual maintenance dose 400 mg/day in divided doses.

Bipolar Disorder in Pts Receiving Valproic Acid

PO: ADULTS, ELDERLY: 25 mg/day every other day for 2 wks, then 25 mg/day for 2 wks, then 50 mg/day for 1 wk, then 100 mg/day. **Usual maintenance dose with valproic acid:** 100 mg/day.

Usual Dosage for Lamictal XR

Adjunct Therapy: Range: 200–600 mg/day.

Conversion to Monotherapy: Range: 250–500 mg/day.

Discontinuation Therapy

◀ALERT▶ A dosage reduction of approximately 50%/wk over at least 2 wks is recommended.

Dosage in Renal Impairment

◀ALERT▶ Decreased dosage may be effective in pts with significant renal impairment.

Dosage in Hepatic Impairment

Moderate to severe without ascites: Reduce dose by 25%. **Severe with ascites:** Reduce dose by 50%.

SIDE EFFECTS

Frequent (38%–14%): Dizziness, headache, diplopia, ataxia, nausea, blurred vision, drowsiness, rhinitis. **Occasional (10%–5%):** Rash, pharyngitis, vomiting, cough, flu-like symptoms, diarrhea, dysmenorrhea, fever, insomnia, dyspepsia. **Rare:** Constipation, tremor, anxiety, pruritus, vaginitis, hypersensitivity reaction.

ADVERSE EFFECTS/ TOXIC REACTIONS

Abrupt withdrawal may increase seizure frequency. Serious rashes, including Stevens-Johnson syndrome, have been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Review history of seizure disorder (type, onset, intensity, frequency, duration, LOC), medication history (esp. other anticonvulsants), other medical conditions (e.g., renal impairment). Initiate seizure precautions. Assess baseline mood, behavior.

INTERVENTION/EVALUATION

Report occurrence of rash (drug discontinuation may be necessary). Assist with ambulation if dizziness, ataxia occurs. Assess for clinical improvement (decreased intensity/frequency of seizures). Assess for visual abnormalities, headache. Monitor for suicidal ideation, depression, behavioral changes.

PATIENT/ FAMILY TEACHING

• Take medication only as prescribed; do not abruptly discontinue medication after long-term therapy. • Avoid alcohol. • Avoid tasks that require alertness, motor skills until response to drug is established. • Carry identification

abnormal albumin/globulin ratio, electrolyte balance, platelet, RBC, WBC count.

AVAILABILITY (Rx)

Tablets, Orally Disintegrating (Prevacid Solu-Tab): 15 mg, 30 mg. **Powder for Oral Suspension (First Lansoprazole):** 3 mg/ml.

AVAILABILITY (Rx)

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for possibility of pregnancy (Pregnancy Category X). Obtain baseline CBC, LFT. Assess limitations in activities of daily living due to rheumatoid arthritis (RA).

INTERVENTION/EVALUATION

Monitor tolerance to medication. Assess symptomatic relief of RA (relief of pain; improved range of motion, grip strength, mobility). Monitor LFT.

PATIENT/FAMILY TEACHING

- May take without regard to food.
- Improvement may take longer than 8 wks.
- Avoid pregnancy (Pregnancy Category X).

lenalidomide

len-a-**lid**-o-myde
(Revlimid)

■ **BLACK BOX ALERT** ■ Pregnancy Category X. Analogue to thalidomide. High potential for significant birth defects. Hematologic toxicity (thrombocytopenia, neutropenia) occurs in 80% of pts. Greatly increases risk for DVT, pulmonary embolism in multiple myeloma pts. **Do not confuse lenalidomide with thalidomide.**

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Isoxazole immunomodulator. **CLINICAL:** Immunosuppressive agent.

USES

Treatment of low- to intermediate-risk myelodysplastic syndrome (MDS) in pts with deletion 5q cytogenetic abnormality with transfusion-dependent anemia. Treatment of multiple myeloma (in combination with dexamethasone). Treatment of relapsed or refractory mantle cell lymphoma. **OFF-LABEL:** Systemic amyloidosis, lower-risk myelodysplastic syndrome, non-Hodgkin's lymphoma, maintenance treatment for multiple myeloma (following autologous stem cell transplant). Relapsed or refractory chronic lymphocytic leukemia (CLL).

PRECAUTIONS

Contraindications: Pregnancy **(Pregnancy Category X),** women capable of becoming pregnant. **Cautions:** Renal/hepatic impairment.

ACTION

Inhibits secretion of pro-inflammatory cytokines, increases secretion of anti-inflammatory cytokines. Enhances cell-mediated immunity by stimulation of T- cells. **Therapeutic Effect:** Inhibits myeloma cell growth; induces cell cycle arrest and cell death.

PHARMACOKINETICS

Well absorbed following PO administration. Protein binding: 30%. Eliminated in urine. **Half-life:** 3 hrs (increased in renal impairment).

Dosage in Renal Impairment

	Creatinine Clearance 30–59 ml/min	Creatinine Clearance Less Than 30 ml/min (Nondialysis Dependent)	Creatinine Clearance Less Than 30 ml/min (Dialysis Dependent)
Myelodysplastic syndrome	5 mg once daily	2.5 mg once daily	2.5 mg once daily (give after dialysis)
Multiple myeloma	10 mg once daily	15 mg q48h	5 mg once daily (give after dialysis)

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (49%–31%): Diarrhea, pruritus, rash, fatigue. **Occasional (24%–12%):** Constipation, nausea, arthralgia, fever, back pain, peripheral edema, cough, dizziness, headache, muscle cramps, epistaxis, asthenia, dry skin, abdominal pain. **Rare (10%–5%):** Extremity pain, vomiting, generalized edema, anorexia, insomnia, night sweats, myalgia, dry mouth, ecchymosis, rigors, depression, dysgeusia, palpitations.

L

ADVERSE EFFECTS/ TOXIC REACTIONS

Significant increased risk of deep vein thrombosis (DVT), pulmonary embolism. Thrombocytopenia occurs in 62% of pts, neutropenia in 59% of pts, and anemia in 12% of pts. Upper respiratory infection (nasopharyngitis, pneumonia, sinusitis, bronchitis, rhinitis), UTI occur occasionally. Cellulitis, peripheral neuropathy, hypertension, hypothyroidism occur in approximately 6% of pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC. Due to high potential for human birth defects/fetal death, female pts must avoid pregnancy 4 wks before therapy, during therapy, during dose interruptions, and 4 wks following therapy. Two reliable forms of contraception must be used even if pt has history of infertility unless it is due to hysterectomy or menopause that has occurred for at least 24 consecutive mos. Confirm two negative pregnancy tests before therapy initiation.

INTERVENTION/EVALUATION

Perform pregnancy tests on women of childbearing potential: weekly during the first 4 wks, then at 4-wk intervals in pts with regular menstrual cycles or q2wks in pts with irregular menstrual cycles. Monitor for hematologic toxicity; obtain CBC weekly during first 8 wks of therapy and at least monthly thereafter. Observe for signs, symptoms of thromboembolism (shortness of breath, chest pain, extremity pain, swelling, stroke-like symptoms).

PATIENT/FAMILY TEACHING

• Two reliable forms of birth control must be used before, during, and after therapy for female pts. • A pregnancy test must be performed within 10–14 days and 24 hrs before therapy begins. • Males must always use a latex condom during any sexual contact with females of childbearing potential even if they have undergone a successful vasectomy.

letrozole

HIGH ALERT

let-roe-zole
(Apo-Letrozole* Femara)
Do not confuse Femara with Famvir, Femhrt, or Provera, or letrozole with anastrozole.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Aromatase inhibitor, hormone. **CLINICAL:** Antineoplastic.

USES

First-line treatment of locally advanced or metastatic breast cancer. Treatment of

mucosa. Primarily excreted in urine. **Half-life:** 15 min; metabolite, 30–35 min.

leuprolide

HIGH ALERT

loo-proe-lide
(Eligard, Lupron, Lupron Depot, Lupron Depot-Ped)

CLASSIFICATION

PHARMACOTHERAPEUTIC: Gonadotropin-releasing hormone (GnRH) analogue. **CLINICAL:** Antineoplastic.

USES

Palliative treatment of advanced prostate carcinoma. Management of endometriosis. Treatment of anemia caused by uterine leiomyomata (fibroids). Treatment of central precocious puberty. **OFF-LABEL:** Treatment of breast cancer, infertility.

PRECAUTIONS

Contraindications: Pregnancy, breastfeeding, undiagnosed vaginal bleeding. Eligard 7.5 mg is contraindicated in women, children; pts with hypersensitivity to GnRH, GnRH agonist analogues, or any of its components. 22.5 mg, 30 mg, 45 mg Lupron Depot contraindicated in women. **Cautions:** History of psychiatric illness. Pts with history of QT_c prolongation, preexisting cardiac disease medications that prolong QT_c interval; chronic alcohol use, steroid therapy.

ACTION

Inhibits gonadotropin secretion; suppresses ovarian and testicular steroidgenesis due to decreased LH/FSH levels. Decreases testosterone and estrogen. **Therapeutic Effect:** Produces pharmacologic castration, decreases growth of abnormal prostate tissue in males; causes endometrial tissue to become inactive, atrophic in females; decreases rate of pubertal development in children with central precocious puberty.

PHARMACOKINETICS

Rapidly, well absorbed after subcutaneous administration. Absorbed slowly after IM administration. Protein binding: 43%–49%. **Half-life:** 3–4 hrs.

occurs. • Avoid tasks that require alertness, motor skills until response to drug is established (potential for dizziness).

levalbuterol

lee-val-**bue**-ter-ole
(Xopenex, Xopenex HFA)
Do not confuse Xopenex with Xanax.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Sympathomimetic. **CLINICAL:** Bronchodilator.

USES

Treatment, prevention of bronchospasm due to reversible obstructive airway disease (e.g., asthma, bronchitis, emphysema).

PRECAUTIONS

Contraindications: History of hypersensitivity to albuterol or levalbuterol. **Cautions:** Cardiovascular disorders (cardiac arrhythmias, HF), seizures, hypertension, hyperthyroidism, diabetes mellitus, glaucoma, hypokalemia.

ACTION

Stimulates beta$_2$-adrenergic receptors in lungs, resulting in relaxation of bronchial smooth muscle. **Therapeutic Effect:** Relieves bronchospasm, reduces airway resistance.

PHARMACOKINETICS

Route	Onset	Peak	Duration
Inhalation	5–10 min	1.5 hrs	5–6 hrs
Nebulization	10–17 min	1.5 hrs	5–8 hrs

Half-life: 3.3–4 hrs.

INTERACTIONS

DRUG: **Beta-adrenergic blocking agents (beta-blockers)** antagonize effects; may produce severe bronchospasm. May decrease **digoxin** concentration. **MAOIs, tricyclic antidepressants** may potentiate cardiovascular effects. **Diuretics** may increase hypokalemia. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May decrease serum potassium.

AVAILABILITY (Rx)

Inhalation Aerosol: 45 mcg/activation. **Solution for Nebulization:** 0.31 in 3-ml vials, 0.63 mg in 3-ml vials, 1.25 mg in 3-ml vials, 1.25 mg in 0.5-ml vials.

ADMINISTRATION/HANDLING

Nebulization

• No diluent necessary. • Protect from light, excessive heat. Store at room temperature. • Once foil is opened, use within 2 wks. • Use within 1 wk and protect from light after removal from pouch • Discard if solution is not colorless. • Do not mix with other medications. • Concentrated solution (1.25 mg in 0.5 ml) should be diluted with 2.5 ml 0.9% NaCl prior to use. • Give over 5–15 min.

Inhalation

• Shake well before inhalation. • Following first inhalation, wait 2 min before inhaling second dose (allows for deeper bronchial penetration). • Rinsing mouth with water immediately after inhalation prevents mouth/throat dryness.

INDICATIONS/ROUTES/DOSAGE

Treatment/Prevention of Bronchospasm

Nebulization: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: Initially, 0.63 mg 3 times a day 6–8 hrs apart. May increase to 1.25 mg 3 times a day with dose monitoring. **CHILDREN 5–11 YRS:** Initially, 0.31 mg 3 times a day. **Maximum:** 0.63 mg 3 times a day. **CHILDREN 4 YRS OR YOUNGER:** 0.31–1.25 mg q4–6h as needed.

PHARMACOKINETICS

Rapidly, completely absorbed following PO administration. Protein binding: less than 10%. Metabolized primarily by enzymatic hydrolysis. Primarily excreted in urine as unchanged drug. **Half-life:** 6–8 hrs.

ACTION

Competes with histamine for H_1-receptor sites on effector cells in GI tract, blood vessels, respiratory tract. **Therapeutic Effect:** Relieves allergic response (sneezing, rhinorrhea, postnasal discharge, nasal pruritus, ocular pruritus, tearing), allergic rhinitis (hay fever), mediated by histamine (urticaria, pruritus).

PHARMACOKINETICS

Rapidly, almost completely absorbed from GI tract. Protein binding: 92%. Excreted primarily unchanged in urine. **Half-life:** 8 hrs (increased in renal impairment).

ADMINISTRATION/HANDLING

drowsiness). • Report tendon pain/swelling, palpitations, chest pain, difficulty breathing, persistent diarrhea occurs. • Avoid exposure to direct sunlight. • Report use of warfarin.

levomilnacipran

lee-voe-mil-**na**-si-pran
(Fetzima)
Do not confuse milnacipran with levomilnacipran.

■ **BLACK BOX ALERT** ■ Increased risk of suicidal ideation and behavior in children, adolescents, and young adults 18–24 yrs with major depressive disorder, other psychiatric disorders. Not approved for pediatric use.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin, norepinephrine reuptake inhibitor. **CLINICAL:** Antidepressant.

L

USES

Treatment of major depressive disorder (MDD).
◄ALERT► Not indicated for management of fibromyalgia.

PRECAUTIONS

Contraindications: Hypersensitivity reactions to levomilnacipran or milnacipran, concomitant use or within 14 days of MAOIs, uncontrolled narrow-angle glaucoma. **Cautions:** Renal impairment, pts with increase risk of suicide, hypertension, tachycardia, history of seizures, alcohol abuse, dysuria (e.g., prostatic hypertrophy, prostatitis), controlled narrow-angle glaucoma.

ACTION

Blocks reuptake of the neurotransmitter serotonin and norepinephrine at CNS neuronal presynaptic membranes, increasing availability at postsynaptic receptor sites. **Therapeutic Effect:** Relieves depression.

PHARMACOKINETICS

Readily absorbed following oral administration. Widely distributed. Metabolized in liver. Protein binding: 22%. Peak plasma concentration: 6–8 hrs. Primarily excreted in urine (58%). **Half-life:** 12 hrs.

USES

PO: Treatment of hypothyroidism, pituitary thyroid-stimulating hormone (TSH) suppression. **IV:** Myxedema coma. **OFF-LABEL:** Management of hemodynamically unstable potential organ donors.

PRECAUTIONS

Contraindications: Acute MI, thyrotoxicosis of any etiology, uncorrected adrenal insufficiency. **Capsule:** Inability to swallow capsules. **Cautions:** Elderly, angina pectoris, hypertension, other cardiovascular disease, adrenal insufficiency, myxedema, diabetes mellitus and insipidus, swallowing disorders.

ACTION

Converts to T_3, then binds to thyroid receptor proteins exerting metabolic effects through DNA and protein synthesis. **Therapeutic Effect:** Involved in normal metabolism, growth and development. Increases basal metabolic rate, enhances gluconeogenesis, stimulates protein synthesis.

PHARMACOKINETICS

Variable, incomplete absorption from GI tract. Protein binding: greater than 99%. Widely distributed. Deiodinated in peripheral tissues, minimal metabolism in liver. Eliminated by biliary excretion. **Half-life:** 6–7 days.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Amide anesthetic. **CLINICAL:** Class 1B Antiarrhythmic, anesthetic.

USES

Antiarrhythmic: Rapid control of acute ventricular arrhythmias following MI, cardiac catheterization, cardiac surgery, digitalis-induced ventricular arrhythmias. **Local Anesthetic:** Infiltration/nerve block for dental/surgical procedures, childbirth. **Topical Anesthetic:** Local skin disorders (minor burns, insect bites, prickly heat, skin manifestations of chickenpox, abrasions). Mucous membranes (local anesthesia of oral, nasal, laryngeal mucous membranes; local anesthesia of respiratory, urinary tracts; relief of discomfort of pruritus ani, hemorrhoids, pruritus vulvae). **Dermal patch:** Relief of chronic pain in post-herpetic neuralgia, allodynia (painful hypersensitivity). **OFF-LABEL:** IV infusion for chronic pain syndrome.

PRECAUTIONS

Contraindications: Adams-Stokes syndrome, hypersensitivity to amide-type local anesthetics, supraventricular arrhythmias, Wolff-Parkinson-White syndrome. Severe degree of SA, AV, or intraventricular heart block (except in pts with functioning pacemaker). **Cautions:** Hepatic disease, marked hypoxia, severe respiratory depression, hypovolemia, incomplete heart. History of malignant hyperthermia, shock, elderly, heart failure.

ACTION

Anesthetic: Inhibits conduction of nerve impulses. **Therapeutic Effect:** Causes temporary loss of feeling/sensation. **Antiarrhythmic:** Suppresses automaticity of conduction tissue; increases electrical stimulation threshold of ventricle, His Purkinje system; and spontaneous depolarization of ventricle during diastole. **Therapeutic Effect:** Inhibits ventricular arrhythmias.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	30–90 sec	N/A	10–20 min
Local anesthetic	2.5 min	N/A	30–60 min

Completely absorbed after IM administration. Protein binding: 60%–80%. Widely distributed. Metabolized in liver. Primarily excreted in urine. Minimally removed by hemodialysis. **Half-life:** 1–2 hrs.

ADVERSE EFFECTS/ TOXIC REACTIONS

Serious adverse reactions to lidocaine are uncommon, but high dosage by any route may produce cardiovascular depression, bradycardia, hypotension, arrhythmias, heart block, cardiovascular collapse, cardiac arrest. Potential for malignant hyperthermia, CNS toxicity may occur, esp. with regional anesthesia use, progressing rapidly from mild side effects to tremors, drowsiness, seizures, vomiting, respiratory depression. Methemoglobinemia (evidenced by cyanosis) has occurred following topical application of lidocaine for teething discomfort and laryngeal anesthetic spray.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for hypersensitivity to lidocaine, amide anesthetics. Obtain baseline B/P, pulse, respiratory rate, EKG, serum electrolytes.

INTERVENTION/EVALUATION

Monitor EKG, vital signs closely during and following drug administration for cardiac performance. If EKG shows arrhythmias, prolongation of PR interval or QRS complex, inform physician immediately. Assess pulse for rhythm, rate, quality. Assess B/P for evidence of hypotension. Monitor for therapeutic serum level (1.5–6 mcg/ml). For lidocaine given by all routes, monitor vital signs, LOC. Drowsiness should be considered a warning sign of high serum levels of lidocaine. **Therapeutic serum level:** 1.5–6 mcg/ml; **toxic serum level:** greater than 6 mcg/ml.

PATIENT/ FAMILY TEACHING

• **Local anesthesia:** Due to loss of feeling/sensation, protective measures may be needed until anesthetic wears off (no ambulation, including special positions for some regional anesthesia). • **Oral mucous membrane anesthesia:** Do not eat, drink, chew gum for 1 hr after application (swallowing reflex may be impaired, increasing risk of aspiration; numbness of tongue, buccal mucosa may lead to bite trauma). • **IV infusions:** Report dizziness, numbness, double vision, nausea, pain/burning, respiratory difficulty. • **Topical:** Report irritation, pain, numbness, swelling, blurred vision, tinnitus, respiratory difficulty.

linaclotide

lin-a-**kloe**-tide
(Linzess)

■ **BLACK BOX ALERT** ■ Contraindicated in pediatric pts 6 yrs of age and younger. Avoid use in pediatric patients 7 yrs through 17 yrs old.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Guanylate cyclase-C (cGMP) agonist. **CLINICAL:** Anti-constipation agent.

USES

Treatment of irritable bowel syndrome with constipation, chronic idiopathic constipation.

PRECAUTIONS

Contraindications: Pediatric patients 6 yrs and younger, known or suspected mechanical GI obstruction. **Cautions:** Diarrhea.

ACTION

Binds on the luminal surface of GI epithelium. Increase cGMP which stimulates chloride and bicarbonate into intestinal lumen. **Therapeutic Effect:** Increase intestinal fluid, accelerates transit.

PHARMACOKINETICS

Metabolized within GI tract. Minimal distribution beyond GI tissue. Minimal systemic absorption. **Half-life:** N/A.

type 2 diabetes mellitus alone or in combination with other antidiabetic agents.

PRECAUTIONS

Contraindications: History of hypersensitive reactions to DD4 inhibitors. **Cautions:** Concurrent use of other hypoglycemics. Not recommended for use in Type 1 diabetes, diabetic ketoacidosis, history of pancreatitis, HF.

ACTION

Slows inactivation of incretin hormones by inhibiting DDP-4 enzyme. **Therapeutic Effect:** Incretin hormones increase insulin synthesis/release from pancreas and decrease glucagon secretion. Lowers serum glucose levels.

PHARMACOKINETICS

Rapidly absorbed following PO administration. Peak plasma concentration: 1.5 hrs. Extensive tissue distribution. Protein binding: 70%–99%. Minimal metabolism (90% excreted as unchanged metabolite). Excreted primarily in enterohepatic system (80%), urine (5%). **Half-life:** 12 hrs.

Storage • Store at room temperature. • Protect from light. • Yellow color does not affect potency.

PO

• Give without regard to meals. • Use suspension within 21 days after reconstitution. Gently invert 3–5 times before administration. • Do not shake.

IV INCOMPATIBILITIES

Amphotericin B complex (Abelcet, AmBisome, Amphotec), co-trimoxazole (Bactrim), diazepam (Valium), erythromycin (Erythrocin), pentamidine (Pentam IV), phenytoin (Dilantin).

IV COMPATIBILITIES

Calcium gluconate, dexmedetomidine (Precedex), heparin, magnesium, potassium chloride.

L

INDICATIONS/ROUTES/DOSAGE

Vancomycin-Resistant Infections (VRI)

PO, IV: ADULTS, ELDERLY, CHILDREN OLDER THAN 11 YRS: 600 mg q12h for 14–28 days. **CHILDREN 11 YRS AND YOUNGER:** 10 mg/kg q8–12h for 14–28 days.

Nosocomial Pneumonia, Community-Acquired Pneumonia, Complicated Skin/Skin Structure Infections

PO, IV: ADULTS, ELDERLY, CHILDREN OLDER THAN 11 YRS: 600 mg q12h for 10–14 days. **CHILDREN 11 YRS AND YOUNGER:** 10 mg/kg q8h for 10–14 days.

Uncomplicated Skin/Skin Structure Infections

PO: ADULTS, ELDERLY: 400 mg q12h for 10–14 days. **CHILDREN OLDER THAN 11 YRS:** 600 mg q12h for 10–14 days. **CHILDREN 5–11 YRS:** 10 mg/kg/dose q12h for 10–14 days. **CHILDREN YOUNGER THAN 5 YRS:** 10 mg/kg q8h for 10–14 days.

MRSA

PO, IV: ADULTS, ELDERLY: 600 mg q12h.

Usual Neonate Dosage

PO, IV: NEONATES: 10 mg/kg/dose q8–12h.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (9%–2%): Diarrhea, nausea, vomiting, insomnia, constipation, rash, dizziness, fever, headache. **Rare (less than 2%):** Altered taste, vaginal candidiasis, fungal infection, tongue discoloration.

ADVERSE EFFECTS/ TOXIC REACTIONS

Thrombocytopenia, myelosuppression occur rarely. Antibiotic-associated colitis, other superinfections (abdominal cramps, severe watery diarrhea, fever) may result from altered bacterial balance in GI tract.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain appropriate culture specimens for sensitivity testing prior to therapy. Obtain baseline CBC, chemistries.

INTERVENTION/EVALUATION

Monitor daily pattern of bowel activity, stool consistency. Mild GI effects may be tolerable, but increasing severity may indicate onset of antibiotic-associated colitis. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema). Monitor CBC, platelets, Hgb, chemistries.

PATIENT/ FAMILY TEACHING

• Continue therapy for full length of treatment. • Doses should be evenly spaced. • May cause GI upset (may take with food, milk). • Excessive amounts of tyramine-containing foods (red wine, aged cheese) may cause severe reaction (severe headache, neck stiffness, diaphoresis, palpitations). • Avoid alcohol. • Report persistent diarrhea, nausea, vomiting.

vomiting, dizziness, nervousness, dyspepsia. **Rare (less than 6%):** Weakness, decreased appetite.

ADVERSE EFFECTS/ TOXIC REACTIONS

Serious hypoglycemia may occur when used concurrently with insulin analogue (e.g., sulfonylurea); consider lowering dose.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check blood glucose concentration before administration. Discuss pt's lifestyle to determine extent of learning, emotional needs. Ensure follow-up instruction if pt/family does not thoroughly understand diabetes management or glucose testing technique. Dose is gradually increased to improve GI tolerance.

INTERVENTION/EVALUATION

Monitor blood glucose level, food intake. Assess for hypoglycemia (cool wet skin, tremors, dizziness, anxiety, headache, tachycardia, numbness in mouth, hunger, diplopia) or hyperglycemia (polyuria, polyphagia, polydipsia, nausea, vomiting, dim vision, fatigue, deep rapid breathing). Be alert to conditions that alter glucose requirements (fever, increased activity/stress, surgical procedures). Consider lowering dose of insulin analogue to reduce risk of hypoglycemia.

PATIENT/FAMILY TEACHING

• Diabetes mellitus requires lifelong control. • Prescribed diet, exercise are principal parts of treatment; do not skip/delay meals. • Continue following dietary instructions, regular exercise program, regular testing of blood glucose level. • Serious hypoglycemia may occur when used concurrently with insulin analogue (e.g., sulfonylurea). • Have source of glucose available to treat symptoms of low blood sugar.

lisdexamfetamine

lis-dex-am-**fet**-a-meen
(Vyvanse)

■ **BLACK BOX ALERT** ■ Potential for drug abuse dependency exists.
Do not confuse lisdexamfetamine with dextroamphetamine, or Vyvanse with Glucovance, Vivactil, or Vytorin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Amphetamine **(Schedule II). CLINICAL:** CNS stimulant.

USES

Treatment of attention deficit hyperactivity disorder (ADHD), moderate to severe binge eating disorder (BED).

PRECAUTIONS

Contraindications: Concurrent use or within 2 wks of use of MAOI. **Cautions:** Hyperthyroidism, glaucoma, agitated states, cardiovascular conditions (hypertension, recent MI, ventricular arrhythmias), elderly, psychiatric/seizures. Avoid use in pts with serious structural cardiac abnormalities, cardiomyopathy, arrhythmias, CAD. History of alcohol or drug abuse.

ACTION

Enhances action of dopamine, norepinephrine by blocking reuptake from synapses, increasing levels in extraneuronal space. **Therapeutic Effect:** Improves attention span in ADHD.

PHARMACOKINETICS

Rapidly absorbed. Converted to dextroamphetamine. Excreted in urine. **Half-life:** Less than 1 hr.

or Zestril with Desyrel, Restoril, Vistaril, Zetia, or Zostrix. Do not confuse lisinopril's combination form Zestoretic with Prilosec.

FIXED-COMBINATION(S)

Prinzide/Zestoretic: lisinopril/hydrochlorothiazide (a diuretic): 10 mg/12.5 mg, 20 mg/12.5 mg, 20 mg/25 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: ACE inhibitor. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension. Used alone or in combination with other antihypertensives. Adjunctive therapy in management of heart failure. Treatment of acute MI within 24 hrs in hemodynamically stable pts to improve survival. Treatment of left ventricular dysfunction following MI.

L

PRECAUTIONS

Contraindications: History of angioedema from treatment with ACE inhibitors, idiopathic or hereditary angioedema. Concomitant use with aliskiren in pts with diabetes. **Cautions:** Renal impairment, unstented unilateral/bilateral renal artery stenosis, volume depletion, ischemic heart disease, cerebrovascular disease, severe aortic stenosis, hypertrophic cardiomyopathy. Concomitant use of potassium supplements.

ACTION

Suppresses renin-angiotensin-aldosterone system (prevents conversion of angiotensin I to angiotensin II, a potent vasoconstrictor; may inhibit angiotensin II at local vascular, renal sites). Decreases plasma angiotensin II, increases plasma renin activity, decreases aldosterone secretion. **Therapeutic Effect:** Reduces blood pressure.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1 hr	6 hrs	24 hrs

Incompletely absorbed from GI tract. Protein binding: 25%. Primarily excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 12 hrs (increased in renal impairment).

lithium

lith-ee-um
(Apo-Lithium, Duralith, Lithobid)

■ **BLACK BOX ALERT** ■ Lithium toxicity is closely related to serum lithium levels and can occur at therapeutic doses. Routine determination of serum lithium levels is essential during therapy.

Do not confuse Lithobid with Levbid or Lithostat.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Psychotherapeutic. **CLINICAL:** Antimanic, antidepressant, vascular headache prophylactic.

L

USES

Management of bipolar disorder. Treatment of mania in pts with bipolar disorder. **OFF-LABEL:** Aggression, post-traumatic stress disorder, conduct disorder in children. Augmenting agent for depression.

PRECAUTIONS

Contraindications: Debilitated pts, severe cardiovascular disease, severe dehydration, severe renal disease, severe sodium depletion or dehydration. **Cautions:** Mild to moderate cardiovascular disease, thyroid disease, elderly, mild to moderate renal impairment, medications altering sodium excretion, pregnancy, pts at risk for suicide, pts with significant fluid loss, pts receiving neuroleptic medications.

ACTION

Changes cation transport across cell membrane in nerve/muscle cells; influences reuptake of serotonin/norepinephrine. **Therapeutic Effect:** Produces antimanic, antidepressant effects.

PHARMACOKINETICS

Rapidly, completely absorbed from GI tract. Protein binding: None. Primarily excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 18–24 hrs (increased in elderly).

lomitapide

lom-i-**ta**-pide
(Juxtapid)
Do not confuse lomitapide with loperamide.

■ **BLACK BOX ALERT** ■ May cause hepatotoxicity. May cause hepatic steatosis (increase in hepatic fat) regardless of ALT, AST elevation; may be risk factor for progressive hepatic disease, including steatohepatitis and cirrhosis. Treatment only available through restricted program under the Risk Evaluation and Mitigation Strategy (REMS) named JUXTAPID REMS PROGRAM.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Microsomal triglyceride transfer protein inhibitor. **CLINICAL:** Antihyperlipidemic.

L

USES

Treatment of homozygous familial hypercholesterolemia (HoFH) in combination with low-fat diet and other lipid-lowering therapies, including LDL-C apheresis, to reduce LDL, total cholesterol, apoprotein B, non–HDL-C.

PRECAUTIONS

Contraindications: Pregnancy (Pregnancy Category X), breastfeeding, moderate to severe hepatic impairment, active hepatic disease including unexplained persistent elevation of serum transaminases, concomitant use of strong CYP3A4 inhibitors (e.g., ketoconazole, protease inhibitors). **Cautions:** Mild to moderate renal impairment, end-stage renal disease, mild hepatic impairment, alcohol consumption, avoid use in pts with history of glucose-galactose malabsorption, other agents having hepatotoxic potential (e.g., acetaminophen).

ACTION

Inhibits microsomal triglyceride transfer protein in lumen of endoplasmic reticulum. Prevents assembly of apo-B-containing lipoproteins in enterocytes, hepatocytes; inhibits synthesis of chylomicrons, very low density lipoprotein (VLDL). **Therapeutic Effect:** Decreases plasma low-density lipoprotein cholesterol (LDL-C).

PHARMACOKINETICS

Well absorbed in GI tract. Metabolized in liver. Protein binding: 99%. Peak plasma concentration: 6 hrs. Primarily excreted in feces. **Half-life:** 40 hrs.

age change, then every month for first year when maintenance goal reached, then every 3 mos. Obtain EKG for palpitations, shortness of breath, dizziness. Monitor for bruising, hematuria, jaundice, right upper abdominal pain, fever, lethargy, melena.

PATIENT/FAMILY TEACHING

• Avoid pregnancy. • Use appropriate contraception measures, including barrier precautions (Pregnancy Category X). • If pregnancy occurs, inform physician immediately. • Diarrhea may decrease effectiveness of oral contraception. • Do not breastfeed. • Maintain low-fat diet. • Report yellowing of skin, bruising, black/tarry stool, right upper quadrant pain, fever, lethargy, chest pain, palpitations. • Avoid alcohol. • Avoid grapefruit products. • Do not chew, crush, or open capsules. • Report any newly prescribed medications.

lomustine

HIGH ALERT

loe-mus-teen
(CeeNU)

■ **BLACK BOX ALERT** ■ Must be administered by certified chemotherapy personnel. Severe myelosuppressant (notably thrombocytopenia, leukopenia). May lead to bleeding, overwhelming infection.

Do not confuse lomustine with bendamustine or carmustine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Alkylating agent (nitrosourea). **CLINICAL:** Antineoplastic.

USES

Treatment of primary/metastatic brain tumors (after surgery and/or radiation therapy), relapsed or refractory Hodgkin's lymphoma (as part of combination chemotherapy). **OFF-LABEL:** Treatment of gastric cancer, metastatic melanoma.

PRECAUTIONS

Contraindications: None known. **Cautions:** Depressed platelet, leukocyte, erythrocyte counts; renal/hepatic impairment.

ACTION

Inhibits DNA, RNA protein synthesis by cross-linking with DNA and RNA strands, preventing cell division. Cell cycle–phase nonspecific. **Therapeutic Effect:** Interferes with DNA, RNA function.

PHARMACOKINETICS

Rapidly, completely absorbed following PO administration. Highly lipid soluble. Metabolized in liver. Excreted in urine. **Half-life:** 16–72 hrs.

A-D, Loperacap, Novo-Loperamide)
Do not confuse Imodium with Indocin, or loperamide with furosemide.

FIXED-COMBINATION(S)

Imodium Advanced: loperamide/simethicone (an antiflatulent): 2 mg/125 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Antidiarrheal agent. **CLINICAL:** Antidiarrheal.

USES

Controls, provides symptomatic relief of acute nonspecific diarrhea, chronic diarrhea associated with inflammatory bowel disease, traveler's diarrhea. **OFF-LABEL:** Chemotherapy-induced diarrhea, chronic diarrhea caused by bowel resection.

L

PRECAUTIONS

Contraindications: Abdominal pain without diarrhea, children younger than 2 yrs of age. **Cautions:** Hepatic impairment, use in young children.

ACTION

Directly affects intestinal wall muscles through opioid receptor. **Therapeutic Effect:** Slows intestinal motility, prolongs transit time of intestinal contents by reducing fecal volume, diminishing loss of fluid, electrolytes, increasing viscosity, bulk of stool. Increases tone of anal sphincter.

PHARMACOKINETICS

Poorly absorbed from GI tract. Protein binding: 97%. Metabolized in liver. Eliminated in feces; excreted in urine. Not removed by hemodialysis. **Half-life:** 7–14 hrs.

feces. Not removed by hemodialysis.
Half-life: 5–6 hrs.

(Claritin): 5 mg. **Tablets (Orally Disintegrating [Alavert]):** 10 mg.

ADMINISTRATION/HANDLING

PO

• May take without regard for food.

Orally Disintegrating Tablets

• Place under tongue. • Disintegration occurs within seconds, after which tablet contents may be swallowed with or without water.

INDICATIONS/ROUTES/DOSAGE

Allergic Rhinitis, Urticaria

PO: ADULTS, ELDERLY, CHILDREN 6 YRS AND OLDER: 10 mg once daily. **CHILDREN 2–5 YRS:** 5 mg once daily.

Dosage in Renal (Creatinine Clearance Less Than 30 ml/min)/Hepatic Impairment

PO: ADULTS, ELDERLY, CHILDREN 6 YRS AND OLDER: 10 mg every other day. **CHILDREN 2–5 YRS:** 5 mg every other day.

SIDE EFFECTS

Frequent (12%–8%): Headache, fatigue, drowsiness. **Occasional (3%):** Dry mouth, nose, throat. **Rare:** Photosensitivity.

ADVERSE EFFECTS/ TOXIC REACTIONS

None significant.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess lung sounds for wheezing, skin for urticaria, other allergy symptoms.

INTERVENTION/EVALUATION

For upper respiratory allergies, increase fluids to decrease viscosity of secretions, offset thirst, replenish loss of fluids from increased diaphoresis. Monitor symptoms for therapeutic response.

PATIENT/FAMILY TEACHING

• Drink plenty of water (may cause dry mouth). • Avoid alcohol. • Avoid tasks that require alertness, motor skills until response to drug is established (may cause drowsiness). • May cause photosensitivity reactions (avoid direct exposure to sunlight).

lorazepam

lor-**az**-e-pam
(Apo-Lorazepam, Ativan, Lorazepam Intensol, Novo-Lorazem)
Do not confuse Ativan with Ambien or Atarax, or lorazepam with alprazolam, diazepam, Lovaza, temazepam, or Zolpidem.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Benzodiazepine **(Schedule IV). CLINICAL:** Antianxiety, sedative-hypnotic, antiemetic, skeletal muscle relaxant, amnesiac, anticonvulsant, antitremor.

USES

PO: Management of anxiety disorders, short-term relief of symptoms of anxiety, anxiety associated with depressive symptoms. Insomnia due to anxiety or transient stress; adjunct to antiemetics. **IV:** Status epilepticus, preanesthesia for amnesia, sedation. **OFF-LABEL:** Treatment of alcohol withdrawal, psychogenic catatonia, partial complex seizures, agitation (IV administration only), antiemetic for chemotherapy; rapid tranquilization of agitated pt, status epilepticus in children.

PRECAUTIONS

Contraindications: Acute narrow-angle glaucoma, IV administration in pts with sleep apnea, severe respiratory depression (except during mechanical ventilation). **Cautions:** Neonates, renal/hepatic impairment, compromised pulmonary function, concomitant CNS depressant use. Depression, history of drug dependence, alcohol abuse, or significant personality disorder.

Antiemetic
IV: ADULTS, ELDERLY: 0.5–2 mg q4–6h as needed. **CHILDREN 2–15 YRS:** 0.04–0.08 mg/kg (up to 4 mg) prior to chemotherapy.
PO: ADULTS, ELDERLY: 0.5–2 mg q4–6h as needed.

Status Epilepticus
IV: ADULTS, ELDERLY: 4 mg over 2–5 min. May repeat in 5–10 min. **CHILDREN:** 0.05–0.1 mg/kg over 2–5 min. **Maximum:** 4 mg. May repeat in 5–10 min. **NEONATES:** 0.05 mg/kg over 2–5 min. May repeat in 10–15 min.

Dosage in Renal/Hepatic Impairment
Use caution.

SIDE EFFECTS

Frequent (16%–7%): Drowsiness, dizziness. **Rare (less than 4%):** Weakness, ataxia, headache, hypotension, nausea, vomiting, confusion, injection site reaction.

ADVERSE EFFECTS/ TOXIC REACTIONS

Abrupt or too-rapid withdrawal may result in pronounced restlessness, irritability, insomnia, hand tremor, abdominal cramping, muscle cramps, diaphoresis, vomiting, seizures. Overdose results in drowsiness, confusion, diminished reflexes, coma. **Antidote:** Flumazenil (see Appendix K for dosage).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Offer emotional support to anxious pt. Pt must remain recumbent following parenteral administration to reduce hypotensive effect. Assess motor responses (agitation, trembling, tension), autonomic responses (cold or clammy hands, diaphoresis).

INTERVENTION/EVALUATION

Monitor B/P, respiratory rate, heart rate. For those on long-term therapy, hepatic/renal function tests, CBC should be performed periodically. Assess for paradoxical reaction, particularly during early therapy. Evaluate for therapeutic response: calm facial expression, decreased restlessness, insomnia. **Therapeutic serum level:** 50–240 ng/ml; **toxic serum level:** N/A.

PATIENT/ FAMILY TEACHING

• Drowsiness usually subsides during continued therapy. • Avoid tasks that require alertness, motor skills until response to drug is established. • Smoking reduces drug effectiveness. • Do not abruptly discontinue medication after long-term therapy. • Do not use alcohol, CNS depressants. • Contraception recommended for long-term therapy. • Immediately report suspected pregnancy.

lorcaserin

lor-**kas**-er-in
(Belviq)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin receptor agonist. **CLINICAL:** Weight loss agent.

USES

Adjunct to reduced-calorie diet and increased physical activity for chronic weight management in adults with an initial body mass index (BMI) of 30 kg/m^2 or greater (obese), or 27 kg/m^2 or greater (overweight) with at least one weight-related comorbid condition (e.g., hypertension, dyslipidemia, type 2 diabetes).

PRECAUTIONS

Contraindications: Pregnancy (Pregnancy Category X). **Cautions:** Use in those with severe renal impairment, end-stage renal disease is not recommended. Concurrent use with medications that affect serotonergic neurotransmitter system (particularly during initiation of therapy and dose

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Ensure negative pregnancy test prior to initiating treatment. Obtain baseline chemistries, particularly renal function, LFT. Obtain weight, BMI.

INTERVENTION/EVALUATION

In trials, most patients lost at least 5% of their body weight over a year, and a further one third lost at least 10%. Most pts who develop signs or symptoms of valvular cardiac disease, including dyspnea, dependent edema, HF, or a new cardiac murmur while on medication; pts should be consistently monitored; discontinuation of treatment may be necessary.

PATIENT/FAMILY TEACHING

• Discontinue therapy if 5% weight loss has not been achieved by 12 wks of treatment. • High-fiber, low-fat diet decreases fat evacuation. • Avoid tasks that require alertness, motor skills until response to drug is established. • Swallow whole. Do not break, chew, dissolve, or divide tablets.

losartan

loe-**sar**-tan
(Apo-Losartan, Cozaar)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

Do not confuse Cozaar with Colace, Coreg, Hyzaar, or Zocor, or losartan with lorcaserin, valsartan.

FIXED-COMBINATION(S)

Hyzaar: losartan/hydrochlorothiazide (a diuretic): 50 mg/12.5 mg, 100 mg/12.5 mg, 100 mg/25 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Angiotensin II receptor antagonist. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension. Used alone or in combination with other antihypertensives. Treatment of diabetic nephropathy (in pts with type 2 diabetes and hypertension), prevention of stroke in pts with hypertension and left ventricular hypertrophy. **OFF-LABEL:** Slow rate of progression of aortic root dilation in children with Marfan's syndrome. HF in pts intolerant of ACE inhibitors.

PRECAUTIONS

Contraindications: Concomitant use of aliskiren in pts with diabetes. **Cautions:** Renal/hepatic impairment, unstented renal arterial stenosis, significant aortic/mitral stenosis. Concurrent use of potassium supplements.

ACTION

Blocks vasoconstrictor, aldosterone-secreting effects of angiotensin II, inhibiting binding of angiotensin II to AT_1 receptors. **Therapeutic Effect:** Causes vasodilation, decreases peripheral resistance, decreases B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	N/A	6 hrs	24 hrs

Well absorbed after PO administration. Protein binding: 98%. Metabolized in liver. Eliminated in urine (35%), feces (60%). Not removed by hemodialysis. **Half-life:** 2 hrs; metabolite, 6–9 hrs.

or pravastatin, or Mevacor with Benicar or Lipitor.

FIXED-COMBINATION(S)

Advicor: lovastatin/niacin: 20 mg/500 mg, 20 mg/750 mg, 20 mg/1,000 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: HMG-CoA reductase inhibitor. **CLINICAL:** Antihyperlipidemic.

USES

Decreases elevated serum total and LDL cholesterol in primary hypercholesterolemia; primary prevention of coronary artery disease. Slows progression of coronary atherosclerosis in pts with coronary heart disease. Adjunct to diet in adolescent pts (10–17 yrs) with heterozygous familial hypercholesterolemia.

L

PRECAUTIONS

Contraindications: Active hepatic disease, pregnancy, unexplained elevated LFT. Pregnancy, breastfeeding. Concomitant use of strong CYP3A4 inhibitors. **Cautions:** History of heavy/chronic alcohol use, renal impairment, previous history of hepatic disease; concomitant use of amiodarone, cyclosporine, fibrates, gemfibrozil, niacin, verapamil (increased risk of myopathy).

ACTION

Inhibits HMG-CoA reductase, the enzyme that catalyzes the early step in cholesterol synthesis. **Therapeutic Effect:** Decreases LDL, VLDL, triglycerides; increases HDL.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (LDL, cholesterol reduction)	3 days	N/A	N/A

Incompletely absorbed from GI tract (increased on empty stomach). Protein binding: 95%. Hydrolyzed in liver. Primarily eliminated in feces. Not removed by hemodialysis. **Half-life:** 1.1–1.7 hrs.

of stool, alleviating symptoms associated with chronic idiopathic constipation.

PHARMACOKINETICS

Rapidly, extensively metabolized within stomach and jejunum. Minimal distribution beyond GI tissue. Protein binding: 94%. Excreted in urine (60%), feces (30%). **Half-life:** 0.9–1.4 hrs.

lurasidone

loo-**ras**-i-done
(Latuda)

■ **BLACK BOX ALERT** ■ Elderly pts with dementia-related psychosis are at increased risk for mortality due to cardiovascular events, infectious diseases. Increased risk of suicidal thinking/behavior in children, adolescents, young adults.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Dopamine, serotonin receptor antagonist.
CLINICAL: Antipsychotic.

USES

Treatment of schizophrenia. Depression associated with bipolar-1 disorder as monotherapy and as adjunctive therapy with lithium or valproate.

L

PRECAUTIONS

Contraindications: Strong CYP3A4 inhibitors (e.g., ketoconazole) and inducers (e.g., rifampin). **Cautions:** Cardiovascular disease (HF, history of MI, ischemia, conduction abnormalities), cerebrovascular disease (history of CVA in pts with dementia, seizure disorders). Diabetes mellitus. Parkinson's disease, renal/hepatic impairment, pts at risk for aspiration pneumonia, pts at risk for suicide, disorders where CNS depression is a feature, pts at risk for hypotension, elderly.

ACTION

Antagonizes central dopamine type 2 and serotonin type 2 receptors. **Therapeutic Effect:** Diminishes symptoms of schizophrenia. Reduces incidence of extrapyramidal side effects.

PHARMACOKINETICS

Absorbed in 1–3 hrs. Steady-state concentration occurs in 7 days. Well absorbed from GI tract (unaffected by food). Protein binding: 99%. Metabolized in liver. Excreted in feces (80%), urine (9%). **Half-life:** 18 hrs.

function of T lymphocytes, which are responsible for cell-mediated and humoral immunity. Stimulates release of hematopoietic growth factors. **Therapeutic Effect:** Prevents allograft rejection; treats aplastic anemia.

PHARMACOKINETICS

Unknown absorption, metabolism, elimination. **Half-life:** Approximately 5–7 days.

Generic Drugs M

macitentan
magnesium
magnesium chloride
magnesium citrate
magnesium hydroxide
magnesium oxide
magnesium protein complex
magnesium sulfate
mannitol
maraviroc
meclizine
medroxyPROGESTERone
megestrol
meloxicam
melphalan
memantine
meperidine
meropenem
mesalamine (5-aminosalicylic acid, 5-ASA)
mesna
metaxalone
metformin
methadone
methocarbamol
methotrexate
methylergonovine
methylnaltrexone
methylphenidate
methylPREDNISolone
methylPREDNISolone acetate
methylPREDNISolone-sodium succinate
metoclopramide
metolazone
metoprolol
metreleptin
metronidazole
micafungin
miconazole
midazolam
midodrine
mifepristone
milnacipran
milrinone
minocycline
minoxidil
mipomersen
mirabegron
mirtazapine
misoprostol
mitomycin
mitoxantrone
modafinil
mometasone
mometasone furoate
montelukast
morphine
moxifloxacin
mupirocin
mycophenolate

device (IUD) or oral contraceptive, plus barrier methods. Unknown if distributed in breast milk. Must either discontinue drug or discontinue breastfeeding. **Males:** May induce atrophy of seminiferous tubules of the testes, reduce sperm count, cause male infertility. **Pregnancy Category X. Children:** Safety and efficacy not established. **Elderly:** No age-related precautions noted.

INTERACTIONS

DRUG: Strong **CYP3A4 inducers (e.g., rifampin)** may decrease concentration/effects. Strong **CYP3A4 inhibitors (e.g., ketoconazole, ritonavir)** may increase concentration/effects. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase serum ALT, AST, bilirubin. May decrease Hgb, Hct.

AVAILABILITY (Rx)

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, LFT. Confirm negative pregnancy status before initiating treatment (Pregnancy Category X). Receive full medication history.

INTERVENTION/EVALUATION

Monitor renal function, LFT, Hgb, Hct routinely. Monitor pregnancy status every mo during treatment and for 1 mo after discontinuation. Notify physician to obtain CXR if difficulty in breathing occurs and screen for veno-occlusive disease or pulmonary embolism. Monitor for jaundice, right upper abdominal pain, amber-colored urine, bruising.

PATIENT/FAMILY TEACHING

• May cause fetal harm. Immediately report suspected pregnancy. • Do not breastfeed. • Do not have unprotected sexual intercourse if taking only oral hormonal birth control. Consult with gynecologist for appropriate birth control methods. • Report any yellowing of skin or eyes, abdominal pain, bruising, black/tarry stools, dark urine, decreased urine output. • Swallow tablets whole; do not chew, crush, dissolve, or divide.

M

magnesium

HIGH ALERT

mag-**nee**-zee-um

magnesium chloride

(Mag-Delay, Slow-Mag)

magnesium citrate

(Citroma, Citro-Mag)

magnesium hydroxide

(Phillips Milk of Magnesia)

magnesium oxide

(Mag-Ox 400, Uro-Mag)

magnesium protein complex

(Mg-PLUS)

magnesium sulfate

(Epsom salt, magnesium sulfate injection)

Do not confuse magnesium sulfate with morphine sulfate.

FIXED-COMBINATION(S)

With aluminum, an antacid **(Aludrox, Delcid, Gaviscon, Maalox);** with aluminum and simethicone, an antiflatulent **(Di-Gel, Gelusil, Maalox Plus, Mylanta);** with aluminum and calcium, an antacid **(Camalox);** with mineral oil, a lubricant laxative **(Haley's MO);** with magnesium oxide and aluminum oxide, an antacid **(Riopan).**

◆CLASSIFICATION

CLINICAL: Antacid, anticonvulsant, electrolyte, laxative.

USES

Magnesium chloride: Dietary supplement. **Magnesium citrate:** Evacuation of bowel before surgical, diagnostic procedures. **Magnesium hydroxide:** Short-term treatment of constipation, symptoms of hyperacidity, laxative. **Magnesium oxide:** Magnesium replacement, dietary supplement. **Magnesium sulfate:** Treatment/prevention of hypomagnesemia; prevention and treatment of seizures in severe preeclampsia or eclampsia; pediatric acute nephritis, treatment of arrhythmias due to hypomagnesemia (ventricular fibrillation, ventricular tachycardia, or torsades de points [a typical ventricular tachycardia]). **OFF-LABEL: Magnesium sulfate:** Asthma exacerbation unresponsive to conventional treatment.

Storage • Store at room temperature.

IM

• For adults, elderly, use 250 mg/ml (25%) or 500 mg/ml (50%) magnesium sulfate concentration. • For infants, children, do not exceed 200 mg/ml (20% diluted solution).

PO (Antacid)

• Shake suspension well before use. • Chewable tablets should be chewed thoroughly before swallowing, followed by full glass of water.

PO (Laxative)

• Drink full glass of liquid (8 oz) with each dose (prevents dehydration). • Flavor may be improved by following with fruit juice, citrus carbonated beverage. • Refrigerate citrate of magnesia (retains potency, palatability).

IV INCOMPATIBILITIES

Amphotericin B complex (Abelcet, AmBisome, Amphotec), cefepime (Maxipime), lansoprazole (Prevacid), pantoprazole (Protonix).

IV COMPATIBILITIES

Amikacin (Amikin), cefazolin (Ancef), ciprofloxacin (Cipro), dexmedetomidine (Precedex), dobutamine (Dobutrex), enalapril (Vasotec), gentamicin, heparin, hydromorphone (Dilaudid), insulin, linezolid (Zyvox), metoclopramide (Reglan), milrinone (Primacor), morphine, piperacillin/tazobactam (Zosyn), potassium chloride, propofol (Diprivan), tobramycin (Nebcin), vancomycin (Vancocin).

INDICATIONS/ROUTES/DOSAGE

Hypomagnesemia

Magnesium sulfate

Mild Deficiency

IM: ADULTS, ELDERLY: 1 g q6h for 4 doses.

Severe Deficiency

IM: ADULTS, ELDERLY: Up to 250 mg/kg over 4 hrs.

IV: ADULTS, ELDERLY: 1–2 g/hr for 3–6 hrs, then 0.5–1 g/hr as needed to correct deficiency. **CHILDREN:** 25–50 mg/kg/dose q4–6h for 3–4 doses.

Symptomatic Deficiency

IV: ADULTS, ELDERLY: 1–2 g over 5–60 min.

Usual Dose for Children

IM/IV: 25–50 mg/kg/dose q4–6h for 3–4 doses. **Maximum single dose:** 2 g.

Usual Dose for Neonates

IM/IV: 25–50 mg/kg/dose q8–12h for 2–3 doses.

Eclampsia

IV: ADULTS: 4–5 g infusion, then 1–2 g/hr continuous infusion. **Maximum:** 40 g/24 hrs.

Hypertension, Seizures

IV, IM *(Magnesium Sulfate)*: ADULTS, ELDERLY: 1 g q6h for 4 doses as needed. **CHILDREN:** 20–100 mg/kg/dose q4–6h as needed.

Arrhythmias, Torsade de Pointes

IV *(Magnesium Sulfate)*: ADULTS, ELDERLY: Initially, 1–2 g over 15 min. **CHILDREN:** 25–50 mg/kg/dose.

Bronchodilation

IV *(Magnesium Sulfate)*: ADULTS, ELDERLY: 2 g as a single dose. **CHILDREN:** 25–75 mg/kg/dose as a single dose.

Constipation

PO *(Magnesium Hydroxide)*: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 6–8 tablets or 30–60 ml/day (400 mg/5 ml). **CHILDREN 6–11 YRS:** 3–4 tablets or 15–30 ml/day (400 mg/5 ml). **CHILDREN 2–5 YRS:** 1–2 tablets or 5–15 ml/day (400 mg/5 ml).

Hyperacidity

PO *(Magnesium Hydroxide)*: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 2–4 tablets or 5–15 ml as needed up to 4 times/day.

mannitol

man-it-ol
(Aridol, Osmitrol)
Do not confuse Osmitrol with esmolol.

■ **BLACK BOX ALERT** ■ May result in severe bronchospasm. Not recommended in pts with asthma.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Polyol (sugar alcohol). **CLINICAL:** Osmotic diuretic.

USES

Prevention, treatment of oliguric phase of acute renal failure (before evidence of permanent renal failure). Reduces increased ICP due to cerebral edema; IOP due to acute glaucoma. Promotes urinary excretion of toxic substances. **OFF-LABEL:** Improves renal transplant function.

M

PRECAUTIONS

Contraindications: Severe dehydration, active intracranial bleeding (except during craniotomy), severe pulmonary edema, congestion, severe renal disease (anuria), progressive HF. **Cautions:** Concurrent nephrotoxic agents, conditions increasing sensitivity to bronchoconstriction, sepsis, preexisting renal disease, hypernatremia.

ACTION

Elevates osmotic pressure of glomerular filtrate, inhibiting tubular reabsorption of water and electrolytes, resulting in increased urine output. Reduces intracranial pressure by decreasing blood viscosity, thereby increasing cerebral blood flow/oxygen transport. **Therapeutic Effect:** Produces diuresis; reduces intraocular pressure (IOP), intracranial pressure (ICP), cerebral edema.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV (diuresis)	1–3 hrs	N/A	—
IV (reduced ICP)	15–30 min	N/A	1.5–6 hrs

Remains in extracellular fluid. Primarily excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 4.7 hrs.

inhibitors or inducers. **Cautions:** Mild to moderate hepatic/renal impairment, history of orthostatic hypotension, hepatitis B or C, concurrent medication known to lower B/P, pts at increased risk for cardiovascular events.

ACTION

Binds to human chemokine receptor (CCR5), present on CD-4 and T-cell membranes, preventing interaction of HIV-1 and CCR5, necessary for HIV-1 to enter cells. **Therapeutic Effect:** Decreased invasion of HIV-1 virus into cells.

PHARMACOKINETICS

Variably absorbed following PO administration. Protein binding: 76%. Metabolized in liver. Eliminated in feces (76%), urine (20%). **Half-life:** 14–18 hrs.

INDICATIONS/ROUTES/DOSAGE

Motion Sickness

PO: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 25–50 mg 1 hr before travel. May repeat q12–24h.

Vertigo

PO: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 25–100 mg/day in divided doses, as needed.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Drowsiness. **Occasional:** Blurred vision, dry mouth, nose, throat.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reaction (eczema, pruritus, rash, cardiac disturbances, photosensitivity) may occur. Overdose may vary from CNS depression (sedation, apnea, cardiovascular collapse, death) to severe paradoxical reaction (hallucinations, tremor, seizures). Children may experience paradoxical reaction (restlessness, insomnia, euphoria, anxiety, tremors). Overdose in children may result in hallucinations, seizures, death.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess degree of nausea/vomiting, degree of vertigo.

INTERVENTION/EVALUATION

Monitor B/P, esp. in elderly (increased risk of hypotension). Monitor children closely for paradoxical reaction. Monitor serum electrolytes in pts with severe vomiting. Assess skin turgor, mucous membranes to evaluate hydration status.

PATIENT/FAMILY TEACHING

- Avoid tasks that require alertness, motor skills until response to drug is established. • Dry mouth, drowsiness, dizziness may be an expected response to drug; • Tolerance to sedative effect may occur. • Avoid alcohol. • Sugarless gum, sips of water may relieve dry mouth. • Coffee, tea may help reduce drowsiness.

*medroxyPROGESTERone

me-**drox**-ee-proe-**jes**-ter-one (Apo-Medroxy, Depo-Provera, Depo-SubQ Provera 104, Novo-Medrone, Provera)

■ **BLACK BOX ALERT** ■ Prolonged use (over 2 yrs) of contraceptive injection form may result in loss of bone mineral density. Limit long-term use (more than 2 yrs). May increase risk of dementia in postmenopausal women. Increased risk of invasive breast cancer in postmenopausal women in combination with conjugated estrogens.

Do not confuse medroxyprogesterone with hydroxyprogesterone, methylprednisolone, or methyltestosterone, or Provera with Covera, Femara, Parlodel, or Premarin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Hormone. **CLINICAL:** Progestin, antineoplastic, contraceptive hormone.

USES

PO: Reduction of endometrial hyperplasia in nonhysterectomized postmenopausal women (concurrently given with estrogen to women with intact uterus), treatment of secondary amenorrhea, abnormal uterine bleeding due to hormonal imbalance. **IM:** Adjunctive therapy, palliative treatment of inoperable, recurrent, metastatic endometrial carcinoma; prevention of pregnancy, endometriosis-associated pain. **OFF-LABEL:** Treatment

of low-grade endometrial, stromal carcinoma.

PRECAUTIONS

Contraindications: Carcinoma of breast, or other progesterone-dependent or estrogen-dependent neoplasm, history of or active thrombotic disorders (cerebral apoplexy, thrombophlebitis, thromboembolic disorders), known or suspected pregnancy, missed abortion, severe hepatic impairment, undiagnosed abnormal vaginal bleeding, cerebrovascular disease, use as pregnancy test. **Cautions:** Those with conditions aggravated by fluid retention (asthma, seizures, migraine, cardiac/renal dysfunction), diabetes, history of mental depression, preexisting hypertriglyceridemia.

ACTION

Inhibits secretion of pituitary gonadotropins. **Therapeutic Effect:** Prevents follicular maturation, ovulation.

PHARMACOKINETICS

Well absorbed after PO administration. Slowly absorbed after IM administration. Protein binding: 90%. Metabolized in liver. Primarily excreted in urine. **Half-life:** **PO:** 12–17 hrs. **IM:** 40–50 days.

Subcutaneous ***(Depo-Subq Provera 104)*****: ADULTS:** 104 mg q3mos (q12–14wks).

Endometriosis-Associated Pain

Subcutaneous ***(Depo-Subq Provera 104)*****: ADULTS:** 104 mg q3mos (q12–14 wks) for up to 2 yrs.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Contraindicated with severe impairment.

SIDE EFFECTS

Frequent: Transient menstrual abnormalities (spotting, change in menstrual flow/cervical secretions, amenorrhea) at initiation of therapy. **Occasional:** Edema, weight change, breast tenderness, anxiety, insomnia, fatigue, dizziness. **Rare:** Alopecia, depression, dermatologic changes, headache, fever, nausea.

M

ADVERSE EFFECTS/ TOXIC REACTIONS

Thrombophlebitis, pulmonary/cerebral embolism, retinal thrombosis occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain usual menstrual history. Question for hypersensitivity to progestins, possibility of pregnancy before initiating therapy (Pregnancy Category X). Obtain baseline weight, serum glucose, B/P.

INTERVENTION/EVALUATION

Check weight daily; report weekly gain of 5 lb or more. Assess B/P periodically. Assess skin for rash, urticaria. Report development of chest pain, sudden shortness of breath, sudden decrease in vision, migraine headache, pain (esp. with swelling, warmth, redness) in calves, numbness of arm/leg (thrombotic disorders) immediately.

PATIENT/FAMILY TEACHING

• Report sudden loss of vision, severe headache, chest pain, coughing up of blood (hemoptysis), numbness in arm/leg, severe pain/swelling in calf, unusual heavy vaginal bleeding, severe abdominal pain/tenderness. • Depo-Provera Contraceptive injection should be used as long-term birth control method (e.g., longer than 2 yrs) only if other birth control methods are inadequate.

megestrol

HIGH ALERT

meh-**jes**-trol

(Apo-Megestrol, Megace, Megace ES, Megace OS)

Do not confuse megestrol with mesalamine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Synthetic hormone. **CLINICAL:** Antineoplastic, progestin.

USES

Palliative treatment of advanced endometrial or breast carcinoma; treatment of anorexia, cachexia, unexplained significant weight loss in pts with AIDS.

PRECAUTIONS

Contraindications: Suspension: Known or suspected pregnancy, concomitant use with dofetilide. **Cautions:** History of thrombophlebitis, diabetes, elderly.

ACTION

Antiestrogenic; interferes with normal estrogen cycle by decreasing release of luteinizing hormone (LH) from anterior pituitary gland by inhibiting pituitary function. May increase appetite by antagonizing metabolic effects of catabolic cytokines. **Therapeutic Effect:** Reduces tumor size. Increases appetite.

CLASSIFICATION

PHARMACOTHERAPEUTIC: NSAID.
CLINICAL: Anti-inflammatory, analgesic.

USES

Relief of signs/symptoms of osteoarthritis, rheumatoid arthritis (RA). Treatment of juvenile idiopathic arthritis (JIA).

PRECAUTIONS

Contraindications: History of asthma, urticaria with NSAIDs, perioperative pain in setting of CABG surgery. **Cautions:** Renal/hepatic impairment, asthma, coagulation disorders, hypertension, history of GI disease (bleeding or ulcers); concurrent use of anticoagulants; fluid retention, HF, dehydration, smoking, alcohol use, elderly, debilitated.

ACTION

Produces analgesic, antipyretic, anti-inflammatory effects by inhibiting prostaglandin synthesis. **Therapeutic Effect:** Reduces inflammatory response, intensity of pain.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (analgesic)	30 min	4–5 hrs	N/A

Well absorbed after PO administration. Protein binding: 99%. Metabolized in liver. Eliminated equally in urine, feces. Not removed by hemodialysis. **Half-life:** 15–20 hrs.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution: 50 mg. **Tablets (Alkeran):** 2 mg.

ADMINISTRATION/HANDLING

10 mg twice daily: 28 mg once daily.
5 mg twice daily: 14 mg once daily.

Dosage in Renal Impairment

Creatinine Clearance	Dosage: Immediate-Release	Dosage: Extended-Release
30 ml/min or greater	No adjustments	No adjustments
5–29 ml/min	5 mg twice daily	14 mg once daily

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Occasional (7%–4%): Dizziness, headache, confusion, constipation, hypertension, cough. **Rare (3%–2%):** Back pain, nausea, fatigue, anxiety, peripheral edema, arthralgia, insomnia.

ADVERSE EFFECTS/ TOXIC REACTIONS

None known.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess cognitive, behavioral, functional deficits of pt. Assess renal function.

INTERVENTION/EVALUATION

Monitor cognitive, behavioral, functional status of pt. Monitor urine pH (alterations of urine pH toward the alkaline condition may lead to accumulation of the drug with possible increase in side effects). Monitor BUN, creatinine clearance lab values.

PATIENT/FAMILY TEACHING

• Do not reduce or stop medication; do not increase dosage without physician direction. • Ensure adequate fluid intake. • If therapy is interrupted for several days, restart at lowest dose, titrate to current dose at minimum of 1-wk intervals. • Local chapter of Alzheimer's Disease Association can provide a guide to services.

meperidine

HIGH ALERT

me-**per**-i-deen
(Demerol)
Do not confuse Demerol with Demulen, Desyrel, Dilaudid, or Pamelor, or meperidine with meprobamate.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Narcotic agonist **(Schedule II). CLINICAL:** Opiate analgesic.

USES

◀ALERT▶ Not considered an opioid of choice for treatment of pain. Relief of moderate to severe pain. **OFF-LABEL:** Reduces postop shivering. Reduces rigors from amphotericin.

PRECAUTIONS

Contraindications: Use of MAOIs within 14 days, severe respiratory insufficiency. **Cautions:** Renal/hepatic impairment, elderly, debilitated, supraventricular tachycardia, cor pulmonale, history of seizures, acute abdominal conditions, increased intracranial pressure (ICP), respiratory abnormalities, sickle cell anemia, Addison's disease, hypothyroidism, prostatic hypertrophy, urethral stricture, pheochromocytoma, substance abuse.

ACTION

Binds to opioid receptors within CNS. **Therapeutic Effect:** Alters pain perception, emotional response to pain.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	15 min	120 min	2–4 hrs
IV	Less than 5 min	5–7 min	2–3 hrs
IM	10–15 min	30–50 min	2–4 hrs
Subcutaneous	10–15 min	60 min	2–4 hrs

INDICATIONS/ROUTES/DOSAGE

Analgesia

◀ALERT▶ Avoid use in elderly.

PO, IM, Subcutaneous: ADULTS: 50–150 mg/dose q3–4h as needed. **CHILDREN:** 1.1–1.8 mg/kg/dose q3–4h as needed. **Maximum dose:** 50–150 mg.

Dosage in Renal Impairment

Avoid use in renal impairment.

Dosage in Hepatic Impairment

Caution in severe impairment.

SIDE EFFECTS

Frequent: Sedation, hypotension (including orthostatic hypotension), diaphoresis, facial flushing, dizziness, nausea, vomiting, constipation. **Occasional:** Confusion, arrhythmias, tremors, urinary retention, abdominal pain, dry mouth, headache, irritation at injection site, euphoria, dysphoria. **Rare:** Allergic reaction (rash, pruritus), insomnia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose results in respiratory depression, skeletal muscle flaccidity, cold/clammy skin, cyanosis, extreme drowsiness progressing to seizures, stupor, coma. **Antidote:** 0.4 mg naloxone (Narcan). Tolerance to analgesic effect, physical dependence may occur with repeated use.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Pt should be in recumbent position before drug is administered by parenteral route. Assess onset, type, location, duration of pain. Obtain vital signs before giving medication. If respirations are 12/min or less (20/min or less in children), withhold medication, contact physician. Effect of medication is reduced if full pain recurs before next dose.

INTERVENTION/EVALUATION

Monitor vital signs 15–30 min after subcutaneous/IM dose, 5–10 min after IV dose (monitor for hypotension, change in rate/quality of pulse). Monitor pain level, sedation response. Monitor daily pattern of bowel activity, stool consistency; avoid constipation. Check for adequate voiding. Initiate deep breathing, coughing exercises, particularly in pts with pulmonary impairment. **Therapeutic serum level:** 100–550 ng/ml; **toxic serum level:** greater than 1,000 ng/ml.

PATIENT/FAMILY TEACHING

• Medication should be taken before pain fully returns, within ordered intervals. • Discomfort may occur with injection. • Slowly go from lying to standing to avoid orthostatic hypotension. • Increase fluids, bulk to prevent constipation. • Tolerance, dependence may occur with prolonged use of high doses. • Avoid alcohol, other CNS depressants. • Avoid tasks requiring mental alertness, motor skills until response to drug is established.

meropenem

mer-oh-**pen**-em
(Merrem IV)
Do not confuse meropenem with doripenem, ertapenem, or imipenem.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Carbapenem. **CLINICAL:** Antibiotic.

USES

Treatment of multidrug-resistant infections; meningitis in children 3 mos and older; intra-abdominal infections; complicated skin/skin structure infections caused by susceptible *S. aureus, S. pyogenes, S. agalactiae, S. pneumoniae, H. influenzae, N. meningitidis, M. catarrhalis, E. coli, Klebsiella, Enterobacter,*

Creatinine Clearance	Dosage	Interval
26–49 ml/min	Normal dose (1,000 mg)	q12h
10–25 ml/min	50% of normal dose	q12h
Less than 10 ml/min	50% of normal dose	q24h
Hemodialysis:	500 mg	q24h
Peritoneal dialysis:	Recommended dose (based on indication)	q24h
Continuous renal replacement therapy		
Continuous venovenous hemofiltration	1 gram then 500 mg 1 gram	q8h OR q12h
Continuous venovenous hemodialysis/ continuous venovenous hemodiafiltration	1 gram then 500 mg 1 gram	q6–8h OR q8–12h

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (5%–3%): Diarrhea, nausea, vomiting, headache, inflammation at injection site. **Occasional (2%):** Oral candidiasis, rash, pruritus. **Rare (less than 2%):** Constipation, glossitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Antibiotic-associated colitis, other superinfections (abdominal cramps, severe watery diarrhea, fever) may result from altered bacterial balance in GI tract. Anaphylactic reactions have been reported. Seizures may occur in those with CNS disorders (e.g., brain lesions, history of seizures), bacterial meningitis, renal impairment.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question history of hypersensitivity, allergic reaction to penicillins, cephalosporins. Inquire about history of seizures.

INTERVENTION/EVALUATION

Monitor daily pattern of bowel activity, stool consistency. Monitor for nausea, vomiting. Evaluate for inflammation at IV injection site. Assess skin for rash. Evaluate hydration status. Monitor I&O, renal function, LFT. Check mental status; be alert to tremors, possible seizures. Assess temperature, B/P twice daily, more often if necessary. Monitor serum electrolytes, esp. potassium.

PATIENT/FAMILY TEACHING

- Report persistent diarrhea, abdominal cramps, fever.

mesalamine (5-aminosalicylic acid, 5-ASA)

me-**sal**-a-meen
(Apriso, Asacol HD, Canasa, Delzicol, Lialda, Mesasal, Pentasa, Rowasa, Salofalk, sfRowasa)
Do not confuse Asacol with Os-Cal, Lialda with Aldara, or mesalamine with megestrol, memantine, or methenamine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Salicylic acid derivative. **CLINICAL:** Anti-inflammatory agent.

USES

PO: Treatment, maintenance of remission of mild to moderate active ulcerative colitis. **Rectal:** Treatment of active mild to moderate distal ulcerative colitis, proctosigmoiditis or proctitis.

◀ALERT▶ Suppository should be retained for 1–3 hrs for maximum benefit.

Dosage of Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Mesalamine is generally well tolerated, with only mild, transient effects. **Frequent (greater than 6%):** **PO:** Abdominal cramps/pain, diarrhea, dizziness, headache, nausea, vomiting, rhinitis, unusual fatigue. **Rectal:** Abdominal/stomach cramps, flatulence, headache, nausea. **Occasional (6%–2%):** **PO:** Hair loss, decreased appetite, back/joint pain, flatulence, acne. **Rectal:** Alopecia. **Rare (less than 2%):** **Rectal:** Anal irritation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Sulfite sensitivity may occur in susceptible pts, manifested as cramping, headache, diarrhea, fever, rash, urticaria, pruritus, wheezing. Discontinue drug immediately. Hepatitis, pancreatitis, pericarditis occur rarely with oral forms.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline chemistries, esp. BUN, creatinine, LFT. Assess for abdominal pain, discomfort.

INTERVENTION/EVALUATION

Encourage adequate fluid intake. Assess bowel sounds for peristalsis. Monitor daily pattern of bowel activity, stool consistency; record time of evacuation. Assess for abdominal disturbances. Assess skin for rash, urticaria. Discontinue medication if rash, fever, cramping, diarrhea occurs.

PATIENT/FAMILY TEACHING

- Report rash, fever, abdominal pain, significant diarrhea. • Avoid tasks that require alertness, motor skills until response to drug is established. • May discolor urine yellow-brown. • Suppositories stain fabrics.

mesna

mess-na
(Mesnex, Uromitexan)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Cytoprotective agent. **CLINICAL:** Antineoplastic adjunct, antidote.

USES

Detoxifying agent used as protectant against hemorrhagic cystitis induced by ifosfamide. **OFF-LABEL:** Reduce incidence of cyclophosphamide-induced hemorrhagic cystitis with high-dose cyclophosphamide.

PRECAUTIONS

Contraindications: None known. **Cautions:** None known.

ACTION

Binds with, detoxifies urotoxic metabolites of ifosfamide/cyclophosphamide. **Therapeutic Effect:** Inhibits ifosfamide/cyclophosphamide-induced hemorrhagic cystitis.

PHARMACOKINETICS

Rapidly metabolized after IV administration to mesna disulfide, which is reduced to mesna in kidneys. Protein binding: 69%–75%. Excreted in urine. **Half-life:** 24 min; metabolite: 72 min.

spasm associated with strains, sprains, other muscle injuries.

PRECAUTIONS

Contraindications: Severe renal/hepatic impairment, drug-induced anemia, hemolytic anemia. **Cautions:** Mild to moderate hepatic/renal impairment, elderly, debilitated pts.

ACTION

Skeletal muscle relaxant action may be related to its CNS depressant effects. Does not directly relax skeletal muscle, motor end plate, or nerve fiber. **Therapeutic Effect:** Relieves musculoskeletal pain.

PHARMACOKINETICS

Rapidly absorbed from GI tract. Extensively distributed in tissues. Metabolized in liver. Excreted in urine. **Half-life:** 9 hrs.

lactic acidosis, acute renal failure (discontinue metformin 24–48 hrs prior to and up to 72 hrs after contrast exposure). **HERBAL:** **Garlic** may cause hypoglycemia. **FOOD:** None known. **LAB VALUES:** May alter cholesterol, LDL, triglycerides, HDL.

AVAILABILITY (Rx)

Oral Solution (Riomet): 100 mg/ml. **Tablets (Glucophage):** 500 mg, 850 mg, 1,000 mg.

respiratory depressant effects. **Elderly:** More susceptible to respiratory depressant effects. Age-related renal impairment may increase risk of urinary retention.

INTERACTIONS

DRUG: **Alcohol, other CNS depressants** may increase CNS effects, respiratory depression, hypotension. **CYP3A4 inducers (e.g., carbamazepine, phenobarbital)** may decrease concentration/effects. **CYP3A4 inhibitors (e.g., rifampin, clarithromycin)** may increase methadone level. **Amiodarone, erythromycin** may prolong QT interval. **MAOIs** may produce serotonin syndrome (reduce dose to ¼ of usual methadone dose). **HERBAL:** **Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depression. **St. John's wort** may decrease concentration/effects. **FOOD:** **Grapefruit products** may alter concentration/effects. **LAB VALUES:** May increase serum amylase, lipase.

AVAILABILITY (Rx)

Injection Solution (Dolophine): 10 mg/ml. **Oral Concentrate (Methadone Intensol, Methadose):** 10 mg/ml. **Oral Solution:** 5 mg/5 ml, 10 mg/5 ml. **Tablets (Dispersible [Methadose, Methadone Diskett]):** 40 mg. **Tablets (Dolophine):** 5 mg, 10 mg.

ADMINISTRATION/HANDLING

IM, Subcutaneous

◀ALERT▶ IM preferred over subcutaneous route (subcutaneous produces pain, local irritation, induration). • Do not use if solution appears cloudy or contains a precipitate. • Administer slowly. • Those with circulatory impairment experience higher risk of overdosage due to delayed absorption of repeated administration.

PO

• Give without regard to meals. • Oral dose for detoxification and maintenance may be given in fruit juice or water. • Dispersible tablet should not be chewed or swallowed; add to liquid, allow to dissolve before swallowing.

INDICATIONS/ROUTES/DOSAGE

Analgesia

PO: ADULTS, ELDERLY: Initially, 2.5–10 mg q4–12h. **CHILDREN:** 0.1–0.2 mg/kg/dose q4–8h for 2–3 doses then q6–12h as needed. **Maximum dose:** 10 mg.

IV, IM, Subcutaneous: ADULTS, ELDERLY: Initially, 2.5 mg q8–12h, then titrate slowly to desired effect. **CHILDREN:** 0.1 mg/kg q4–8h for 2–3 doses, then q4–12h. **Maximum:** 10 mg/dose.

Renal/Hepatic Impairment

Creatinine clearance less than 10 ml/min: 50–75% normal dose. Avoid in severe hepatic disease.

Detoxification

PO: ADULTS, ELDERLY: Initially, dose should not exceed 30 mg. An additional 5–10 mg may be provided if withdrawal symptoms have not been suppressed or if symptoms reappear after 2–4 hrs. Total daily dose not to exceed 40 mg. **Maintenance range:** 80–120 mg/day with titration occurring cautiously. Withdrawal should be less than 10% of the maintenance dose every 10–14 days. **Short-term:** Initially, titrate to 40 mg/day in 2 divided doses. Continue 40-mg dose for 2–3 days. Decrease dose every day or every other day.

SIDE EFFECTS

Frequent: Sedation, orthostatic hypotension, diaphoresis, facial flushing, constipation, dizziness, nausea, vomiting. **Occasional:** Confusion, urinary retention, palpitations, abdominal cramps, visual changes, dry mouth, headache, decreased appetite, anxiety, insomnia. **Rare:** Allergic reaction (rash, pruritus).

INTERACTIONS

DRUG: **CNS depressants**, including **alcohol, benzodiazepines, opioids, tricyclic antidepressants,** may increase sedative effects. May inhibit effect of **pyridostigmine.** **HERBAL:** **St. John's wort, valerian, kava kava, gotu kola** may increase CNS depression. **FOOD:** **High-fat meals** may increase concentration. **LAB VALUES:** May decrease WBC count.

AVAILABILITY (Rx)

Injection, Solution: 100 mg/ml.

22.5 mg, 25 mg, 27.5 mg, 30 mg. **Injection Solution:** 25 mg/ml. **Injection Syringe (Otrexup):** 10 mg/0.4 ml, 15 mg/0.4 ml, 20 mg/0.4 ml, 25 mg/0.4 ml. **Tablets:** 2.5 mg (Rheumatrex), 5 mg (Trexall), 7.5 mg (Trexall), 10 mg (Trexall), 15 mg (Trexall).

ADMINISTRATION/HANDLING

◀ALERT▶ May be carcinogenic, mutagenic, teratogenic. Handle with extreme care during preparation/administration. Wear gloves when preparing solution. If powder or solution comes in contact with skin, wash immediately, thoroughly with soap, water. May give IM, IV, intraarterially, intrathecally.

Rapidly absorbed from GI tract after IM administration. Distributed rapidly to plasma, extracellular fluid, tissues. Metabolized in liver. Primarily excreted in urine. **Half-life:** 0.5–2 hrs.

INTERVENTION/EVALUATION

Encourage fluid intake. Assess bowel sounds for peristalsis. Monitor daily pattern of bowel activity, stool consistency. If opioid medication is stopped, drug should be discontinued. Assess for abdominal disturbances.

PATIENT/FAMILY TEACHING

• Laxative effect usually occurs within 30 min but may take up to 24 hrs after medication administration. • Common side effects include transient abdominal pain, nausea, vomiting. • Report persistent or worsening symptoms, or if severe or persistent diarrhea occurs.

TOP 100

methylphenidate

meth-il-**fen**-i-date

(Apo-Methylphenidate, Concerta, Daytrana, Metadate CD, Metadate ER, Methylin, Methylin ER, PMS-Methylphenidate, Quillivant XR, Ritalin, Ritalin LA, Ritalin SR)

■ **BLACK BOX ALERT** ■ Chronic abuse can lead to marked tolerance, psychological dependence. Abrupt withdrawal from prolonged use may lead to severe depression, psychosis.

Do not confuse Metadate ER with Metadate CD, Methylphenidate with methadone, or Ritalin with Rifadin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: CNS stimulant **(Schedule II). CLINICAL:** CNS stimulant.

USES

Treatment of attention-deficit hyperactivity disorder (ADHD). Management of narcolepsy. **OFF-LABEL:** Secondary mental depression (especially elderly, medically ill).

PRECAUTIONS

Contraindications: Use of MAOIs within 14 days; marked anxiety, tension, agitation, motor tics; family history or diagnosis of Tourette's syndrome, glaucoma. **Metadate (additional):** Severe hypertension, heart failure, arrhythmia, hyperthyroidism, recent MI or angina. **Cautions:** Hypertension, seizures, acute stress reaction, emotional instability, history of drug dependence, HF, recent MI, hyperthyroidism, known structural cardiac abnormality, bipolar disorder, cardiomyopathy, arrhythmias, alcohol abuse.

ACTION

Blocks reuptake of norepinephrine, dopamine into presynaptic neurons. **Therapeutic Effect:** Decreases motor restlessness, fatigue. Increases motor activity, attention span, mental alertness. Produces mild euphoria.

PHARMACOKINETICS

Onset	Peak	Duration
Immediate-release	2 hrs	3–6 hrs
Sustained-release	4–7 hrs	8 hrs
Extended-release	N/A	12 hrs
Transdermal	2 hrs	N/A

Slowly, incompletely absorbed from GI tract. Protein binding: 15%. Metabolized in liver. Primarily excreted in urine. Unknown if removed by hemodialysis. **Half-life:** 2–4 hrs.

corresponds to sustained-release or extended-release tablet strength. **Maximum:** 60 mg/day.

PATCH *(Daytrana)*: CHILDREN 6–12 YRS, ADOLESCENTS: Initially, 10 mg daily (applied and worn for 9 hrs). Dosage is titrated to desired effect. May increase dose no more frequently than every wk.

Narcolepsy

PO: ADULTS, ELDERLY: Initially, 5 mg twice daily, before breakfast and lunch. May increase by 5–10 mg/day at weekly intervals. **Maximum:** 60 mg/day in 2–3 divided doses.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Anxiety, insomnia, anorexia. **Occasional:** Dizziness, drowsiness, headache, nausea, abdominal pain, fever, rash, arthralgia, vomiting. **Rare:** Blurred vision, Tourette's syndrome (uncontrolled vocal outbursts, repetitive body movements, tics), palpitations, priapism.

ADVERSE EFFECTS/ TOXIC REACTIONS

Prolonged administration to children with ADHD may delay normal weight gain pattern. Overdose may produce tachycardia, palpitations, arrhythmias, chest pain, psychotic episode, seizures, coma. Hypersensitivity reactions, blood dyscrasias occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

ADHD: Assess attention span, impulsivity, interaction with others, distractibility. **Narcolepsy:** Observe/assess frequency of episodes.

INTERVENTION/EVALUATION

Monitor B/P, pulse, changes in ADHD symptoms. CBC with differential should be performed routinely during therapy. If paradoxical return of attention-deficit occurs, dosage should be reduced or discontinued. Monitor growth.

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Sugarless gum, sips of water may relieve dry mouth. • Report any increase in seizures. • Take daily dose early in morning to avoid insomnia. • Report anxiety, palpitations, fever, vomiting, skin rash. • Report new or worsened symptoms (e.g., behavior, hostility, concentration ability). • Avoid caffeine. • Do not stop taking abruptly after prolonged use.

*methylPREDNISolone

(Medrol)

*methylPREDNISolone acetate

(DepoMedrol)

*methylPREDNISolone sodium succinate

(Solu-Medrol)

meth-il-pred-**niss**-oh-lone

Do not confuse DepoMedrol with Solu-Medrol, Medrol with Mebaral, or methylprednisolone with medroxyprogesterone or prednisolone.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Adrenal corticosteroid. **CLINICAL:** Anti-inflammatory.

USES

Anti-inflammatory or immunosuppressant in treatment of hematologic, allergic, inflammatory, autoimmune, or neoplastic

disorders. **OFF-LABEL:** Acute spinal cord injury.

PRECAUTIONS

Contraindications: Administration of live virus vaccines, systemic fungal infection. **IM (additional):** Idiopathic thrombocytopenia purpura. **Cautions:** Respiratory tuberculosis, untreated systemic infections, hypertension, HF, diabetes, GI disease (e.g., peptic ulcer), myasthenia gravis, renal/hepatic impairment, seizures, cataracts, glaucoma, following acute MI, thyroid disorder, thromboembolic tendencies, cardiovascular disease, elderly, psychiatric conditions, pts at risk for osteoporosis.

ACTION

Suppresses migration of polymorphonuclear leukocytes, reverses increased capillary permeability. **Therapeutic Effect:** Decreases inflammation.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	Rapid	1–2 hrs	30–36 hrs
IM	Rapid	4–8 days	1–4 wks
IV	Rapid	N/A	N/A

Well absorbed from GI tract after IM administration. Widely distributed. Metabolized in liver. Excreted in urine. Removed by hemodialysis. **Half-life:** 3.5 hrs.

IV COMPATIBILITIES

Dexmedetomidine (Precedex), dopamine (Intropin), heparin, midazolam (Versed), theophylline.

INDICATIONS/ROUTES/DOSAGE

Anti-Inflammatory, Immunosuppressive

IV: ADULTS, ELDERLY: 10–40 mg. May repeat q4–6h as needed. **CHILDREN:** 0.5–1.7 mg/kg/day or 5–25 mg/m²/day in 2–4 divided doses.

PO: ADULTS, ELDERLY: 2–60 mg/day in 1–4 divided doses. **CHILDREN:** 0.5–1.7 mg/kg/day or 5–25 mg/m²/day in 2–4 divided doses.

IM *(Methylprednisolone Acetate)*: ADULTS, ELDERLY: 10–80 mg q1–2wks.

Intra-Articular, Intralesional: ADULTS, ELDERLY: 20–60 mg q1–5wks.

Spinal Cord Injury

IV Bolus: ADULTS, ELDERLY, CHILDREN: 30 mg/kg over 15 min, followed by 5.4 mg/kg/hr over 23 hrs, to be started within 45 min of bolus dose.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Insomnia, heartburn, anxiety, abdominal distention, diaphoresis, acne, mood swings, increased appetite, facial flushing, GI distress, delayed wound healing, increased susceptibility to infection, diarrhea, constipation. **Occasional:** Headache, edema, tachycardia, change in skin color, frequent urination, depression. **Rare:** Psychosis, increased blood coagulability, hallucinations.

ADVERSE EFFECTS/ TOXIC REACTIONS

Long-term therapy: Hypocalcemia, hypokalemia, muscle wasting (esp. in arms, legs), osteoporosis, spontaneous fractures, amenorrhea, cataracts, glaucoma, peptic ulcer, HF. **Abrupt withdrawal after long-term therapy:** Anorexia, nausea, fever, headache, severe arthralgia, rebound inflammation, fatigue, weakness, lethargy, dizziness, orthostatic hypotension.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for hypersensitivity to any of the corticosteroids, components. Obtain baselines for height, weight, B/P, serum glucose, electrolytes. Check results of initial tests (tuberculosis [TB] skin test, X-rays, EKG).

INTERVENTION/EVALUATION

Monitor I&O, daily weight; assess for edema. Monitor daily pattern of bowel activity, stool consistency. Check vital signs at least twice daily. Be alert for infection (sore throat, fever, vague symptoms). Monitor serum electrolytes, including B/P, glucose. Monitor for hypocalcemia (muscle twitching, cramps, positive Trousseau's or Chvostek's signs), hypokalemia (weakness, muscle cramps, numbness, tingling [esp. lower extremities], nausea/vomiting, irritability, EKG changes). Assess emotional status, ability to sleep. Check lab results for blood coagulability, clinical evidence of thromboembolism.

PATIENT/FAMILY TEACHING

• Take oral dose with food, milk. • Do not change dose/schedule or stop taking drug; must taper off gradually under medical supervision. • Report fever, sore throat, muscle aches, sudden weight gain or loss, edema, loss of appetite, fatigue. • Maintain strict personal hygiene, avoid exposure to disease, trauma. • Severe stress (serious infection, surgery, trauma) may require increased dosage. • Follow-up visits, lab tests are necessary. • Children must be assessed for growth retardation. • Inform dentist, other physicians of methylprednisolone therapy now or within past 12 mos.

IV INCOMPATIBILITIES

Allopurinol (Aloprim), cefepime (Maxipime), furosemide (Lasix), propofol (Diprivan).

IV COMPATIBILITIES

Dexamethasone, dexmedetomidine (Precedex), diltiazem (Cardizem), diphenhydramine (Benadryl), fentanyl (Sublimaze), heparin, hydromorphone (Dilaudid), morphine, potassium chloride.

INDICATIONS/ROUTES/DOSAGE

Prevention of Chemotherapy-Induced Nausea/Vomiting

IV: ADULTS, ELDERLY, CHILDREN: 1–2 mg/kg 30 min before chemotherapy; repeat q2h for 2 doses, then q3h as needed for total of 5 doses/day.

Postop Nausea/Vomiting

IV: ADULTS, ELDERLY: 10–20 mg near end of surgery.

Gastroparesis

PO, IV: ADULTS: 10 mg 30 min before meals and at bedtime for 2–8 wks.
PO: ELDERLY: Initially, 5 mg 30 min before meals and at bedtime. May increase to 10 mg.
IV: ELDERLY: 5 mg over 1–2 min. May increase to 10 mg.

Symptomatic Gastroesophageal Reflux Disease (GERD)

PO: ADULTS: 10–15 mg up to 4 times/day, or single doses up to 20 mg as needed. **ELDERLY:** Initially, 5 mg 4 times/day. May increase to 10 mg. **CHILDREN:** 0.1–0.2 mg/kg/dose 4 times/day.

Facilitate Small Bowel Intubation (Single Dose)

IV: ADULTS, ELDERLY: 10 mg as a single dose. **CHILDREN 6–14 YRS:** 2.5–5 mg as a single dose. **CHILDREN YOUNGER THAN 6 YRS:** 0.1 mg/kg as a single dose.

Dosage in Renal Impairment

Dosage is modified based on creatinine clearance.

Creatinine Clearance	Dosage
Less than 40 ml/min	50% of normal dose

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

◀ALERT▶ Doses of 2 mg/kg or greater, or increased length of therapy, may result in a greater incidence of side effects.
Frequent (10%): Drowsiness, restlessness, fatigue, lethargy. **Occasional (3%):** Dizziness, anxiety, headache, insomnia, breast tenderness, altered menstruation, constipation, rash, dry mouth, galactorrhea, gynecomastia. **Rare (less than 3%):** Hypotension, hypertension, tachycardia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Extrapyramidal reactions occur most frequently in children, young adults (18–30 yrs) receiving large doses (2 mg/kg) during chemotherapy and usually are limited to akathisia (involuntary limb movement, facial grimacing, motor restlessness). Neuroleptic malignant syndrome (diaphoresis, fever, unstable B/P, muscular rigidity) has been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Antiemetic: Assess for dehydration (poor skin turgor, dry mucous membranes, longitudinal furrows in tongue). Assess for nausea, vomiting, abdominal distention, bowel sounds.

INTERVENTION/EVALUATION

Monitor for anxiety, restlessness, extrapyramidal symptoms (EPS) during IV administration. Monitor daily pattern of bowel activity, stool consistency. Assess skin for rash. Evaluate for therapeutic response from gastroparesis (nausea, vomiting, bloating). Monitor renal function, B/P, heart rate.

Usual Pediatric Dosage
PO: 0.2–0.4 mg/kg/day in 1–2 divided doses.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Expected: Increased urinary frequency/volume. **Frequent (10%–9%):** Dizziness, light-headedness, headache. **Occasional (6%–4%):** Muscle cramps/spasm, drowsiness, fatigue, lethargy. **Rare (less than 2%):** Asthenia, palpitations, depression, nausea, vomiting, abdominal bloating, constipation, diarrhea, urticaria.

ADVERSE EFFECTS/ TOXIC REACTIONS

Vigorous diuresis may lead to profound water loss and electrolyte depletion, resulting in hypokalemia, hyponatremia, dehydration. Acute hypotensive episodes may occur. Hyperglycemia may occur during prolonged therapy. Pancreatitis, paresthesia, blood dyscrasias, pulmonary edema, allergic pneumonitis, dermatologic reactions occur rarely. Overdose can lead to lethargy, coma without changes in electrolytes, hydration.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check vital signs, esp. B/P for hypotension, before administration. Assess baseline serum electrolytes, particularly check for hypokalemia. Assess skin turgor, mucous membranes for hydration status. Assess for peripheral edema. Assess muscle strength, mental status. Note skin temperature, moisture. Obtain baseline weight. Monitor I&O.

INTERVENTION/EVALUATION

Continue to monitor B/P, vital signs, serum electrolytes, I&O, weight. Note extent of diuresis. Monitor for electrolyte disturbances (hypokalemia may result in weakness, tremors, muscle cramps, nausea, vomiting, altered mental status, tachycardia; hyponatremia may result in confusion, thirst, cold/clammy skin).

PATIENT/FAMILY TEACHING

• Expect increased urinary frequency/volume. • Slowly go from lying to standing to reduce hypotensive effect. • Avoid tasks requiring motor skills, mental alertness until response to drug is established. • Eat foods high in potassium, such as whole grains (cereals), legumes, meat, bananas, apricots, orange juice, potatoes (white, sweet), raisins.

metoprolol

TOP 100 HIGH ALERT

me-**toe**-pro-lol
(Apo-Metoprolol, Betaloc, Lopressor, Nu-Metop, Toprol XL)

■ **BLACK BOX ALERT** ■ Abrupt withdrawal can produce acute tachycardia, hypertension, ischemia. Drug should be gradually tapered over 1–2 wks.

Do not confuse metoprolol with atenolol, labetolol, nadolol, or stanozolol, or Toprol XL with Tegretol, Tegretol XR, or Topamax.

FIXED-COMBINATION(S)

Dutoprol: metoprolol/hydrochlorothiazide (a diuretic): 25 mg/12.5 mg, 50 mg/12.5 mg, 100 mg/12.5 mg. **Lopressor HCT:** metoprolol/hydro-chlorothiazide (a diuretic): 50 mg/25 mg, 100 mg/25 mg, 100 mg/50 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: $Beta_1$-adrenergic blocker. **CLINICAL:** Antianginal, antihypertensive, MI adjunct.

USES

Lopressor: Treatment of hemodynamically stable acute myocardial infarction

ADMINISTRATION/HANDLING

class I cytokine signaling receptors. **Therapeutic Effect:** Decreases accumulation of fat in nonadipose tissue (e.g., liver, muscle). Reduces metabolic abnormalities associated with leptin deficiency.

PHARMACOKINETICS

No physiologic process of metabolism specified. Peak plasma concentration: 4 hrs. Eliminated primarily in urine. **Half-life:** 3.8-4.7 hrs.

worsening of autoimmune disease, certain blood cancers such as lymphoma. • Report generalized rash, itching, hives; may indicate allergic reaction. • Interrupting treatment may cause pancreatitis or elevated lipid levels; do not run out of supply. • Do not freeze medication. • Protect drug from light.

metronidazole

me-troe-**nye**-da-zole
(Apo-Metronidazole, Flagyl, Flagyl ER, Flagyl 375, MetroCream, MetroGel, MetroGel-Vaginal, NidaGel, Noritate, Vandazole)
Do not confuse metronidazole with meropenum, metformin, methotrexate, or miconazole.

FIXED-COMBINATION(S)

Helidac: metronidazole/bismuth/tetracycline (an anti-infective): 250 mg/262 mg/500 mg. **Pylera:** metronidazole/bismuth/tetracycline (an anti-infective): 125 mg/140 mg/125 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Nitroimidazole derivative. **CLINICAL:** Antibacterial, antiprotozoal.

USES

Treatment of anaerobic infections (skin/skin structure, CNS, lower respiratory tract, bone/joints, intra-abdominal, gynecologic, endocarditis, septicemia). Treatment of *H. pylori* (part of multidrug regimen); surgical prophylaxis (colorectal), trichomoniasis, amebiasis, antibiotic-associated pseudomembranous colitis (AAPC). Topical treatment of acne rosacea or inflammatory lesions. **Vaginal gel:** Treatment of bacterial vaginosis. **OFF-LABEL:** Crohn's disease, urethritis.

PRECAUTIONS

Contraindications: Pregnancy (first trimester), use of disulfiram within 2 wks, use of alcohol during therapy or within 3 days of discontinuing metronidazole. **Cautions:** Blood dyscrasias, severe hepatic dysfunction; end-stage renal disease, history of seizures, HF, other sodium-retaining states, elderly.

ACTION

Disrupts DNA, inhibiting nucleic acid synthesis. **Therapeutic Effect:** Produces bactericidal, antiprotozoal, amebicidal, trichomonacidal effects. Produces anti-inflammatory, immunosuppressive effects when applied topically.

PHARMACOKINETICS

Well absorbed from GI tract; minimally absorbed after topical application. Protein binding: less than 20%. Widely distributed; crosses blood-brain barrier. Metabolized in liver. Excreted in urine (80%), feces (15%). Removed by hemodialysis. **Half-life:** 8 hrs (increased in alcoholic hepatic disease, neonates).

SIDE EFFECTS

Frequent: Systemic: Anorexia, nausea, dry mouth, metallic taste. **Vaginal:** Symptomatic cervicitis/vaginitis, abdominal cramps, uterine pain. **Occasional: Systemic:** Diarrhea, constipation, vomiting, dizziness, erythematous rash, urticaria, reddish-brown urine. **Topical:** Transient erythema, mild dryness, burning, irritation, stinging, tearing when applied too close to eyes. **Vaginal:** Vaginal, perineal, vulvar itching; vulvar swelling. **Rare:** Mild, transient leukopenia; thrombophlebitis with IV therapy.

ADVERSE EFFECTS/ TOXIC REACTIONS

Oral therapy may result in furry tongue, glossitis, cystitis, dysuria, pancreatitis. Peripheral neuropathy (manifested as numbness, tingling of hands/feet) usually is reversible if treatment is stopped immediately upon appearance of neurologic symptoms. Seizures occur occasionally.

M

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of hypersensitivity to metronidazole, other nitroimidazole derivatives (and parabens with topical). Obtain specimens for diagnostic tests, cultures before giving first dose (therapy may begin before results are known).

INTERVENTION/EVALUATION

Monitor daily pattern of bowel activity, stool consistency. Monitor I&O, assess for urinary problems. Be alert to neurologic symptoms (dizziness, paresthesia of extremities). Assess for rash, urticaria. Monitor for onset of superinfection (ulceration/change of oral mucosa, furry tongue, vaginal discharge, genital/anal pruritus).

PATIENT/FAMILY TEACHING

• Urine may be red-brown or dark. • Avoid alcohol, alcohol-containing preparations (cough syrups, elixirs) for at least 48 hrs after last dose. • Avoid tasks that require alertness, motor skills until response to drug is established. • If taking metronidazole for trichomoniasis, refrain from sexual intercourse until full treatment is completed. • For amebiasis, frequent stool specimen checks will be necessary. • **Topical:** Avoid contact with eyes. • May apply cosmetics after application. • Metronidazole acts on erythema, papules, pustules but has no effect on rhinophyma (hypertrophy of nose), telangiectasia, ocular problems (conjunctivitis, keratitis, blepharitis). • Other recommendations for rosacea include avoidance of hot/spicy foods, alcohol, extremes of hot/cold temperatures, excessive sunlight.

micafungin

mye-ka-**fun**-jin
(Mycamine)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Echinocandin antifungal. **CLINICAL:** Antifungal.

USES

Treatment of esophageal candidiasis, candidemia, candida peritonitis, abscesses, acute disseminated candidiasis, prophylaxis of *Candida* infection in pts undergoing hematopoietic stem cell transplant. **OFF-LABEL:** Prophylaxis of HIV-related esophageal candidiasis. Treatment of infections due to *Aspergillus* spp.

PRECAUTIONS

Contraindications: None known. **Cautions:** Hepatic/renal impairment, concomitant hepatotoxic medications.

ACTION

Inhibits synthesis of glucan (vital component of fungal cell formation), damaging

miconazole

mye-**kon**-a-zol
(Baza Antifungal, Lotrimin, Micaderm, Micatin, Micozole, Mitrazol, Monistat, Monistat 3, Monistat 7)
Do not confuse Lotrimin with Lotrisone, Micatin with Miacalcin, or miconazole with metronidazole or Micronase.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Imidazole derivative. **CLINICAL:** Antifungal.

USES

Vaginal: Vulvovaginal candidiasis. **Topical:** Cutaneous candidiasis, tinea cruris, t. corporis, t. pedis, t. versicolor.

PRECAUTIONS

Contraindications: Avoid vaginal preparations during first trimester of pregnancy (unless essential to pt's welfare). **Cautions:** Sensitivity to other antifungals (clotrimazole, ketoconazole).

ACTION

Inhibits synthesis of ergosterol (vital component of fungal cell formation), damaging fungal cell membrane. **Therapeutic Effect:** Fungistatic; may be fungicidal, depending on concentration.

PHARMACOKINETICS

Small amounts absorbed systemically after vaginal administration. Widely distributed. Protein binding: 91%–93%. Metabolized in liver. Primarily excreted in feces. **Half-life:** 24 hrs.

equipment, O_2 must be readily available before IV administration. • Administer by slow IV injection over at least 2–5 min at concentration of 1–5 mg/ml. • Reduce IV rate in those older than 60 yrs, debilitated pts with chronic disease states, pulmonary impairment. • Too-rapid IV rate, excessive doses, or single large dose increases risk of respiratory depression/arrest.

Storage • Store vials at room temperature.

IM

• Give deep IM into large muscle mass. **Maximum concentration:** 1 mg/ml.

PO

• Do not mix with grapefruit juice.

IV INCOMPATIBILITIES

Albumin, amphotericin B complex (Abelcet, AmBisome, Amphotec), ampicillin (Polycillin), ampicillin and sulbactam (Unasyn), bumetanide (Bumex), co-trimoxazole (Bactrim), dexamethasone (Decadron), fosphenytoin (Cerebyx), furosemide (Lasix), hydrocortisone (Solu-Cortef), methotrexate, nafcillin (Nafcil), sodium bicarbonate.

IV COMPATIBILITIES

Amiodarone (Cordarone), atropine, calcium gluconate, dexmedetomidine (Precedex), diltiazem (Cardizem), diphenhydramine (Benadryl), dobutamine (Dobutrex), dopamine (Intropin), etomidate (Amidate), fentanyl (Sublimaze), glycopyrrolate (Robinul), heparin, hydromorphone (Dilaudid), hydroxyzine (Vistaril), insulin, lorazepam (Ativan), milrinone (Primacor), morphine, nitroglycerin, norepinephrine (Levophed), potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Preop Sedation

PO: CHILDREN: 0.5–0.75 mg/kg. **Maximum:** 20 mg.

IV: ADULTS, ELDERLY: 0.02–0.04 mg/kg. **CHILDREN 6–12 YRS:** 0.025–0.05 mg/kg. **CHILDREN 6 MOS–5 YRS:** 0.05–0.1 mg/kg. **IM: ADULTS, ELDERLY:** 0.07–0.08 mg/kg 30–60 min before surgery. Usual dose: 5 mg. **CHILDREN:** 0.1–0.15 mg/kg 30–60 min before surgery. **Maximum:** 10 mg.

Continuous Sedation During Mechanical Ventilation

IV: ADULTS, ELDERLY: Initially, 0.01–0.05 mg/kg (1–5 mg in 70-kg adult). May repeat at 5- to 15-min intervals until adequate sedation achieved or continuous infusion rate of 0.02–0.1 mg/kg/hr and titrated to desired effect. **CHILDREN:** Initially, 0.05–0.2 mg/kg followed by continuous infusion of 0.06–0.12 mg/kg/hr (1–2 mcg/kg/min) titrated to desired effect. Usual range: 0.4–6 mcg/kg/min.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Use caution with severe impairment.

SIDE EFFECTS

Frequent (10%–4%): Decreased respiratory rate, tenderness at IM or IV injection site, pain during injection, oxygen desaturation, hiccups. **Occasional (3%–2%):** Hypotension, paradoxical CNS reaction. **Rare (less than 2%):** Nausea, vomiting, headache, coughing.

ADVERSE EFFECTS/ TOXIC REACTIONS

Inadequate or excessive dosage, improper administration may result in cerebral hypoxia, agitation, involuntary movements, hyperactivity, combativeness. Too-rapid IV rate, excessive doses, or single large dose increases risk of respiratory depression/arrest. Respiratory depression/apnea may produce hypoxia, cardiac arrest.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Resuscitative equipment, oxygen must be available. Obtain vital signs before administration.

SIDE EFFECTS

Frequent (20%–7%): Paresthesia, piloerection, pruritus, dysuria, supine hypertension. **Occasional (6%–1%):** Pain, rash, chills, headache, facial flushing, confusion, dry mouth, anxiety.

ADVERSE EFFECTS/ TOXIC REACTIONS

Increased systolic arterial pressure has been noted.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess sensitivity to midodrine, other medications (esp. digoxin, sodium-retaining vasoconstrictors). Assess medical history, esp. for renal impairment, severe hypertension, cardiac disease.

INTERVENTION/EVALUATION

Monitor B/P, renal, hepatic, cardiac function.

PATIENT/FAMILY TEACHING

- Do not take last dose of the day after evening meal or less than 4 hrs before bedtime. • Do not give if pt will be supine. • Use caution with OTC medications that may affect B/P (e.g., cough and cold, diet medications).

M

mifepristone

mif-e-**pris**-tone
(Korlym, Mifeprex)

■ **BLACK BOX ALERT** ■ Discuss medication guide, pt agreement, and expected effects before prescribing. Serious, sometimes fatal, infections, excessive bleeding have occurred following surgical and medical abortions, including following use of mifepristone.

Do not confuse Mifeprex with Mirapex, or mifepristone with misoprostol.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antiprogestin. **CLINICAL:** Abortifacient.

USES

Korlym: Control of hyperglycemia secondary to hypercortisolism in adults with endogenous Cushing's syndrome who have type 2 diabetes or glucose intolerance who failed surgery or are not surgical candidates. **Mifeprex:** Termination of intrauterine pregnancy through day 49 of pregnancy. **OFF-LABEL:** Breast/ovarian cancer, unresectable meningioma, termination of pregnancy (63 or fewer days of pregnancy).

PRECAUTIONS

Contraindications: **Mifeprex:** Chronic adrenal failure, concurrent long-term steroid or anticoagulant therapy, confirmed or suspected ectopic pregnancy, intrauterine device (IUD) in place, hemorrhagic disorders, inherited porphyria, hypersensitivity to misoprostol or other prostaglandins, lack of access to emergency medical service, inability to understand or comply with treatment. **Korlym:** Concomitant use with lovastatin, simvastatin, or CYP3A substrates, corticosteroids for serious medical conditions, history of unexplained vaginal bleeding, pregnancy, endometrial hyperplasia, or carcinoma. **Cautions:** Treatment of women older than 35 yrs, smoking more than 10 cigarettes/day, cardiovascular disease, hypertension, use of medications that prolong QT interval, severe anemia, hemostatic disorders, hemorrhagic disorders, unexplained vaginal bleeding HF, coronary vascular disease. **Pregnancy Category X.**

ACTION

Has antiprogestational activity resulting from competitive interaction with progesterone. Inhibits activity of endogenous, exogenous progesterone. Has antiglucocorticoid, weak antiandrogenic activity. **Therapeutic Effect:** Terminates pregnancy.

PHARMACOKINETICS

Rapidly absorbed from GI tract. Protein binding: 98%. Metabolized in liver. Primarily eliminated in feces; minimal excretion in urine. **Half-life:** 18 hrs.

USES

Management of fibromyalgia.

PRECAUTIONS

Contraindications: Concomitant use or within 14 days of MAOIs, uncontrolled narrow-angle glaucoma, initiation of milnacipran in pts receiving linezolid. **Cautions:** Pts with depression, pts at increased risk of suicide, other psychiatric disorders; elevated blood pressure or heart rate, history of seizures, pts with substantial alcohol use or chronic liver disease, pts with history of dysuria (e.g., prostatic hypertrophy, prostatitis), controlled narrow-angle glaucoma. Renal impairment, cardiovascular disease.

ACTION

Appears to inhibit serotonin and norepinephrine reuptake at CNS neuronal presynaptic membranes. **Therapeutic Effect:** Reduces chronic pain, fatigue, depression, sleep disorders associated with fibromyalgia syndrome; improves physical function.

PHARMACOKINETICS

Well absorbed following PO administration. Protein binding: 13%. Eliminated unchanged in urine. Steady-state levels reached in 36–48 hrs. **Half-life:** 6–8 hrs.

INTERACTIONS

DRUG: None significant. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** None significant.

AVAILABILITY (Rx)

Injection Solution (Primacor): 1 mg/ml, 10-ml single-dose vial, 20-ml single-dose vial, 50-ml single-dose vial. **Injection Solution (Premix [Primacor]):** 200 mcg/ml (100 ml, 200 ml).

ADMINISTRATION/HANDLING

***(Capsule or Immediate-Release Tablet)*: ADULTS, ELDERLY:** 50–100 mg/day.

Dosage in Renal Impairment
Use caution.

Dosage in Hepatic impairment
No dose adjustment.

SIDE EFFECTS

Frequent: Dizziness, light-headedness, diarrhea, nausea, vomiting, abdominal cramps, possibly severe photosensitivity, drowsiness, vertigo. **Occasional:** Altered pigmentation of skin, mucous membranes, rectal/genital pruritus, stomatitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Superinfection (esp. fungal), anaphylaxis, increased ICP may occur. Bulging fontanelles occur rarely in infants.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of allergies, esp. tetracyclines, sulfite.

INTERVENTION/EVALUATION

Assess ability to ambulate (may cause vertigo, dizziness). Monitor daily pattern of bowel activity, stool consistency. Monitor renal function, LFT with long-term therapy. Assess skin for rash. Observe for signs of increased intracranial pressure (altered LOC, widened pulse pressure). Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulcération, pain, erythema).

PATIENT/FAMILY TEACHING

• Continue antibiotic for full length of treatment. • Space doses evenly. • Drink full glass of water with capsules or tablets. • Avoid tasks that require alertness, motor skills until response to drug is established. • Report diarrhea, rash, other new symptoms. • Protect skin from sun exposure. • Advise female pts to use additional form of birth control (may decrease effectiveness of oral contraceptives).

minoxidil

min-**ox**-i-dil
(Apo-Gain, Loniten, Rogaine*, Rogaine Extra Strength)

■ **BLACK BOX ALERT** ■ Can cause pericarditis and pericardial effusion, occasionally progressing to tamponade; can exacerbate angina pectoris.
Do not confuse Loniten with Lotensin, or minoxidil with metolazone, midodrine, Minipress, Minocin, Monopril, or Noxafil.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Peripheral vasodilator. **CLINICAL:** Antihypertensive, hair growth stimulant.

USES

PO: Management of severe hypertension. **Topical:** Treatment of alopecia androgenetica (**males:** baldness of vertex of scalp; **females:** diffuse hair loss or thinning of frontoparietal areas).

PRECAUTIONS

Contraindications: Pheochromocytoma. **Cautions:** Severe renal impairment, chronic HF, coronary artery disease, recent MI, pulmonary hypertension.

ACTION

Acts directly on vascular smooth muscle, producing vasodilation of arterioles. **Therapeutic Effect:** Decreases peripheral vascular resistance, B/P; increases cutaneous blood flow; stimulates hair follicle epithelium, hair follicle growth.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	0.5 hr	2–8 hrs	2–5 days

medication. If pulse increases 20 beats/min or more over baseline or systolic or diastolic B/P decreases more than 20 mm Hg, withhold drug, contact physician.

INTERVENTION/EVALUATION

Monitor fluids/electrolytes, body weight, B/P. Assess for peripheral edema. Assess for signs of HF (cough, rales at base of lungs, cool extremities, dyspnea on exertion). Monitor fluid, serum electrolytes. Assess for distant or muffled heart sounds by auscultation (pericardial effusion, tamponade).

PATIENT/FAMILY TEACHING

• Maximum B/P response occurs in 3–7 days. • Slowly go from lying to standing. • Reversible growth of fine body hair may begin 3–6 wks following initiation of treatment. • When used topically for stimulation of hair growth, treatment must continue on a permanent basis—cessation of treatment will begin reversal of new hair growth. • Avoid exposure to sunlight, artificial light sources.

mipomersen

mi-poe-**mer**-sen
(Kynamro)

■ **BLACK BOX ALERT** ■ May cause hepatotoxicity. May cause hepatic steatosis (increase in hepatic fat) regardless of ALT, AST elevation; may be risk factor for progressive hepatic disease including steatohepatitis and cirrhosis. Monitor hepatic enzymes regularly. Treatment only available through restricted program under the Risk Evaluation and Mitigation Strategy (REMS) named KYNAMRO REMS PROGRAM.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Oligonucleotide inhibitor. **CLINICAL:** Antihyperlipidemic.

USES

Adjunct to lipid-lowering medications and diet to reduce low-density lipoprotein cholesterol (LDL-C), apolipoprotein B (apo-B), total cholesterol (TC), and non–high-density lipoprotein cholesterol (non-HDL-C) in pts with homozygous familial hypercholesterolemia (HoFH).

PRECAUTIONS

Contraindications: Moderate to severe hepatic impairment, active hepatic disease, hepatitis, unexplained persistent elevations of serum transaminases. **Cautions:** Alcohol dependency, other medications known to cause hepatotoxicity.

ACTION

Prevents assembly of apo-B–containing lipoproteins by inhibiting translation of apo-B 100 human messenger ribonucleic acid (mRNA); the principle precursor of LDL. **Therapeutic Effect:** Decreases plasma low-density lipoprotein cholesterol (LDL-C) and total cholesterol.

PHARMACOKINETICS

Readily absorbed following SQ administration. Metabolized in tissues by endonucleases. Protein binding: greater than 90%. Peak plasma concentration: 3–4 hrs. Steady state reached within 6 mos. Excreted primarily in urine. **Half-life:** 1–2 mos.

monitored. • Report signs of liver problems (yellowing of skin, bruising, black/tarry stool, right upper quadrant pain, fever, lethargy), chest pain, palpitations. • Avoid alcohol. • Most pts experience injection site reactions. • Flu-like symptoms (chills, fatigue, nausea, muscle pain) most likely occur within 2 days. • Inject medication into fatty tissue of upper arm, abdomen, thigh; do not inject into muscle.

mirabegron

mir-a-**beg**-ron
(Myrbetriq)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: $Beta_3$-adrenergic agonist. **CLINICAL:** Smooth muscle relaxant.

USES

Treatment of overactive bladder with symptoms of urinary incontinence, urgency, frequency.

PRECAUTIONS

Contraindications: None known. **Cautions:** Bladder outlet obstruction, pts taking antimuscarinic medications (increases urinary retention), mild to moderate hepatic/renal impairment. Not recommended for use in pts with severe uncontrolled hypertension (SBP equal to or greater than 180 mm Hg and/or DBP equal to or greater than 110 mm Hg).

ACTION

Relaxes detrusor smooth muscle of bladder through $beta_3$ stimulation during storage phase of urinary bladder fill–void cycle. **Therapeutic Effect:** Increases bladder capacity, reduces symptoms of urinary urgency, increased voiding frequency, urge incontinence, nocturia.

PHARMACOKINETICS

Readily absorbed following PO administration; widely distributed. Protein binding: 71%. Renal elimination primarily through active tubular secretion along with glomerular filtration. Eliminated in urine (55%), feces (35%). **Half-life:** 50 hrs.

CYP3A4 inducers (e.g., phenytoin) may decrease concentration/effects. **CYP3A4 inhibitors (e.g., ketoconazole)** may increase concentration/effects. **MAOIs** may increase risk of neuroleptic malignant syndrome, hypertensive crisis, severe seizures. **HERBAL: Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depression. **St. John's wort** may decrease concentration/effects, may increase risk of serotonin syndrome. **FOOD:** None known. **LAB VALUES:** May increase serum cholesterol, triglycerides, ALT.

AVAILABILITY (Rx)

Tablets (Remeron): 7.5 mg, 15 mg, 30 mg, 45 mg. **Tablets (Orally Disintegrating [Remeron Soltab]):** 15 mg, 30 mg, 45 mg.

ADMINISTRATION/HANDLING

PO

• Give without regard to food. • May crush/break scored tablets.

Orally Disintegrating Tablets

• Give without regard to food. • Do not split tablet. • Place on tongue; dissolves without water.

INDICATIONS/ROUTES/DOSAGE

Depression

PO: ADULTS: Initially, 15 mg at bedtime. May increase by 15 mg/day q1–2wks. **Maximum:** 45 mg/day. **ELDERLY:** Initially, 7.5 mg at bedtime. May increase by 7.5–15 mg/day q1–2wks. **Maximum:** 45 mg/day.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (54%–12%): Drowsiness, dry mouth, increased appetite, constipation, weight gain. **Occasional (89%–4%):** Asthenia, dizziness, flu-like symptoms, abnormal dreams. **Rare:** Abdominal discomfort, vasodilation, paresthesia, acne, dry skin, thirst, arthralgia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Higher incidence of seizures than with tricyclic antidepressants (esp. in those with no history of seizures). Overdose may produce cardiovascular effects (severe orthostatic hypotension, dizziness, tachycardia, palpitations, arrhythmias). Abrupt discontinuation from prolonged therapy may produce headache, malaise, nausea, vomiting, vivid dreams. Agranulocytosis occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess mental status, appearance, behavior, speech pattern, level of interest, mood. Obtain baseline weight. For pts on long-term therapy, renal function, LFT, CBC should be performed periodically.

INTERVENTION/EVALUATION

Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Children, adolescents are at increased risk for suicidal thoughts/behavior and worsening of depression, esp. during first few mos of therapy. Assess appearance, behavior, speech pattern, level of interest, mood. Monitor for hypotension, arrhythmias.

PATIENT/FAMILY TEACHING

• Take as single bedtime dose. • Avoid alcohol, depressant/sedating medications. • Avoid tasks requiring alertness, motor skills until response to drug established. • Report worsening depression, suicidal ideation, unusual changes in behavior.

misoprostol

mis-oh-**pros**-tol
(Cytotec, Novo-Misoprostol)

■ **BLACK BOX ALERT** ■ Pregnancy Category X. Use during pregnancy can cause abortion, premature

flatulence, dyspepsia, headache. **Rare (1%):** Vomiting, constipation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdosage may produce sedation, tremor, seizures, dyspnea, palpitations, hypotension, bradycardia.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for possibility of pregnancy before initiating therapy (Pregnancy Category X).

PATIENT/FAMILY TEACHING

- Avoid magnesium-containing antacids (minimizes potential for diarrhea).
- Women of childbearing potential must not be pregnant before or during medication therapy (may result in hospitalization, surgery, infertility, fetal death).
- Incidence of diarrhea may be lessened by taking immediately following meals.

mitomycin

HIGH ALERT

mye-toe-**mye**-sin
(Mutamycin)

■ **BLACK BOX ALERT** ■ Potent vesicant. Marked myelosuppression. Infiltration produces ulceration, necrosis, cellulitis, tissue sloughing. Hemolytic-uremic syndrome reported. Must be administered by certified chemotherapy personnel.
Do not confuse mitomycin with mithramycin or mitoxantrone.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Antibiotic. **CLINICAL:** Antineoplastic.

USES

Treatment of disseminated adenocarcinoma of stomach, pancreas. **OFF-LABEL:** Treatment of bladder cancer, anal carcinoma; cervical, esophageal, gastric, non–small-cell lung cancer.

PRECAUTIONS

Contraindications: Coagulation disorders, bleeding tendencies, platelet count less than 75,000/mm^3. **Cautions:** Myelosuppression, renal (serum creatinine greater than 1.7 mg/dL)/hepatic impairment, pregnancy, prior radiation treatment.

ACTION

Alkylating agent, cross-linking with strands of DNA. **Therapeutic Effect:** Inhibits DNA, RNA synthesis.

PHARMACOKINETICS

Widely distributed. Does not cross blood-brain barrier. Primarily metabolized in liver. Excreted in urine. **Half-life:** 50 min.

syndrome, characterized by hemolytic anemia, thrombocytopenia, renal failure, hypertension.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC with differential, PT, bleeding time, before and periodically during therapy. Antiemetics before and during therapy may alleviate nausea/vomiting.

INTERVENTION/EVALUATION

Monitor hematologic status, renal function studies. Assess IV site for phlebitis, extravasation. Monitor for hematologic toxicity (fever, sore throat, signs of local infection, unusual bruising/bleeding from any site), symptoms of anemia (excessive fatigue, weakness). Assess for renal toxicity (foul odor from urine, elevated serum BUN, creatinine).

PATIENT/FAMILY TEACHING

• Maintain strict oral hygiene. • Immediately report stinging, burning, pain at injection site. • Do not have immunizations without physician's approval (drug lowers resistance to infection). • Avoid contact with those who have recently received live virus vaccine. • Hair loss is reversible, but new hair growth may have different color, texture. • Report nausea/vomiting, fever, sore throat, bruising, bleeding, shortness of breath, painful urination.

mitoxantrone

HIGH ALERT

my-toe-**zan**-trone
(Novantrone)

■ **BLACK BOX ALERT** ■ May cause cardiotoxicity, potentially fatal HF. Infiltration produces ulceration, necrosis, cellulitis, tissue sloughing. Secondary AML, myelodysplasia have occurred. Must be administered by certified chemotherapy personnel.

Do not confuse mitoxantrone with methotrexate, mitomycin, or Mutamycin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Anthracenedione. **CLINICAL:** Nonvesicant, antineoplastic.

USES

Treatment of acute, nonlymphocytic leukemia (monocytic, myelogenous, promyelocytic), late-stage hormone-resistant prostate cancer, secondary progressive or relapsing-remitting multiple sclerosis. **OFF-LABEL:** Treatment of acute lymphocytic leukemia, breast cancer, non-Hodgkin's lymphoma, pediatric acute leukemias, pediatric sarcoma, Hodgkin's lymphoma, myelodysplastic lymphoma. Part of conditioning regimen for stem cell transplantation.

PRECAUTIONS

Contraindications: None known. **Cautions:** Preexisting bone marrow suppression, previous treatment with cardiotoxic medications, hepatobiliary impairment. Baseline left ventricular ejection fraction less than 50%, cumulative lifetime mitoxantrone dose of 140 mg/m^2 or more, multiple sclerosis with hepatic impairment.

ACTION

Inhibits B-cell, T-cell, macrophage proliferation, DNA, RNA synthesis. Active throughout entire cell cycle. **Therapeutic Effect:** Causes cell death.

PHARMACOKINETICS

Protein binding: greater than 95%. Widely distributed. Metabolized in liver. Primarily eliminated in feces by biliary system. Not removed by hemodialysis. **Half-life:** 2.3–13 days.

infection, unusual bruising/bleeding from any site. Extravasation produces swelling, pain, burning, blue discoloration of skin.

PATIENT/FAMILY TEACHING

• Urine will appear blue-green for 24 hrs after administration. Blue tint to sclera may appear. • Maintain adequate daily fluid intake (may protect against renal impairment). • Do not have immunizations without physician's approval (drug lowers resistance to infection). • Avoid crowds, those with infection. • Contraceptive measures recommended during therapy. • Report chills, fever, sore throat, difficulty breathing, unusual bruising/bleeding.

modafinil

TOP 100

moe-**daf**-i-nil
(Alertec, Provigil)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: $Alpha_1$-agonist, CNS stimulant **(Schedule IV).**
CLINICAL: Wakefulness-promoting agent, antinarcoleptic.

USES

Treatment of excessive daytime sleepiness associated with narcolepsy, shift work sleep disorder, adjunct therapy for obstructive sleep apnea/hypopnea syndrome. **OFF-LABEL:** Treatment of ADHD, multiple sclerosis–related fatigue.

PRECAUTIONS

Contraindications: None known. **Cautions:** History of clinically significant mitral valve prolapse, left ventricular hypertrophy, renal/hepatic impairment, angina, cardiac disease, myocardial ischemia, recent MI, preexisting psychosis or bipolar disorder, Tourette's syndrome.

ACTION

Increases alpha activity, decreasing delta, theta, brain wave activity. **Therapeutic Effect:** Reduces number of sleep episodes, total daytime sleep.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 60%. Widely distributed. Metabolized in liver. Excreted by kidneys. Unknown if removed by hemodialysis. **Half-life:** 15 hrs.

Canadian trade name

or food). • Give within 15 min of opening packet.

INDICATIONS/ROUTES/DOSAGE

Bronchial Asthma

PO: ADULTS, ELDERLY, CHILDREN 15 YRS AND OLDER: One 10-mg tablet daily, taken in the evening. **CHILDREN 6–14 YRS:** One 5-mg chewable tablet daily, taken in the evening. **CHILDREN 2–5 YRS:** One 4-mg chewable tablet daily, taken in the evening. **CHILDREN 6–23 MOS:** 4 mg (oral granules) once daily in the evening.

Seasonal Allergic Rhinitis

PO: ADULTS, ELDERLY, CHILDREN 15 YRS AND OLDER: One 10-mg tablet, taken in the evening. **CHILDREN 6–14 YRS:** One 5-mg chewable tablet, taken in the evening. **CHILDREN 2–5 YRS:** One 4-mg chewable tablet, taken in the evening.

Perennial Allergic Rhinitis

PO: ADULTS, ELDERLY, CHILDREN 15 YRS AND OLDER: One 10-mg tablet, taken in the evening. **CHILDREN 6–14 YRS:** One 5-mg chewable tablet, taken in the evening. **CHILDREN 2–5 YRS:** One 4-mg chewable tablet, taken in the evening. **CHILDREN 6–23 MOS:** 4 mg oral granules, taken in the evening.

Exercise-Induced Bronchoconstriction Prevention

PO: ADULTS, ELDERLY, CHILDREN 15 YRS AND OLDER: 10 mg 2 or more hrs before exercise. No additional doses within 24 hrs. **CHILDREN 6–14 YRS:** 5 mg (chew tab) 2 or more hrs prior to exercise. No additional doses within 24 hrs.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

ADULTS, CHILDREN 15 YRS AND OLDER: Frequent (18%): Headache. **Occasional (4%):** Influenza. **Rare (3%–2%):** Abdominal pain, cough, dyspepsia, dizziness, fatigue, dental pain. **CHILDREN 6–14 YRS: Rare (less than 2%):** Diarrhea, laryngitis, pharyngitis, nausea, otitis media, sinusitis, viral infection.

ADVERSE EFFECTS/ TOXIC REACTIONS

Suicidal ideation and behavior, depression has been noted.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Chewable tablet contains phenylalanine (component of aspartame); parents of phenylketonuric pts should be informed. Assess lung sounds for wheezing. Assess for allergy symptoms.

INTERVENTION/EVALUATION

Monitor rate, depth, rhythm, type of respirations; quality/rate of pulse. Assess lung sounds for wheezing. Monitor for change in mood, behavior.

PATIENT/FAMILY TEACHING

• Increase fluid intake (decreases lung secretion viscosity). • Take as prescribed, even during symptom-free periods as well as during exacerbations of asthma. • Do not alter/stop other asthma medications. • Drug is not for treatment of acute asthma attacks. • Report increased use or frequency of short-acting bronchodilators, changes in behavior, suicidal ideation.

morphine

TOP 100 HIGH ALERT

mor-feen

(Astramorph PF, Avinza, Duramorph, Infumorph, Kadian, M-Eslon, MS Contin, MSIR)

■ **BLACK BOX ALERT** ■ Be alert for signs of abuse, misuse, diversion. ***Epidural:*** Monitor for delayed sedation. ***Sustained-release:*** Do not crush or chew. ***MS Contin:*** Use only in opioid-tolerant pts requiring over 400 mg/day. ***Kadian:*** Use only in opioid-tolerant pts. ***Avinza:*** Alcohol

opiates during pregnancy may produce withdrawal symptoms in neonate (irritability, excessive crying, tremors, hyperactive reflexes, fever, vomiting, diarrhea, yawning, sneezing, seizures). **Pregnancy Category C (D if used for prolonged periods or at high dosages at term). Children:** Paradoxical excitement may occur; those younger than 2 yrs are more susceptible to respiratory depressant effects. **Elderly:** Paradoxical excitement may occur. Age-related renal impairment may increase risk of urinary retention.

INTERACTIONS

DRUG: Alcohol, other CNS depressants may increase CNS effects, respiratory depression, hypotension. **MAOIs** may produce serotonin syndrome. (Reduce dosage to ¼ of usual morphine dose). **HERBAL: Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depression. **FOOD:** None known. **LAB VALUES:** May increase serum amylase, lipase.

AVAILABILITY (Rx)

Injection, Solution: 2 mg/ml, 4 mg/ml, 5 mg/ml, 10 mg/ml, 15 mg/ml, 25 mg/ml, 50 mg/ml. **Injection, Solution (Epidural, Intrathecal, IV Infusion) (Astramorph PF, Duramorph):** 0.5 mg/ml, 1 mg/ml. **Injection, Solution (Epidural or Intrathecal) (Infumorph):** 10 mg/ml, 25 mg/ml. **Injection, Solution Patient-Controlled Analgesia (PCA) Pump:** 1 mg/ml, 5 mg/ml. **Solution Oral:** 20 mg/ml, 10 mg/5 ml, 20 mg/5 ml. **Suppository:** 5 mg, 10 mg, 20 mg, 30 mg. **Tablets:** 15 mg, 30 mg.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose results in respiratory depression, skeletal muscle flaccidity, cold/clammy skin, cyanosis, extreme drowsiness progressing to seizures, stupor, coma. Tolerance to analgesic effect, physical dependence may occur with repeated use. Prolonged duration of action, cumulative effect may occur in those with hepatic/renal impairment. **Antidote:** Naloxone (see Appendix K for dosage).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Pt should be in recumbent position before drug is given by parenteral route. Assess onset, type, location, duration of pain. Obtain vital signs before giving medication. If respirations are 12/min or less (20/min or less in children), withhold medication, contact physician. Effect of medication is reduced if full pain recurs before next dose.

INTERVENTION/EVALUATION

Monitor vital signs 5–10 min after IV administration, 15–30 min after subcutaneous, IM. Be alert for decreased respirations, B/P. Check for adequate voiding. Monitor daily pattern of bowel activity, stool consistency; avoid constipation. Initiate deep breathing, coughing exercises, particularly in those with pulmonary impairment. Assess for clinical improvement, record onset of pain relief. Consult physician if pain relief is not adequate.

PATIENT/FAMILY TEACHING

• Discomfort may occur with injection. • Change positions slowly to avoid orthostatic hypotension. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol, CNS depressants. • Tolerance, dependence may occur with prolonged use of high doses. • Report ineffective pain control, constipation, urinary retention.

moxifloxacin

mox-i-**flox**-a-sin
(Avelox, Avelox IV, Moxeza, Vigamox)

■ **BLACK BOX ALERT** ■ May increase risk of tendonitis, tendon rupture (increased with concurrent corticosteroids, organ transplant recipients, those older than 60 yrs). May aggravate myasthenia gravis (avoid use).

Do not confuse Avelox with Avonex.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Fluoroquinolone. **CLINICAL:** Antibacterial, antibiotic.

USES

Treatment of susceptible infections due to *S. pneumoniae, S. pyogenes, S. aureus, H. influenzae, M. catarrhalis, K. pneumoniae, M. pneumoniae, C. pneumoniae* including acute bacterial exacerbation of chronic bronchitis, acute bacterial sinusitis, intra-abdominal infection, community-acquired pneumonia, uncomplicated skin/skin structure infections. **Ophthalmic:** Topical treatment of bacterial conjunctivitis due to susceptible strains of bacteria. **OFF-LABEL:** Legionella, pneumonia, tuberculosis (second-line therapy).

PRECAUTIONS

Contraindications: Hypersensitivity to quinolones. **Cautions:** Renal/hepatic impairment, bradycardia, acute myocardial ischemia, myasthenia gravis, diabetes, rheumatoid arthritis, seizures, pts with prolonged QT interval.

ACTION

Inhibits two enzymes, topoisomerase II and IV, in susceptible microorganisms. **Therapeutic Effect:** Interferes with bacterial DNA replication. Prevents/delays emergence of resistant organisms. Bactericidal.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (8%–6%): Nausea, diarrhea. **Occasional:** **PO, IV (3%–2%):** Dizziness, headache, abdominal pain, vomiting. **Ophthalmic (6%–1%):** Conjunctival irritation, reduced visual acuity, dry eye, keratitis, eye pain, ocular itching, swelling of tissue around cornea, eye discharge, fever, cough, pharyngitis, rash, rhinitis. **Rare (1%):** Altered taste, dyspepsia, photosensitivity.

ADVERSE EFFECTS/ TOXIC REACTIONS

Pseudomembranous colitis (severe abdominal cramps/pain, severe watery diarrhea, fever) may occur. Superinfection (anal/genital pruritus, moderate to severe diarrhea, stomatitis) may occur.

M

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of hypersensitivity to moxifloxacin, quinolones.

INTERVENTION/EVALUATION

Monitor daily pattern of bowel activity, stool consistency. Assist with ambulation if dizziness occurs. Assess for headache, abdominal pain, vomiting, altered taste, dyspepsia. Monitor WBC, signs of infection.

PATIENT/FAMILY TEACHING

• May be taken without regard to food. • Drink plenty of fluids. • Avoid exposure to direct sunlight; may cause photosensitivity reaction. • Do not take antacids 4 hrs before or 8 hrs after dosing. • Take full course of therapy. • Report abdominal cramping/ pain, persistent diarrhea.

mupirocin

mue-peer-oh-sin
(Bactroban, Bactroban Nasal)

Do not confuse Bactroban or Bactroban Nasal with bacitracin, baclofen, or Bactrim.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antibacterial. **CLINICAL:** Topical antibiotic.

USES

Ointment: Topical treatment of impetigo caused by *S. aureus*, *S. pyogenes*. **Cream:** Treatment of traumatic skin lesions due to *S. aureus*, *S. pyogenes*. **Intranasal ointment:** Eradication of *S. aureus* from nasal, perineal carriage sites. **OFF-LABEL:** Surgical prophylaxis to prevent wound infections (intranasal).

PRECAUTIONS

Contraindications: None known. **Cautions:** Renal impairment, burn pts.

ACTION

Inhibits bacterial protein, RNA synthesis. Less effective on DNA synthesis. **Nasal:** Eradicates nasal colonization of methicillin-resistant *Staphylococcus aureus* (MRSA). **Therapeutic Effect:** Prevents bacterial growth, replication. Bacteriostatic.

PHARMACOKINETICS

Following topical administration, penetrates outer layer of skin (minimal through intact skin). Protein binding: 95%. Metabolized in liver. Excreted in urine. **Half-life:** 17–36 min.

PRECAUTIONS

Contraindications: Hypersensitivity to mycophenolic acid or polysorbate 80 (IV formulation). **Cautions:** Active severe GI disease, renal impairment, neutropenia, women of childbearing potential.

ACTION

Suppresses immunologically-mediated inflammatory response by inhibiting inosine monophosphate dehydrogenase, an enzyme that deprives lymphocytes of nucleotides necessary for DNA, RNA synthesis, thus inhibiting proliferation of T and B lymphocytes. **Therapeutic Effect:** Prevents transplant rejection.

PHARMACOKINETICS

Rapidly, extensively absorbed after PO administration (food decreases drug plasma concentration but does not affect absorption). Protein binding: 97%. Completely hydrolyzed to active metabolite mycophenolic acid. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 17.9 hrs.

Generic Drugs N

nabumetone
nadolol
nafcillin
nalbuphine
naloxegol
naloxone
naltrexone
naproxen
naratriptan
natalizumab
nateglinide
nebivolol
nelarabine
neostigmine
nesiritide
niacin, nicotinic acid
niCARdipine
nicotine
NIFEdipine
nilotinib
nilutamide
nimodipine
nitazoxanide
nitrofurantoin
nitroglycerin
nitroprusside
nizatidine
norepinephrine
norfloxacin
nortriptyline
nystatin

N

ACTION

Blocks $beta_1$- and $beta_2$-adrenergic receptors. **Therapeutic Effect:** Reduces blood pressure, improves symptoms of angina.

PHARMACOKINETICS

Variable absorption after PO administration. Protein binding: 28%–30%. Not metabolized. Excreted unchanged in feces. **Half-life:** 20–24 hrs.

IM

- Reconstitute each 500 mg with 1.7 ml Sterile Water for Injection or 0.9% NaCl to provide concentration of 250 mg/ml.
- Inject IM into large muscle mass.

IV INCOMPATIBILITIES

Aztreonam (Azactam), diltiazem (Cardizem), droperidol (Inapsine), fentanyl, gentamicin, insulin, labetalol (Normodyne, Trandate), methylprednisolone (Solu-Medrol), midazolam (Versed), nalbuphine (Nubain), vancomycin (Vancocin), verapamil (Isoptin).

IV COMPATIBILITIES

Acyclovir, famotidine (Pepcid), fluconazole (Diflucan), heparin, hydromorphone (Dilaudid), lidocaine, lipids, magnesium, morphine, potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Usual Dosage

IV: ADULTS, ELDERLY: 0.5–2 g q4–6h. **CHILDREN:** 50–200 mg/kg/day in divided doses q4–6h. **Maximum:** 12 g/day. **NEONATES:** 25 mg/kg/dose in divided doses q6–12h.

IM: ADULTS, ELDERLY: 500 mg q4–6h.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Mild hypersensitivity reaction (fever, rash, pruritus), GI effects (nausea, vomiting, diarrhea). **Occasional:** Hypokalemia with high IV dosages, phlebitis, thrombophlebitis (common in elderly). **Rare:** Extravasation with IV administration.

ADVERSE EFFECTS/ TOXIC REACTIONS

Potentially fatal antibiotic-associated colitis, superinfections (abdominal cramps, severe watery diarrhea, fever) may result from altered bacterial balance in GI tract. Hematologic effects (esp. involving platelets, WBCs), severe hypersensitivity reactions, anaphylaxis occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of allergies, esp. penicillins, cephalosporins.

INTERVENTION/EVALUATION

Hold medication, promptly report rash (possible hypersensitivity), diarrhea (fever, abdominal pain, mucus/blood in stool may indicate antibiotic-associated colitis). Evaluate IV site frequently for phlebitis (heat, pain, red streaking over vein), infiltration (potential extravasation). Monitor periodic CBC, urinalysis, BMP, LFT. Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal changes (ulceration, pain, erythema).

PATIENT/FAMILY TEACHING

- Continue antibiotic for full length of treatment. • Doses should be evenly spaced. • Discomfort may occur with IM injection. • Report IV discomfort immediately. • Report diarrhea, rash, other new symptoms.

nalbuphine

HIGH ALERT

nal-bue-feen

CLASSIFICATION

PHARMACOTHERAPEUTIC: Narcotic agonist, antagonist. **CLINICAL:** Opioid analgesic.

USES

Relief of moderate to severe pain, preop analgesia, obstetric analgesia, adjunct to anesthesia. **OFF-LABEL:** Opioid-induced pruritus.

PRECAUTIONS

Contraindications: None known. **Cautions:** Hepatic/renal impairment, respiratory depression, recent MI, recent

ADVERSE EFFECTS/ TOXIC REACTIONS

Abrupt withdrawal after prolonged use may produce symptoms of narcotic withdrawal (abdominal cramping, rhinorrhea, lacrimation, anxiety, fever, piloerection [goose bumps]). Overdose results in severe respiratory depression, skeletal muscle flaccidity, cyanosis, extreme drowsiness progressing to seizures, stupor, coma. Tolerance to analgesic effect, physical dependence may occur with chronic use.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain vital signs before giving medication. If respirations are 12/min or less (20/min or less in children), withhold medication, contact physician. Assess onset, type, location, duration of pain. Effect of medication is reduced if full pain recurs before next dose. Low abuse potential.

INTERVENTION/EVALUATION

Monitor for change in respirations, B/P, rate/quality of pulse. Monitor daily pattern of bowel activity, stool consistency. Initiate deep breathing, coughing exercises, particularly in pts with pulmonary impairment. Assess for clinical improvement, record onset of relief of pain. Consult physician if pain relief is not adequate.

PATIENT/FAMILY TEACHING

• Avoid alcohol. • Avoid tasks that require alertness, motor skills until response to drug is established. • May cause dry mouth. • May be habit forming.

naloxegol

nal-**ox**-ee-gol
(Movantik)
Do not confuse naloxegol with naloxone.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Opioid receptor antagonist. **CLINICAL:** Anti–opioid-induced constipation agent.

USES

Treatment of opioid-induced constipation (OIC) in adult pts with chronic noncancer pain.

PRECAUTIONS

Contraindications: Concomitant use of strong CYP3A inhibitors, known or suspected mechanical GI obstruction, prior hypersensitivity reaction to drug class. **Cautions:** Concomitant use of moderate CYP3A4 inducers, CYP3A4 inhibitors, avoid use of other opioid antagonists. Pts with peptic ulcer disease, diverticular disease, infiltrative GI tract malignancies, Crohn's disease. Severe renal/hepatic impairment.

ACTION

Blocks opioid binding at peripheral mu-opioid receptors within GI tract. **Therapeutic Effect:** Decreases opioid-related constipation with minimal consequence to opioid analgesic effect.

PHARMACOKINETICS

Absorbed rapidly. Metabolized in liver. Protein binding: 4.2%. Peak plasma concentration: less than 2 hrs. Eliminated in feces (68%), urine (16%). **Half-life:** 6–11 hrs.

naloxone

nal-**ox**-own
(Evzio)
Do not confuse naloxone with Lanoxin or naltrexone.

FIXED-COMBINATION(S)

Embeda: naloxone/morphine (an opioid agonist): 0.8 mg/20 mg, 1.2 mg/30 mg, 2 mg/50 mg, 2.4 mg/60 mg, 3.2 mg/80 mg, 4 mg/100 mg. **Suboxone (sublingual film):** naloxone/buprenorphine (an analgesic): 0.5 mg/2 mg, 1 mg/4 mg, 2 mg/8 mg, 3 mg/12 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Narcotic antagonist. **CLINICAL:** Antidote.

USES

Complete or partial reversal of opioid depression including respiratory depression. Diagnosis of suspected opioid tolerance or acute opioid overdose. Neonatal opiate depression. Coma of unknown origin. **OFF-LABEL:** Opioid-induced pruritus.

PRECAUTIONS

Contraindications: None known. **Cautions:** Cardiac/pulmonary disease, history of seizures.

ACTION

Displaces opioids at opioid-occupied receptor sites in CNS. **Therapeutic Effect:** Reverses opioid-induced sleep/sedation, increases respiratory rate, raises B/P to normal range.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	1–2 min	N/A	20–60 min
IM	2–5 min	N/A	20–60 min
Subcutaneous	2–5 min	N/A	20–60 min

Well absorbed after IM, subcutaneous administration. Metabolized in liver. Primarily excreted in urine. **Half-life:** 60–100 min.

metabolism when given by intramuscular route. Excreted primarily in urine. **Half-life:** **PO:** 4 hrs; **IM:** 5–10 days.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (analgesic)	1 hr	2–4 hrs	7 hrs or less
PO (anti-inflammatory)	2 wks	2–4 wks	12 hrs

Completely absorbed from GI tract. Protein binding: 99%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 13 hrs.

MAOI use within 14 days. **Cautions:** Mild to moderate renal/hepatic impairment, pt profile suggesting cardiovascular risks, elderly.

ACTION

Binds selectively to serotonin receptors, producing vasoconstrictive effect on cranial blood vessels. **Therapeutic Effect:** Relieves migraine headache.

PHARMACOKINETICS

Well absorbed after PO administration. Protein binding: 28%–31%. Metabolized in liver. Eliminated primarily in urine. **Half-life:** 6 hrs (increased in hepatic/renal impairment).

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (35%–15%): Headache, fatigue, depression, arthralgia. **Occasional (10%–5%):** Abdominal discomfort, rash, urinary urgency/frequency, irregular menstruation/dysmenorrhea, dermatitis. **Rare (4%–2%):** Pruritus, chest discomfort, local bleeding, rigors, tremor, syncope.

ADVERSE EFFECTS/ TOXIC REACTIONS

UTI, lower respiratory tract infection, gastroenteritis, vaginitis, allergic reaction, tonsillitis, PMI.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, serum chemistries, LFT. Assess home situation for support of therapy.

INTERVENTION/EVALUATION

Periodically monitor lab results. Assess for arthralgia, depression, urinary changes, menstrual irregularities. Assess skin for evidence of rash, pruritus, dermatitis. Monitor for signs/symptoms of UTI, respiratory infection.

nateglinide

HIGH ALERT

na-**te**-glye-nide
(Starlix)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antihyperglycemic. **CLINICAL:** Antidiabetic agent.

USES

Treatment of type 2 diabetes mellitus as an adjunct to diet and exercise.

PRECAUTIONS

Contraindications: Diabetic ketoacidosis, type 1 diabetes mellitus. **Cautions:** Moderate to severe hepatic impairment, severe renal impairment, elderly, malnourished, adrenal/pituitary dysfunction.

ACTION

Stimulates insulin release from beta cells of pancreas by depolarizing beta cells, leading to opening of calcium channels. Resulting calcium influx induces insulin secretion. **Therapeutic Effect:** Lowers serum glucose concentration.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	20 min	1 hr	4 hrs

Rapidly absorbed from GI tract. Protein binding: 98%. Extensive metabolism in liver. Excreted in urine (83%), feces (10%). **Half-life:** 1.5 hrs.

CHILDREN

Frequent (17%): Headache. **Occasional (10%–6%):** Vomiting, drowsiness, asthenia, peripheral neuropathy. **Rare (4%–2%):** Paresthesia, tremor, ataxia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may result in severe neurotoxicity, myelosuppression. Hematologic toxicity manifested as thrombocytopenia, neutropenia, anemia occurs in most cases. Pleural effusion occurs in 10% of pts, pneumonia in 8% of pts, seizures in 6% of pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Give emotional support. Use strict asepsis, protect pt from infection. Hydration, urine alkalization, prophylaxis with allopurinol must be given to prevent hyperuricemia of tumor lysis syndrome. Perform blood counts as needed to monitor response and toxicity but esp. before each dosing cycle.

INTERVENTION/EVALUATION

Monitor for neurologic toxicity (severe drowsiness, confusion, seizure), hematologic toxicity (fever, sore throat, signs of local infections, unusual bruising/bleeding), symptoms of anemia (excessive fatigue, weakness). Assess response to medication; monitor and report nausea, vomiting, diarrhea. Avoid rectal temperatures, other traumas that may induce bleeding. Monitor renal/hepatic function.

PATIENT/FAMILY TEACHING

• Do not have immunizations without physician's approval (drug lowers resistance). • Avoid crowds, persons with known infections. • Report signs of infection at once (fever, flu-like symptoms). • Report persistent nausea/vomiting. • Advise men to use barrier contraception while receiving treatment. • Measures should be taken to avoid pregnancy. • Report new or worsening symptoms of peripheral neuropathy.

neostigmine

nee-oh-**stig**-meen
(Prostigmin)
Do not confuse neostigmine or Prostigmin with physostigmine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Cholinergic. **CLINICAL:** Antimyasthenic agent, antidote.

USES

Improvement of muscle strength in control of myasthenia gravis, diagnosis of myasthenia gravis, prevention/treatment of postop bladder distention, urinary retention; antidote for reversal of effects of nondepolarizing neuromuscular blocking agents after surgery.

PRECAUTIONS

Contraindications: GI/GU obstruction, peritonitis, history of hypersensitivity reaction to bromides (tablets only). **Cautions:** Epilepsy, asthma, bradycardia, hyperthyroidism, arrhythmias, peptic ulcer, hypotension, coronary artery disease, elderly. **Pregnancy Category C.**

ACTION

Prevents destruction of acetylcholine by attaching to enzyme acetylcholinesterase, enhancing impulse transmission across myoneural junction. **Therapeutic Effect:** Improves intestinal/skeletal muscle tone; stimulates salivary, sweat gland secretions.

INTERACTIONS

DRUG: Anticholinergics reverse, prevent effects. **Cholinesterase inhibitors** may increase risk of toxicity. Antagonizes effects of **neuromuscular blockers.**

PATIENT/FAMILY TEACHING

- Report nausea, vomiting, diarrhea, diaphoresis, increased salivary secretions, palpitations, muscle weakness, severe abdominal pain, difficulty breathing.

nesiritide

ne-**sir**-i-tide
(Natrecor)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Human B-type natriuretic peptide. **CLINICAL:** Endogenous hormone.

USES

Treatment of acutely decompensated HF in pts who have dyspnea at rest or with minimal activity.

PRECAUTIONS

Contraindications: Cardiogenic shock (when used as primary therapy), persistent systolic B/P less than 100 mm Hg prior to therapy. **Cautions:** Significant valvular stenosis, restrictive/obstructive cardiomyopathy, constrictive pericarditis, pericardial tamponade, low cardiac filling pressures, renal insufficiency.

ACTION

Increases cyclic GMP, causing smooth muscle relaxation. **Therapeutic Effect:** Promotes vasodilation, natriuresis, diuresis, correcting HF.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	15 min	1 hr	Up to 4 hrs

Excreted primarily in heart by left ventricle. Metabolized by natriuretic neutral endopeptidase enzymes on vascular luminal surface. **Half-life:** 18–23 min.

PATIENT/FAMILY TEACHING

• Transient flushing of the skin, sensation of warmth, pruritus, tingling may occur. • Report dizziness (avoid sudden changes in posture). • Report nausea, vomiting, loss of appetite, yellowing of skin, dark urine, feeling of weakness. • If medically approved, take aspirin 30 min before taking extended-release niacin to minimize flushing. • Take at bedtime with low-fat snack. • Limit alcohol consumption.

*niCARdipine

nye-**kar**-di-peen
(Cardene IV, Cardene SR)
Do not confuse Cardene SR with Cardizem SR or codeine, or nicardipine with nifedipine or nimodipine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Calcium channel blocker. **CLINICAL:** Antianginal, antihypertensive.

USES

PO: Immediate-release: Treatment of chronic stable (effort-associated) angina, hypertension. **Sustained-release:** Treatment of hypertension. **Parenteral:** Short-term treatment of hypertension when oral therapy not feasible or desirable. **OFF-LABEL:** Subarachnoid hemorrhage with associated neurologic deficits, prevention of migraine headaches, HF, control blood pressure in acute ischemic stroke and intracranial hemorrhage, postoperative hypertension associated with carotid endarterectomy.

PRECAUTIONS

Contraindications: Advanced aortic stenosis. **Cautions:** Cardiac/renal/hepatic dysfunction, HF, hypertrophic cardiomyopathy with outflow tract obstruction, aortic stenosis, coronary artery disease, portal hypertension.

ACTION

Inhibits calcium ion movement across cell membranes, depressing contraction of cardiac, vascular smooth muscle. **Therapeutic Effect:** Increases heart rate, cardiac output, myocardial oxygen delivery. Decreases systemic vascular resistance, B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	0.5–2 hrs	—	8 hrs
IV	10 min	—	8 hrs or less

Rapidly, completely absorbed from GI tract. Protein binding: 95%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 2–4 hrs.

NaCl to provide concentration of 0.1 mg/ml.

Rate of Administration • Give by slow IV infusion. • Change IV site q12h if administered peripherally.

Storage • Store at room temperature. • Diluted IV solution is stable for 24 hrs at room temperature.

PO

• Give without regard to food. • Do not break, crush, or open capsules. Give whole.

IV INCOMPATIBILITIES

Ampicillin (Principen), ampicillin/sulbactam (Unasyn), cefepime (Maxipime), ceftazidime (Fortaz), furosemide (Lasix), heparin, sodium bicarbonate.

IV COMPATIBILITIES

Diltiazem (Cardizem), dobutamine (Dobutrex), dopamine (Intropin), epinephrine, hydromorphone (Dilaudid), labetalol (Trandate), lorazepam (Ativan), midazolam (Versed), milrinone (Primacor), morphine, nitroglycerin, norepinephrine (Levophed), potassium chloride.

INDICATIONS/ROUTES/DOSAGE

Chronic Stable Angina

PO: ADULTS, ELDERLY: Initially, 20 mg 3 times/day. Range: 20–40 mg 3 times/day (allow 3 days between dosage increases).

Hypertension

PO: ADULTS, ELDERLY: Initially, 20 mg 3 times/day. Range: 20–40 mg 3 times/day (allow 3 days between dosage increases).

PO *(Sustained-Release):* ADULTS, ELDERLY: Initially, 30 mg twice daily. Range: 30–60 mg twice daily.

Short-Term Treatment of Hypertension (Parenteral Dosage as Substitute for Oral Nicardipine)

IV: ADULTS, ELDERLY: 0.5 mg/hr (for pt receiving 20 mg PO q8h), 1.2 mg/hr (for pt receiving 30 mg PO q8h), 2.2 mg/hr (for pt receiving 40 mg PO q8h).

Pts Not Already Receiving Nicardipine

IV: ADULTS, ELDERLY (GRADUAL B/P DECREASE): Initially, 5 mg/hr. May increase by 2.5 mg/hr q15min. After B/P goal is achieved, decrease rate to 3 mg/hr. **ADULTS, ELDERLY (RAPID B/P DECREASE):** Initially, 5 mg/hr. May increase by 2.5 mg/hr q5min. **Maximum:** 15 mg/hr until desired B/P attained. After B/P goal achieved, decrease rate to 3 mg/hr.

Changing From IV to Oral Antihypertensive Therapy

ADULTS, ELDERLY: Begin antihypertensives other than nicardipine when IV has been discontinued; for nicardipine, give first dose 1 hr before discontinuing IV.

Dosage in Hepatic Impairment

ADULTS, ELDERLY: Initially, give 20 mg twice daily, then titrate.

Dosage in Renal Impairment

ADULTS, ELDERLY: Initially, give 20 mg q8h (30 mg twice daily [sustained-release capsules]), then titrate.

SIDE EFFECTS

Frequent (10%–7%): Headache, facial flushing, peripheral edema, light-headedness, dizziness. **Occasional (6%–3%):** Asthenia, palpitations, angina, tachycardia. **Rare (Less Than 2%):** Nausea, abdominal cramps, dyspepsia, dry mouth, rash.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose produces confusion, slurred speech, drowsiness, marked hypotension, bradycardia.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Concurrent therapy with sublingual nitroglycerin may be used for relief of anginal pain. Record onset, type (sharp, dull, squeezing), radiation, location, intensity, duration of anginal pain, precipitating factors (exertion, emotional stress).

INTERVENTION/EVALUATION

Monitor B/P during and following IV infusion. Assess for peripheral edema. Assess skin for facial flushing, dermatitis, rash. Question for asthenia, headache. Monitor LFT results. Assess EKG, pulse for tachycardia.

PATIENT/FAMILY TEACHING

• May take without regard to food. • Sustained-release capsule taken whole; do not break, chew, crush, or divide. • Avoid alcohol, grapefruit products, limit caffeine. • Report if anginal pain not relieved or palpitations, shortness of breath, swelling, dizziness, constipation, nausea, hypotension occur. • Avoid tasks requiring motor skills, alertness until response to drug is established.

nicotine

nik-o-teen
(Habitrol, NicoDerm, NicoDerm CQ, Nicorette, Nicorette Plus, Nicotrol, Nicotrol Inhaler, Nicotrol NS, Thrive)
Do not confuse NicoDerm with Nitroderm.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Cholinergic-receptor agonist. **CLINICAL:** Smoking deterrent.

USES

Treatment to aid smoking cessation for relief of nicotine withdrawal symptoms. **OFF-LABEL:** **Transdermal:** Management of ulcerative colitis.

PRECAUTIONS

Contraindications: Smoking during immediate post-MI period, life-threatening arrhythmias, severe or worsening angina, active temporomandibular joint disease (gum), pregnancy. **Cautions:** Hyperthyroidism, pheochromocytoma, insulin-dependent diabetes mellitus, severe renal impairment, eczematous dermatitis, oropharyngeal inflammation, esophagitis, peptic ulcer (delays healing in peptic ulcer disease), coronary artery disease, recent MI, serious cardiac arrhythmias, vasospastic disease, angina, hypertension, hepatic impairment, use of oral inhaler/nasal spray with bronchospastic disease.

ACTION

Binds to acetylcholine receptors, producing both stimulating, depressant effects on peripheral, central nervous systems. **Therapeutic Effect:** Provides source of nicotine during nicotine withdrawal, reduces withdrawal symptoms.

PHARMACOKINETICS

Absorbed slowly after transdermal administration. Protein binding: 5%. Metabolized in liver. Excreted primarily in urine. **Half-life:** 4 hrs.

ADMINISTRATION/HANDLING

Gum

• Do not swallow. • Chew 1 piece when urge to smoke present. • Chew slowly and intermittently for 30 min. • Chew until distinctive nicotine taste (peppery) or slight tingling in mouth perceived, then stop; when tingling almost gone (about 1 min) repeat chewing procedure (this allows constant slow buccal absorption). • Too-rapid chewing may cause excessive release of nicotine, resulting in adverse effects similar to oversmoking (e.g., nausea, throat irritation).

Inhaler

• Insert cartridge into mouthpiece. • Puff on nicotine cartridge mouthpiece for 20 min.

Lozenge

• Do not chew or swallow. • Allow to dissolve slowly (20–30 min).

Transdermal

• Apply promptly upon removal from protective pouch (prevents evaporation, loss of nicotine). • Use only intact pouch. Do not cut patch. • Apply only once daily to hairless, clean, dry skin on upper body, outer arm. • Replace daily; rotate sites; do not use same site within 7 days; do not use same patch longer than 24 hrs. • Wash hands with water alone after applying patch (soap may increase nicotine absorption). • Discard used patch by folding patch in half (sticky side together), placing in pouch of new patch, and throwing away in such a way as to prevent child or pet accessibility. • Patch may contain conducting metal; remove prior to MRI.

INDICATIONS/ROUTES/DOSAGE

Smoking Cessation Aid to Relieve Nicotine Withdrawal Symptoms

PO *(Chewing Gum)*: ADULTS, ELDERLY: Less than 25 cigarettes/day: Use 2 mg. 25 or more cigarettes/day: Use 4 mg. Chew 1 piece of gum when urge to smoke, up to 24/day. Use following schedule: wks 1–6: q1–2h (at least 9 pieces/day); wks 7–9: q2–4h; wks 10–12: q4–8h.

PO *(Lozenge)*: ◀ALERT▶ For pts who smoke the first cigarette within 30 min of waking, administer the 4-mg lozenge; otherwise, administer the 2-mg lozenge. **ADULTS, ELDERLY:** One 4-mg or 2-mg lozenge q1–2h for the first 6 wks (use at least 9 lozenges/day first 6 wks); 1 lozenge q2–4h for wks 7–9; and 1 lozenge q4–8h for wks 10–12. **Maximum:** 1 lozenge at a time, 5 lozenges/6 hrs, 20 lozenges/day.

Transdermal: ◀ALERT▶ Apply 1 new patch q24h. **ADULTS, ELDERLY WHO SMOKE 10 CIGARETTES OR MORE PER DAY:** Follow the guidelines below. **Step 1:** 21 mg/day for 6 wks. **Step 2:** 14 mg/day for 2 wks. **Step 3:** 7 mg/day for 2 wks. **ADULTS, ELDERLY WHO SMOKE LESS THAN 10 CIGARETTES PER DAY:** Follow the guidelines below. **Step 1:** 14 mg/day for 6 wks. **Step 2:** 7 mg/day for 2 wks.

Nasal: ADULTS, ELDERLY: Each dose (2 sprays, 1 spray in each nostril) = 1 mg nicotine. Initially, 1–2 doses/hr. **Maximum:** 5 doses/hr (10 sprays), 40 doses/day (80 sprays). Take at least 8 doses (16 sprays) per day.

Inhaler *(Nicotrol)*: ADULTS, ELDERLY: Puff on nicotine cartridge mouthpiece for about 20 min as needed.

SIDE EFFECTS

Frequent: All forms: Hiccups, nausea. **Gum:** Mouth/throat soreness. **Transdermal:** Erythema, pruritus, burning at application site. **Occasional: All forms:** Eructation, GI upset, dry mouth, insomnia, diaphoresis, irritability. **Gum:** Hoarseness. **Inhaler:** Mouth/throat irritation, cough. **Rare: All forms:** Dizziness, myalgia, arthralgia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose produces palpitations, tachyarrhythmias, seizures, depression, confusion, diaphoresis, hypotension, rapid/weak pulse, dyspnea. Lethal dose for

adults is 40–60 mg. Death results from respiratory paralysis.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Screen, evaluate those with coronary heart disease (history of MI, angina pectoris), serious cardiac arrhythmias, Buerger's disease, Prinzmetal's variant angina.

INTERVENTION/EVALUATION

Monitor smoking habits, B/P, pulse, sleep pattern, skin for erythema, pruritus, burning at application site if transdermal system used.

PATIENT/FAMILY TEACHING

• Follow guidelines for proper application of transdermal system. • Chew gum slowly to avoid jaw ache, maximize benefit. • Report persistent rash, pruritus that occurs with patch. • Do not smoke while wearing patch.

*NIFEdipine

nye-**fed**-i-peen
(Adalat CC, Adalat XL, Afeditab CR, Apo-Nifed, Nifediac CC, Nifedical XL, Procardia, Procardia XL)
Do not confuse nifedipine with nicardipine or nimodipine, or Procardia XL with Cartia XT.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Calcium channel blocker. **CLINICAL:** Antianginal, antihypertensive.

USES

Treatment of angina due to coronary artery spasm (Prinzmetal's variant angina), chronic stable angina (effort-associated angina). **Extended-release:** Treatment of hypertension. **OFF-LABEL:** Treatment of Raynaud's phenomenon, pulmonary hypertension, preterm labor, prevention/treatment of high-altitude pulmonary edema.

PRECAUTIONS

Contraindications: Cardiogenic shock, concomitant administration with strong CYP3A4 inducers (e.g., rifampin), acute MI. **Immediate-Release:** Treatment of urgent/emergent hypertension. **Cautions:** Renal/hepatic impairment, obstructive coronary disease, HF, severe aortic stenosis, edema, severe left ventricular dysfunction, hypertrophic cardiomyopathy, concurrent use with beta blockers or digoxin, CYP3A4 inhibitors/inducers.

ACTION

Inhibits calcium ion movement across cell membranes, depressing contraction of cardiac, vascular smooth muscle. **Therapeutic Effect:** Increases heart rate, myocardial oxygen delivery, cardiac output. Decreases systemic vascular resistance, B/P.

PHARMACOKINETICS

Rapidly, completely absorbed from GI tract. Protein binding: 92%–98%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 2–5 hrs.

furosemide, other diuretics) may increase risk of arrhythmias. **HERBAL: Ephedra, garlic, ginseng, yohimbe** may increase hypertension. **Licorice** may cause retention of sodium, water; may increase loss of potassium. **St. John's wort** decreases concentration/effects. **FOOD: Grapefruit products** may increase risk for flushing, headache, tachycardia, hypotension. **LAB VALUES:** May cause positive ANA, direct Coombs' test.

AVAILABILITY (Rx)

Capsules (Procardia): 10 mg, 20 mg.

INDICATIONS/ROUTES/DOSAGE

Note: Dosage adjusted in hepatic impairment, hematologic toxicity, nonhematologic toxicity, QT prolongation (consult specific product labeling).

Chronic Myelogenous Leukemia (CML)
PO: ADULTS, ELDERLY: 400 mg twice daily every 12 hrs, without food.

Ph+ CML-CP
PO: ADULTS, ELDERLY: 300 mg twice daily. **HEPATIC IMPAIRMENT:** 200 mg twice daily, may increase to 300 mg twice daily based on tolerability.

Dosage in Renal Impairment
No dose adjustment.

Dosage in Hepatic Impairment
300 mg twice daily; may increase to 400 mg twice daily based on tolerability.

SIDE EFFECTS

Frequent (33%–21%): Rash, nausea, headache, pruritus, fatigue, diarrhea, constipation, vomiting. **Occasional (18%–10%):** Arthralgia, cough, pharyngitis, asthenia, fever, myalgia, abdominal pain, peripheral edema, weight gain, bone pain, muscle spasm, back pain. **Rare (9%–1%):** Anorexia, insomnia, dizziness, paresthesia, vertigo, palpitations, flushing, hypertension, flatulence, alopecia, night sweats.

ADVERSE EFFECTS/ TOXIC REACTIONS

Prolongation of QT interval producing ventricular tachycardia (torsades de pointes) may result in seizure, sudden death. Neutropenia, thrombocytopenia, anemia are expected response to drug. Respiratory toxicity manifested as dyspnea, pneumonia.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC every 2 wks for the first 2 mos and then monthly thereafter. Hypokalemia or hypomagnesemia must be corrected prior to initiating therapy. Monitor LFT before treatment begins and monthly thereafter. Obtain baseline weight.

INTERVENTION/EVALUATION

Monitor serum electrolytes periodically during therapy, particularly potassium, magnesium, sodium, lipase. Monitor for unexpected weight gain. Offer antiemetics to control nausea, vomiting. Monitor daily pattern of bowel frequency, stool consistency. Monitor CBC for evidence of neutropenia, thrombocytopenia; assess LFT for hepatotoxicity. Monitor closely for QT-interval prolongation.

PATIENT/FAMILY TEACHING

• Avoid crowds, those with known infection. • Avoid contact with anyone who recently received live virus vaccine; do not receive vaccinations. • Do not ingest food less than 2 hours before and less than 1 hr after dose is taken. • Avoid grapefruit products.

N

nilutamide

HIGH ALERT

nye-**loo**-ta-myde
(Anandron, Nilandron)

■ **BLACK BOX ALERT** ■ Interstitial pneumonitis reported in 2% of pts manifested as progressive exertional dyspnea, cough, chest pain, fever.

Do not confuse nilutamide with nilotinib.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Hormone. **CLINICAL:** Antineoplastic.

USES

Treatment of metastatic prostatic carcinoma (stage D_2) in combination with surgical castration.

PRECAUTIONS

Contraindications: Severe hepatic impairment, severe respiratory insufficiency.

USES

Improvement of neurologic deficits due to cerebral vasospasm following subarachnoid hemorrhage from ruptured intracranial aneurysms.

PRECAUTIONS

Contraindications: None known. **Cautions:** Pts with cirrhosis.

ADVERSE EFFECTS/ TOXIC REACTIONS

None known.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Establish baseline B/P, weight, serum glucose, electrolytes. Assess for dehydration.

INTERVENTION/EVALUATION

Evaluate serum glucose in diabetics, electrolytes (therapy generally reduces abnormalities). Weigh pt daily. Encourage adequate fluid intake. Assess bowel sounds for peristalsis. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

- Parents of children with diabetes should be aware that the oral suspension contains 1.48 g of sucrose per 5 ml.
- Therapy should provide significant improvement of diarrhea.

nitrofurantoin

nye-troe-fue-**ran**-toyn
(Apo-Nitrofurantoin ✱, Furadantin, Macrobid, Macrodantin, Novo-Furantoin ✱)

Do not confuse Macrobid with MicroK or Nitro-Bid, or nitrofurantoin with Neurontin or nitroglycerin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Antibacterial. **CLINICAL:** Antibiotic, UTI prophylaxis.

USES

Prevention/treatment of UTI caused by susceptible gram-negative, gram-positive organisms, including *E. coli, S. aureus, Enterococcus, Klebsiella, Enterobacter.*

PRECAUTIONS

Contraindications: Anuria, oliguria, substantial renal impairment (creatinine clearance less than 60 ml/min), infants younger than 1 mo due to risk of hemolytic anemia. Pregnancy at term, during labor, or delivery, or when onset of labor is imminent. Pts with history of cholestatic jaundice or hepatic impairment with previous nitrofurantoin therapy **Cautions:** Renal impairment, diabetes mellitus, electrolyte imbalance, anemia, vitamin B deficiency, debilitated (greater risk of peripheral neuropathy), G6PD deficiency (greater risk of hemolytic anemia).

ACTION

Inhibits with bacterial enzyme systems, interfering with metabolism and cell wall synthesis. **Therapeutic Effect:** Bacteriostatic (bactericidal at high concentrations).

PHARMACOKINETICS

Microcrystalline form rapidly, completely absorbed; macrocrystalline form more slowly absorbed. Food increases absorption. Protein binding: 60%. Primarily concentrated in urine, kidneys. Metabolized in most body tissues. Primarily excreted in urine. Removed by hemodialysis. **Half-life:** 20–60 min.

USES

Treatment/prevention of angina pectoris. Extended-release, topical forms used for prophylaxis, long-term angina management. IV form used in treatment of HF, acute MI, perioperative hypertension, induction of intraoperative hypotension. **OFF-LABEL:** Short-term management of pulmonary hypertension, esophageal spastic disorders, uterine relaxation, treatment of sympathomimetic vasopressor extravasation.

PRECAUTIONS

Contraindications: Allergy to adhesives (transdermal); increased ICP; severe anemia; concurrent use of sildenafil, tadalafil, vardenafil (PDE5 inhibitors). **IV:** Restrictive cardiomyopathy, pericardial tamponade, constrictive pericarditis. **Cautions:** Blood volume depletion, severe hypotension (systolic B/P less than 90 mm Hg), bradycardia (less than 50 beats/min), inferior wall MI and suspected right ventricular involvement.

N

ACTION

Dilates coronary arteries, improves collateral blood flow to ischemic areas within myocardium. IV form produces peripheral vasodilation. **Therapeutic Effect:** Decreases myocardial oxygen demand. Reduces left ventricular preload, afterload.

PHARMACOKINETICS

Route	Onset	Peak	Duration
Sublingual	1–3 min	4–8 min	30–60 min
Translingual spray	2 min	4–10 min	30–60 min
Buccal tablet	2–5 min	4–10 min	2 hrs
PO (extended-release)	20–45 min	45–120 min	4–8 hrs
Topical	15–60 min	30–120 min	2–12 hrs
Transdermal patch	40–60 min	60–180 min	18–24 hrs
IV	1–2 min	Immediate	3–5 min

Well absorbed after PO, sublingual, topical administration. Metabolized in liver, by enzymes in bloodstream. Protein binding: 60%. Excreted in urine. Not removed by hemodialysis. **Half-life:** 1–4 min.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent: Headache (possibly severe; occurs mostly in early therapy, diminishes rapidly in intensity, usually disappears during continued treatment), transient flushing of face/neck, dizziness (esp. if pt is standing immobile or is in a warm environment), weakness, orthostatic hypotension. **Sublingual:** Burning, tingling sensation at oral point of dissolution. **Ointment:** Erythema, pruritus. **Occasional:** GI upset. **Transdermal:** Contact dermatitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Discontinue drug if blurred vision, dry mouth occurs. Severe orthostatic hypotension may occur, manifested by syncope, pulselessness, cold/clammy skin, diaphoresis. Tolerance may occur with repeated, prolonged therapy; minor tolerance may occur with intermittent use of sublingual tablets. High doses tend to produce severe headache.

N

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Record onset, type (sharp, dull, squeezing), radiation, location, intensity, duration of anginal pain; precipitating factors (exertion, emotional stress). Assess B/P, apical pulse before administration and periodically following dose. Pt must have continuous EKG monitoring for IV administration. Rule out right-sided MI, if applicable (may precipitate life-threatening hypotension).

INTERVENTION/EVALUATION

Monitor B/P, heart rate. Assess for facial, neck flushing. Cardioverter/defibrillator must not be discharged through paddle electrode overlying nitroglycerin (transdermal, ointment) system (may cause burns to pt or damage to paddle via electrical arcing). Consider NS boluses for hypotension.

PATIENT/FAMILY TEACHING

• Go from lying to standing slowly. • Take oral form on empty stomach (however, if headache occurs during therapy, take medication with meals). • Use spray only when lying down. • Dissolve sublingual tablet under tongue; do not swallow. • Take at first sign of angina. • May take another dose q5min if needed up to a total of 3 doses. • If not relieved within 5 min, contact physician or immediately go to emergency room. • Do not change brands. • Keep container away from heat, moisture. • Do not inhale lingual aerosol but spray onto or under tongue (avoid swallowing after spray is administered). • Expel from mouth any remaining lingual, sublingual, intrabuccal tablet after pain is completely relieved. • Place transmucosal tablets under upper lip or buccal pouch (between cheek and gum); do not chew/swallow tablet. • Avoid alcohol (intensifies hypotensive effect). If alcohol is ingested soon after taking nitroglycerin, possible acute hypotensive episode (marked drop in B/P, vertigo, diaphoresis, pallor) may occur. • Do not use within 48 hrs of sildenafil, tadalafil, vardenafil (PDE_5 inhibitors; may cause acute hypotensive episode.

nitroprusside

HIGH ALERT

nye-troe-**prus**-ide
(Nipride, Nitropress)

■ **BLACK BOX ALERT** ■ Must dilute with D_5W. Can cause sharp decrease in B/P; may lead to irreversible ischemia, death. Unless used briefly or at low infusion rate (less than 2 mcg/kg/min), potentially lethal levels of cyanide may result. Do not use maximum dose for longer than 10 min.

Do not confuse nitroprusside with nitroglycerin or Nitrostat.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Vasodilator. **CLINICAL:** Antihypertensive, vasodilator, antidote.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Occasional: Flushing of skin, pruritus, pain/redness at injection site.

ADVERSE EFFECTS/ TOXIC REACTIONS

Too-rapid IV infusion rate reduces B/P too quickly. Nausea, vomiting, diaphoresis, apprehension, headache, restlessness, muscle twitching, dizziness, palpitations, retrosternal pain, abdominal pain may occur. Symptoms disappear rapidly if rate of administration is slowed or temporarily discontinued. Overdose produces metabolic acidosis, tolerance to therapeutic effect.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check with physician for desired B/P parameters (B/P is normally maintained approximately 30%–40% below pretreatment levels). Medication should be discontinued if therapeutic response is not achieved within 10 min after IV infusion at 10 mcg/kg/min.

INTERVENTION/EVALUATION

Monitor EKG, B/P continuously. Monitor blood acid-base balance, electrolytes, laboratory results, I&O. Assess for metabolic acidosis (weakness, disorientation, headache, nausea, hyperventilation, vomiting). Assess for therapeutic response to medication. Monitor B/P for potential rebound hypertension after infusion is discontinued.

nizatidine

nye-**za**-ti-deen
(Apo-Nizatidine, Axid, Axid AR
Novo-Nizatidine)
Do not confuse Axid with Ansaid.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: H_2 receptor antagonist. **CLINICAL:** Antiulcer, gastric acid secretion inhibitor.

USES

Short-term treatment of active duodenal ulcer, active benign gastric ulcer. Prevention of duodenal ulcer recurrence. Treatment of gastroesophageal reflux disease (GERD), including erosive esophagitis. **OFF-LABEL:** Part of multidrug therapy for *H. pylori* eradication used to reduce risk of duodenal ulcer recurrence.

PRECAUTIONS

Contraindications: Hypersensitivity to other H_2 antagonists. **Cautions:** Renal impairment.

ACTION

Inhibits histamine action at histamine-2 (H_2) receptors of gastric parietal cells. **Therapeutic Effect:** Inhibits basal/nocturnal gastric acid secretion.

PHARMACOKINETICS

Rapidly, well absorbed from GI tract. Protein binding: 35%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 1–2 hrs (increased in renal impairment).

until volume replaced), mesenteric/peripheral vascular thrombosis (unless it is lifesaving procedure). **Cautions:** Concurrent use of MAOIs.

ACTION

Stimulates $beta_1$-adrenergic receptors, alpha-adrenergic receptors, increasing contractility, heart rate and producing vasoconstriction. **Therapeutic Effect:** Increases systemic B/P, coronary blood flow.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	Rapid	1–2 min	N/A

Localized in sympathetic tissue. Metabolized in liver. Primarily excreted in urine.

AVAILABILITY (Rx)

Tablets: 400 mg.

ADMINISTRATION/HANDLING

PO

• Give 1 hr before or 2 hrs after meals with 8 oz of water. • Encourage additional glasses of water between meals. • Do not administer antacids with or within 2 hrs of norfloxacin dose. • Encourage cranberry juice, citrus fruits (to acidify urine).

INDICATIONS/ROUTES/DOSAGE

UTI

PO: ADULTS, ELDERLY: 400 mg twice daily for 3–21 days.

Dosage in Renal Impairment

Dosage and frequency are modified based on creatinine clearance.

Creatinine Clearance	Dosage
30 ml/min or higher	400 mg twice daily
Less than 30 ml/min	400 mg once daily

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Nausea, headache, dizziness. **Rare:** Vomiting, diarrhea, dry mouth, bitter taste, anxiety, drowsiness, insomnia, photosensitivity, tinnitus, crystalluria, rash, fever, seizures.

ADVERSE EFFECTS/ TOXIC REACTIONS

Superinfection, anaphylaxis, Stevens-Johnson syndrome, arthropathy occur rarely. Hypersensitivity reactions, including photosensitivity, rash, pruritus, blisters, edema, burning skin, may be noted.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of hypersensitivity to norfloxacin, quinolones.

INTERVENTION/EVALUATION

Assess for nausea, headache, dizziness. Evaluate food tolerance. Assess for chest, joint pain (arthropathy).

PATIENT/FAMILY TEACHING

• Take 1 hr before or 2 hrs after meals. • Complete full course of therapy. • Take with 8 oz of water; drink several glasses of water between meals. • May cause dizziness, drowsiness. • Avoid tasks that require alertness, motor skills until response to drug is established. • Do not take antacids with or within 2 hrs of norfloxacin dose (reduces or destroys effectiveness).

nortriptyline

nor-**trip**-ti-leen
(Apo-Nortriptyline, Aventyl, Norventyl, Pamelor)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal thinking and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse Aventyl with Bentyl, or nortriptyline with amitriptyline, desipramine, or Norpramin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tricyclic compound. **CLINICAL:** Antidepressant.

USES

Treatment of symptoms of depression. **OFF-LABEL:** Treatment of neurogenic pain, anxiety disorders, ADHD, adjunctive therapy for smoking cessation, enuresis, migraine prophylaxis.

PRECAUTIONS

Contraindications: Acute recovery period after MI, MAOI use within 14 days, initiation of nortriptyline in pt receiving linezolid. **Cautions:** Prostatic hyperplasia,

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess for suicidal ideation/tendencies, behavior, thought content, appearance. Obtain baseline glucose, cholesterol levels. For pts on long-term therapy, hepatic/renal function tests, blood counts should be performed periodically.

INTERVENTION/EVALUATION

Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Assess appearance, behavior, speech pattern, level of interest, mood. Monitor daily pattern of bowel activity, stool consistency. Avoid constipation with increased fluids, bulky foods. Monitor B/P, pulse for hypotension, arrhythmias, weight. Assess for urinary retention. Therapeutic peak serum level: 6–10 mcg/ml; trough serum level: 0.5–2 mcg/ml. Toxic peak serum level: greater than 12 mcg/ml; toxic trough: greater than 2 mcg/ml.

PATIENT/FAMILY TEACHING

• Slowly go from lying to standing to avoid hypotensive effect; tolerance to postural hypotension, sedative, anticholinergic effects usually develops during early therapy. • Avoid alcohol. • Avoid tasks that require alertness, motor skills until response to drug is established. • Therapeutic effect may be noted in 2 wks or longer. • Photosensitivity to sun may occur; use sunscreen, protective clothing. • Dry mouth may be relieved by sugarless gum, sips of water. • Report visual disturbances, worsening depression, suicidal ideation, unusual changes in behavior (esp. at initiation of therapy or with changes in dosage). • Do not abruptly discontinue medication.

N

nystatin

nye-**stat**-in
(Candistatin, Nystop, Pedi-Dri)
Do not confuse nystatin with atorvastatin, fluvastatin, lovastatin, Nitrostat, pitavastatin, pravastatin, rosuvastatin, or simvastatin.

FIXED-COMBINATION(S)

Mycolog, Myco-Triacet: nystatin/triamcinolone (a steroid): 100,000 units/0.1%.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Polyene antifungal antibiotic. **CLINICAL:** Antifungal.

USES

Treatment of cutaneous, intestinal, oral cavity, infections caused by *Candida* spp.

PRECAUTIONS

Contraindications: None known. **Cautions:** None known.

ACTION

Binds to sterols in cell membrane, increasing fungal cell membrane permeability, permitting loss of potassium, other cellular components. **Therapeutic Effect:** Fungistatic.

PHARMACOKINETICS

PO: Poorly absorbed from GI tract. Eliminated unchanged in feces. **Topical:** Not absorbed systemically from intact skin.

Generic Drugs O

obinutuzumab
octreotide
ofatumumab
ofloxacin
olanzapine
olmesartan
olodaterol
olsalazine
omacetaxine
omalizumab
omega-3 acidethyl esters
omeprazole
ondansetron
oprelvekin (interleukin-2, IL-2)
oritavancin
orlistat
oseltamivir
ospemifene
oxaliplatin
oxaprozin
oxcarbazepine
oxybutynin
oxycodone
oxymorphone
oxytocin

breastfeeding. **Pregnancy Category C. Children:** Safety and efficacy not established. **Elderly:** May have increased risk of adverse reactions.

INTERACTIONS

DRUG: **ACE inhibitors, angiotensin receptor blockers, beta blockers** may increase risk of hypotension. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase serum alkaline phosphatase, ALT, AST, bilirubin, creatinine, uric acid. May decrease albumin, Hgb, Hct, lymphocytes, neutrophils, platelets, serum potassium, sodium.

AVAILABILITY (Rx)

Solution, Injection: 1,000 mg/40 ml (25 mg/ml) single-use vial.

ADMINISTRATION/HANDLING

◀ALERT▶ Administer via dedicated line. Do not administer IV push or bolus. Withhold hypertensive medications at least 12 hrs before and 1 hr after administration. Do not mix with dextrose-containing fluids.

octreotide

ock-**tree**-oh-tide
(Sandostatin, Sandostatin LAR Depot)
Do not confuse Sandostatin with Sandimmune, Sandostatin LAR, sargramostim, or simvastatin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Somatostatin analogue. **CLINICAL:** Secretory inhibitory, growth hormone suppressant; antidiarrheal.

USES

Controls diarrhea and flushing in pts with metastatic carcinoid tumors, treatment of watery diarrhea associated with vasoactive intestinal peptic-secreting tumors (VIPomas), acromegaly. **OFF-LABEL:** Control of bleeding esophageal varices, treatment of AIDS-associated secretory diarrhea, chemotherapy-induced diarrhea, insulinomas, small-bowel fistulas, Zollinger-Ellison syndrome, Cushing's syndrome, hypothalamic obesity, malignant bowel obstruction, postgastrectomy dumping syndrome.

PRECAUTIONS

Contraindications: None known. **Cautions:** Diabetic pts with gastroparesis, renal failure, hepatic impairment, HF, concomitant medications altering heart rate or rhythm. Concurrent use of medications that prolong QT interval, elderly.

ACTION

Suppresses secretion of serotonin, gastrin, VIP, insulin, glucagon, secretin, pancreatic polypeptide. **Therapeutic Effect:** Prolongs intestinal transit time.

PHARMACOKINETICS

Route	Onset	Peak	Duration
Subcutaneous	N/A	N/A	Up to 12 hrs

Rapidly, completely absorbed from injection site. Protein binding: 65%. Metabolized in liver. Excreted in urine. Removed by hemodialysis. **Half-life:** 1.7–1.9 hrs.

ofatumumab

oh-fa-**tue**-mue-mab
(Arzerra)

■ **BLACK BOX ALERT** ■ Hepatitis B virus (HBV) reactivation may occur, resulting in hepatitis, hepatic failure, death. Progressive multifocal leukoencephalopathy (PML), resulting in death may occur.

Do not confuse ofatumumab with omalizumab.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Monoclonal antibody. **CLINICAL:** Antineoplastic.

USES

Treatment of chronic lymphocytic leukemia (CLL).

PRECAUTIONS

Contraindications: None known. **Cautions:** Carriers of hepatitis B virus.

ACTION

Binds to CD20 molecule, the antigen on surface of B-cell lymphocytes; inhibits early-stage B-lymphocyte activation. **Therapeutic Effect:** Controls tumor growth, triggers cell death.

PHARMACOKINETICS

Eliminated through both a target-independent route and a B-cell–mediated route. Due to depletion of B cells, clearance is decreased substantially after subsequent infusions compared to first infusion. **Half-life:** 12–16 days.

USES

Treatment of susceptible infections due to *S. pneumoniae, S. aureus, S. pyogenes, H. influenzae, P. mirabilis, N. gonorrhoeae, C. trachomatis, E. coli, K. pneumoniae, P. aeruginosa,* including infections of urinary tract, lower respiratory tract, skin/skin structure; sexually transmitted diseases, prostatitis due to *E. coli,* pelvic inflammatory disease (PID). **Ophthalmic:** Bacterial conjunctivitis, corneal ulcers. **Otic:** Otitis externa, acute or chronic otitis media. **OFF-LABEL: Oral:** Epididymitis, leprosy, traveler's diarrhea.

PRECAUTIONS

Contraindications: Hypersensitivity to any quinolones. **Otic:** Viral infection of external ear canal. **Cautions:** Renal/hepatic impairment, CNS disorders, seizures, severe cerebral arteriosclerosis, prolongation of QT interval, bradycardia, cardiomyopathy, hypokalemia, hypomagnesemia, rheumatoid arthritis, elderly.

ACTION

Interferes with bacterial cell replication, repair by inhibiting DNA-gyrase in susceptible microorganisms. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Rapidly, well absorbed from GI tract. Protein binding: 20%–25%. Widely distributed (including CSF). Metabolized in liver. Primarily excreted in urine. Removed by hemodialysis. **Half-life:** 4.7–7 hrs (increased in renal impairment, cirrhosis, elderly).

USES

PO: Management of manifestations of schizophrenia. Treatment of acute mania associated with bipolar disorder. In combination with fluoxetine: treatment of depressive episodes associated with bipolar I disorder and treatment of treatment-resistant bipolar depression. **IM: Zyprexa Intramuscular:** Controls agitation in schizophrenia and bipolar mania. **Relprevv:** Long acting antipsychotic for IM injection for treatment of schizophrenia. **OFF-LABEL:** Psychosis/schizophrenia in children, chronic pain, prevention of chemotherapy-induced nausea/vomiting, psychosis/agitation related to Alzheimer's dementia. Acute treatment of delirium.

PRECAUTIONS

Contraindications: None known. **Cautions:** Disorders where CNS depression is prominent; cardiac disease, hemodynamic instability, prior MI, ischemic heart disease; hyperlipidemia, pts at risk for aspiration pneumonia, decreased GI motility, urinary retention, BPH, narrow-angle glaucoma, diabetes, elderly, pts at risk for suicide.

ACTION

Antagonizes alpha$_1$-adrenergic, dopamine, histamine, muscarinic, serotonin receptors. Produces anticholinergic, histaminic, CNS depressant effects. **Therapeutic Effect:** Diminishes psychotic symptoms.

PHARMACOKINETICS

Well absorbed after PO administration. Rapid absorption following IM administration. Protein binding: 93%. Widely distributed. Excreted in urine (57%), feces (30%). Not removed by dialysis. **Half-life:** 21–54 hrs.

PATIENT/FAMILY TEACHING

• Avoid dehydration, particularly during exercise, exposure to extreme heat, concurrent use of medication causing dry mouth, other drying effects. • Sugarless gum, sips of water may relieve dry mouth. • Report suspected pregnancy. • Take medication as prescribed; do not stop taking or increase dosage. • Slowly go from lying to standing. • Avoid alcohol. • Avoid tasks that require alertness, motor skills until response to drug is established. • Monitor diet, exercise program to prevent weight gain.

olmesartan

TOP 100

ol-me-**sar**-tan
(Benicar, Olmetec)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

Do not confuse Benicar with Mevacor.

FIXED-COMBINATION(S)

Azor: olmesartan/amlodipine (calcium channel blocker): 20 mg/5 mg, 40 mg/5 mg, 20 mg/10 mg, 40 mg/10 mg. **Benicar HCT:** olmesartan/hydrochlorothiazide (a diuretic): 20 mg/12.5 mg, 40 mg/12.5 mg, 40 mg/25 mg. **Tribenzor:** olmesartan/hydrochlorothiazide/amlodipine: 20 mg/12.5 mg/5 mg, 40 mg/12.5 mg/5 mg, 40 mg/25 mg/5 mg, 40 mg/12.5 mg/10 mg, 40 mg/25 mg/10 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Angiotensin II receptor antagonist. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension alone or in combination with other antihypertensives.

PRECAUTIONS

Contraindications: Concomitant use with aliskiren in pts with diabetes. **Cautions:** Renal impairment, unstented unilateral or bilateral renal arterial stenosis, significant aortic/mitral stenosis. Concurrent potassium supplements; pts who are volume depleted.

ACTION

Blocks vasoconstrictor, aldosterone-secreting effects of angiotensin II by inhibiting binding of angiotensin II to AT_1 receptors in vascular smooth muscle. **Therapeutic Effect:** Causes vasodilation, decreases peripheral resistance, decreases B/P.

PHARMACOKINETICS

Moderately absorbed after PO administration. Hydrolyzed in GI tract to olmesartan. Protein binding: 99%. Eliminated in urine (35%–50%), remainder in feces. Not removed by hemodialysis. **Half-life:** 13 hrs.

Therapeutic Effect: Relieves bronchospasm, reduces airway resistance, improves bronchodilation.

PHARMACOKINETICS

Rapidly absorbed following inhalation. Extensively distributed in tissue. Metabolized in liver. Protein binding: 60%. Peak plasma concentration: 10–20 min. Eliminated in urine. **Half-life:** 45 hrs.

ACTION

Converted to mesalamine in colon by bacterial action. Blocks local chemical mediators of inflammatory response. **Therapeutic Effect:** Reduces colonic inflammation.

PHARMACOKINETICS

Small amount absorbed. Protein binding: 99%. Metabolized by bacteria in colon. Minimal elimination in urine, feces. **Half-life:** 0.9 hr.

headache. **Rare (7% or Less):** Dyspnea, epistaxis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Thrombocytopenia, neutropenia, leukopenia, lymphopenia, or myelosuppression is an expected response to therapy, but more severe reactions including bone marrow failure, febrile neutropenia may result in life-threatening events. Pts with neutropenia are at increased risk for infection. Thrombocytopenia may increase risk for intracranial hemorrhage, GI bleeding. Hyperglycemic events including hyperglycemic hyperosmolar nonketotic syndrome (HHNK) may occur. Pts with uncontrolled diabetes are at increased risk for hyperglycemic emergency.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline serum chemistries, CBC, PT/INR if on anticoagulants. Question for possibility of pregnancy, current breastfeeding status. Obtain negative urine pregnancy before initiating treatment. Obtain full medication history including vitamins, supplements, herbal products, anticoagulants. Question for history of diabetes mellitus, GI bleeding.

INTERVENTION/EVALUATION

Monitor CBC weekly, then every 2 wks during maintenance phase. Obtain frequent blood glucose levels, especially in diabetic pts. Do not initiate therapy until negative urine pregnancy confirmed. Monitor LFT if hepatic impairment suspected. If drug exposure occurs, immediately wash affected area with soap and water. Consider isolation protocol if pt develops neutropenia.

PATIENT/FAMILY TEACHING

• Serum lab studies will be routinely monitored. • Report if pregnant or planning to become pregnant. • Use barrier methods during sexual activity. • Strictly avoid pregnancy. • May cause male infertility. • Immediately report yellowing of skin or eyes, abdominal pain, bruising, black/tarry stools, dark urine, dehydration, GI bleeding, nausea, vomiting, rash. • Report fever, cough, night sweats, flu-like symptoms, skin changes. • Shortness of breath, pale skin, weakness may indicate bleeding or severe myelosuppression. • Avoid tasks that require alertness, motor skills until response to drug is established.

omalizumab

TOP 100

oh-ma-**liz**-ue-mab
(Xolair)

■ **BLACK BOX ALERT** ■ Anaphylaxis (severe bronchospasm, hypotension, angioedema, syncope, urticaria) has occurred after first dose, and in some cases, after 1 yr of regular treatment.

Do not confuse omalizumab with ofatumumab.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Monoclonal antibody. **CLINICAL:** Antiasthmatic.

USES

Treatment of moderate to severe persistent asthma in pts reactive to perennial allergens and inadequately controlled asthma symptoms with inhaled corticosteroids. Chronic idiopathic urticaria in adults and children 12 yrs and older.

PRECAUTIONS

Contraindications: Acute bronchospasm, status asthmaticus. **Cautions:** Pts at risk for parasitic infections.

ACTION

Selectively binds to human immunoglobulin E (IgE). Inhibits binding of IgE on

2-Wk Dosing Table

Pretreatment Serum IgE Levels (units/ml)	Weight 30–60 kg	Weight 61–70 kg	Weight 71–90 kg	Weight 91–150 kg
101–200	See preceding table	See preceding table	See preceding table	225 mg
201–300	See preceding table	225 mg	225 mg	300 mg
301–400	225 mg	225 mg	300 mg	Do not dose
401–500	300 mg	300 mg	375 mg	Do not dose
501–600	300 mg	375 mg	Do not dose	Do not dose
601–700	375 mg	Do not dose	Do not dose	Do not dose

SIDE EFFECTS

Frequent (45%–11%): Injection site ecchymosis, redness, warmth, stinging, urticaria, viral infection, sinusitis, headache, pharyngitis. **Occasional (8%–3%):** Arthralgia, leg pain, fatigue, dizziness. **Rare (2%):** Arm pain, earache, dermatitis, pruritus.

ADVERSE EFFECTS/ TOXIC REACTIONS

Anaphylaxis, occurring within 2 hrs of first dose or subsequent doses, occurs in 0.1% of pts. Malignant neoplasms occur in 0.5% of pts.

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NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline serum total IgE level before initiation of treatment (dosage is based on pretreatment levels). Drug is not for treatment of acute exacerbations of asthma, acute bronchospasm, status asthmaticus.

INTERVENTION/EVALUATION

Monitor rate, depth, rhythm, type of respirations, quality/rate of pulse. Assess lung sounds for rhonchi, wheezing, rales. Observe lips, fingernails for cyanosis.

PATIENT/FAMILY TEACHING

• Increase fluid intake (decreases viscosity of pulmonary secretions). • Do not alter/stop other asthma medications. • Report allergic reactions (e.g., breathing difficulty, swelling of throat/tongue).

omega-3 acid-ethyl esters

TOP 100

oh-**may**-ga 3 **as**-id **eth**-il **es**-ters (Lovaza, Epanova, Omtryg)
Do not confuse Lovaza with lorazepam.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Omega-3 fatty acid. **CLINICAL:** Antihypertriglyceride agent.

USES

Adjunct to diet to reduce very high (500 mg/dL or higher) serum triglyceride levels in adult pts. **OFF-LABEL:** Treatment of IgA nephropathy.

PRECAUTIONS

Contraindications: None known. **Cautions:** Known sensitivity, allergy to fish.

ACTION

Inhibits esterification of fatty acids, prevents hepatic enzymes from catalyzing final step of triglyceride synthesis. **Therapeutic Effect:** Reduces serum triglyceride levels.

PHARMACOKINETICS

Well absorbed following PO administration. Incorporated into phospholipids. **Half-life:** N/A.

uncomplicated heartburn occurring 2 or more days/wk. **OFF-LABEL:** Prevention/treatment of NSAID-induced ulcers, stress ulcer prophylaxis in critically ill pts.

PRECAUTIONS

Contraindications: Hypersensitivity to other proton pump inhibitors. **Cautions:** May increase risk of fractures, gastrointestinal infections. Hepatic impairment, pts of Asian descent.

ACTION

Inhibits hydrogen-potassium adenosine triphosphatase (H^+/K^+ ATP pump), an enzyme on the surface of gastric parietal cells. **Therapeutic Effect:** Increases gastric pH, reduces gastric acid production.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1 hr	2 hrs	72 hrs

Rapidly absorbed from GI tract. Protein binding: 95%. Primarily distributed into gastric parietal cells. Metabolized in liver. Primarily excreted in urine. Unknown if removed by hemodialysis. **Half-life:** 0.5–1 hr (increased in hepatic impairment).

AVAILABILITY (Rx)

Injection Solution (Zofran): 2 mg/ml. **Oral Soluble Film (Zuplenz):** 4 mg, 8 mg. **Oral Solution (Zofran):** 4 mg/5 ml. **Tablets (Zofran):** 4 mg, 8 mg. **Tablets (Orally Disintegrating [Zofran ODT]):** 4 mg, 8 mg.

ADMINISTRATION/HANDLING

PRECAUTIONS

Contraindications: None known. **Cautions:** HF, left ventricular dysfunction, hypertension, cardiac arrhythmias, conduction defect, respiratory disease, history of thromboembolic disease, renal/hepatic impairment, transient ischemic attack, CVA, preexisting pericardial effusion or papilledema; ascites, tumors involving the CNS.

ACTION

Stimulates production of blood platelets, essential to blood-clotting process. **Therapeutic Effect:** Increases platelet production.

PHARMACOKINETICS

Renal elimination as metabolite. **Half-life:** 5–8 hrs.

concentration of 10 mg/ml per vial. • To avoid foaming, gently swirl until contents completely dissolved. • Visually inspect each vial for particulate matter or discoloration.

Dilution • Using D_5W, withdraw 120 ml from 1,000-ml bag and discard. • Withdraw 40 ml from each vial and mix into D_5W to provide a final concentration of 1.2 mg/ml.

Rate of Administration • Administer over 3 hrs.

Storage • Reconstituted solution should appear clear, colorless to pale yellow. • Infuse diluted solution within 6 hrs when stored at room temperature or 12 hrs when refrigerated. • Combined storage time and 3 hr infusion time should not exceed 6 hrs if at room temperature or 12 hrs if refrigerated.

IV INCOMPATIBILITIES

Dilute using 5% Dextrose in Water only. Dilution with normal saline may cause precipitate formation. Infuse via dedicated line only. Do not piggyback through maintenance IV line.

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INDICATIONS/ROUTES/DOSAGE

Acute Bacterial Skin and Skin Structure Infection

IV: ADULTS, ELDERLY: 1,200 mg as single dose.

Dosage in Renal/Hepatic Impairment

No dose adjustment. Use caution.

SIDE EFFECTS

Occasional (10%–5%): Nausea, headache, vomiting. **Rare (4%–3%):** Diarrhea, dizziness, tachycardia.

ADVERSE EFFECTS/TOXIC REACTIONS

Serious hypersensitivity reactions including anaphylaxis, angioedema, bronchospasm, severe skin reactions, wheezing have been reported with glycopeptide antibacterial agents. *C. difficile*–associated diarrhea with severity ranging from mild diarrhea to fatal colitis has occurred. Treatment in the absence of proven or strongly suspected bacterial infection may increase risk of drug-resistant bacteria. Infusion site reactions phlebitis, irritation, abscess, rash, pruritus have occurred. Increased incidence of osteomyelitis has been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC (WBC), BMP, LFT, wound culture and sensitivity, vital signs. Question history of recent *C. difficile* infection, hepatic/renal impairment, hypersensitivity reaction. Assess skin wound characteristics, hydration status. Question pt's usual stool characteristics (color, frequency, consistency).

INTERVENTION/EVALUATION

Assess skin infection/wound for improvement. Monitor daily pattern of bowel activity, stool consistency; increasing severity may indicate antibiotic-associated colitis. If frequent diarrhea occurs, obtain *C. difficile* toxin screen and initiate isolation precautions until result confirmed. Encourage PO intake. Monitor I&O. If osteomyelitis suspected, other antimicrobial agents may be required. Screen for hypersensitivity reaction.

PATIENT/FAMILY TEACHING

• Treatment will consist of a single infusion only. • Report episodes of diarrhea, esp. following weeks after treatment completion. Frequent diarrhea, fever, abdominal pain, blood-streaked stool may indicate *C. difficile* infection, which may be contagious to others. • Report abdominal pain, black/tarry stools, bruising, yellowing of skin or eyes; dark urine, decreased urine output; or allergic reactions including difficulty breathing, itching, hives, tongue swelling, wheezing • Do not breastfeed. • Drink plenty of fluids. • Report symptoms of bone pain; may indicate bone infection.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline laboratory tests. Obtain pt weight.

INTERVENTION/EVALUATION

Monitor serum cholesterol, LDL, glucose, changes in coagulation parameters. Monitor weight weekly.

PATIENT/FAMILY TEACHING

• Maintain nutritionally balanced, reduced-calorie diet. • Daily intake of fat, carbohydrates, protein to be distributed over 3 main meals.

oseltamivir

TOP 100

oh-sel-**tam**-i-veer
(Tamiflu)
Do not confuse Tamiflu with Thera-flu.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Neuraminidase inhibitor. **CLINICAL:** Antiviral.

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USES

Symptomatic treatment of uncomplicated acute illness caused by influenza A or B virus in adults and children 1 yr and older who are symptomatic no longer than 2 days. Prevention of influenza in adults, children 1 yr and older.
OFF-LABEL: Treatment and chemoprophylaxis of H1N1 influenza A (swine flu) virus infection, including pts with confirmed, probable, or suspected H1N1 influenza A (swine flu) virus infection and their close contacts.

PRECAUTIONS

Contraindications: None known. **Cautions:** Renal impairment.

ACTION

Selective inhibitor of influenza virus neuraminidase, an enzyme essential for viral replication. Acts against influenza A and B viruses. **Therapeutic Effect:** Suppresses spread of infection within respiratory system, reduces duration of clinical symptoms.

PHARMACOKINETICS

Readily absorbed after PO administration. Protein binding: 3%. Metabolized in liver. Primarily excreted in urine. **Half-life:** 6–10 hrs.

PHARMACOKINETICS

Readily absorbed following PO administration. Metabolized in liver. Protein binding: 99%. Peak plasma concentration: 2 hrs. Excreted in feces (75%), urine (7%). **Half-life:** 26 hrs.

IV COMPATIBILITIES

Dexamethasone, diphenhydramine (Benadryl), granisetron (Kytril), ondansetron (Zofran), palonosetron (Aloxi).

INDICATIONS/ROUTES/DOSAGE

Refer to individual protocols.
◄ALERT► Pretreat pt with antiemetics. Repeat courses should not be given more frequently than every 2 wks.

Advanced Colorectal Cancer

IV: ADULTS: 85 mg/m^2 q2wks until disease progression or unacceptable toxicity (in combination with fluorouracil/leucovorin).

Stage III Colon Cancer

IV: ADULTS: 85 mg/m^2 q2wks for total of 6 months (in combination with fluorouracil/leucovorin).

Ovarian Cancer (Off-Label Use)

IV: ADULTS: Oxaliplatin 130 mg/m^2 q3wks. Prior to subsequent therapy cycles, evaluate pt for clinical toxicities and evaluate laboratory tests for alterations.

Dosage in Renal Impairment

Creatinine clearance less than 30 ml/min: Reduce dose to 65 mg/m^2.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (76%–20%): Peripheral/sensory neuropathy (usually occurs in hands, feet, perioral area, throat but may present as: jaw spasm, abnormal tongue sensation, eye pain, chest pressure, difficulty walking, swallowing, writing), nausea, fatigue, diarrhea, vomiting, constipation, abdominal pain, fever, anorexia. **Occasional (14%–10%):** Stomatitis, earache, insomnia, cough, difficulty breathing, backache, edema. **Rare (7%–3%):** Dyspepsia, dizziness, rhinitis, flushing, alopecia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Peripheral/sensory neuropathy can occur without any prior event by drinking or holding a glass of cold liquid during IV infusion. Pulmonary fibrosis (characterized as nonproductive cough, dyspnea, crackles, radiologic pulmonary infiltrates) may warrant drug discontinuation. Hypersensitivity reaction (rash, urticaria, pruritus) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline renal function, WBC, platelet count.

INTERVENTION/EVALUATION

Monitor for decrease in WBC, platelets (myelosuppression is minimal). Monitor daily pattern of bowel activity, stool consistency. Monitor for diarrhea, GI bleeding (bright red, black tarry stool), signs of neuropathy. Pt should avoid ice or drinking, holding glass of cold liquid during IV infusion and for 5 days following completion of infusion; may precipitate/exacerbate neurotoxicity (occurs within hrs or 1–2 days of dosing, lasts up to 14 days). Maintain strict I&O. Assess oral mucosa for stomatitis.

PATIENT/FAMILY TEACHING

• Promptly report fever, sore throat, signs of local infection, unusual bruising/bleeding from any site, persistent diarrhea, difficulty breathing. • Do not have immunizations without physician's approval (drug lowers resistance). • Avoid contact with those who have recently taken oral polio vaccine. • Avoid cold drinks, ice, cold objects (may produce neuropathy).

oxaprozin

ox-a-**proe**-zin
(Apo-Oxaprozin, Daypro)

■ **BLACK BOX ALERT** ■ Increased risk of serious cardiovascular

CHILDREN WEIGHING 32–54 KG: 900 mg/day. **CHILDREN WEIGHING 22–31 KG:** 600 mg/day.

Dosage in Renal Impairment

ADULTS, ELDERLY PTS WITH RENAL IMPAIRMENT: Recommended initial dose is 600 mg/day; may be increased up to 1,200 mg/day.

Dosage in Hepatic Impairment

Use caution in severe impairment.

SIDE EFFECTS

Occasional (9%–3%): Nausea, diarrhea, constipation, dyspepsia, edema. **Rare (Less Than 3%):** Vomiting, abdominal cramps/pain, flatulence, anorexia, confusion, tinnitus, insomnia, drowsiness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypertension, acute renal failure, respiratory depression, GI bleeding, coma occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain/inflammation.

INTERVENTION/EVALUATION

Observe for weight gain, edema, bleeding, ecchymoses, mental confusion. Monitor renal function, LFT. Assess for therapeutic response: relief of pain, stiffness, swelling; increased joint mobility; reduced joint tenderness; improved grip strength.

PATIENT/FAMILY TEACHING

• Avoid aspirin, alcohol during therapy (increases risk of GI bleeding). • If gastric upset occurs, take with food, milk, antacids. • Report persistent GI effects. • Report blood in stool, weight gain, persistent abdominal pain. • Avoid tasks that require alertness, motor skills until response to drug is established.

oxcarbazepine

ox-kar-**baz**-e-peen
(Apo-Oxcarbazepine, Oxtellar XR, Trileptal)
Do not confuse oxcarbazepine with carbamazepine, or Trileptal with TriLipix.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Carboxamide derivative, anticonvulsant.
CLINICAL: Anticonvulsant.

USES

Trileptal: Monotherapy, adjunctive therapy in treatment of partial seizures. **Oxtellar XR:** Adjunctive therapy in treatment of partial seizures. **OFF-LABEL:** Treatment of neuropathic pain, bipolar disorder.

PRECAUTIONS

Contraindications: None known. **Cautions:** Renal impairment, sensitivity to carbamazepine, pts at increased risk for suicide.

ACTION

Blocks sodium channels, stabilizing hyperexcited neural membranes, inhibiting repetitive neuronal firing, diminishing synaptic impulses. **Therapeutic Effect:** Prevents seizures.

PHARMACOKINETICS

Completely absorbed from GI tract. Metabolized in liver. Protein binding: 40%. Primarily excreted in urine. **Half-life:** 2 hrs; metabolite, 6–10 hrs.

Dosage in Hepatic Impairment
Severe: Use caution with immediate-release, not recommended with extended-release.

SIDE EFFECTS

Frequent (22%–13%): Dizziness, nausea, headache. **Occasional (7%–5%):** Vomiting, diarrhea, ataxia muscular incoordination, nervousness, dyspepsia, constipation. **Rare (4%):** Tremor, rash, back pain, epistaxis, sinusitis, diplopia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Clinically significant hyponatremia may occur, manifested as leg cramping, hypotension, cold/clammy skin, increased pulse rate, headache, nausea, vomiting, diarrhea. Suicidal ideation occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Review history of seizure disorder (type, onset, intensity, frequency, duration, LOC), drug history (esp. other anticonvulsants). Provide safety precautions; quiet, dark environment.

INTERVENTION/EVALUATION

Assist with ambulation if dizziness, ataxia occur. Assess for visual abnormalities, headache. Monitor serum sodium. Assess for signs of hyponatremia (nausea, malaise, headache, lethargy, confusion). Assess for clinical improvement (decrease in intensity, frequency of seizures). Monitor for worsening depression, suicidal ideation.

PATIENT/FAMILY TEACHING

• Do not abruptly stop taking medication (may increase seizure activity). • Report rash, nausea, headache, dizziness occurs. • May need periodic blood tests. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • May decrease effectiveness of oral contraceptives.

oxybutynin

ox-i-**bue**-ti-nin
(Apo-Oxybutynin, Ditropan XL, Gelnique, Novo-Oxybutynin, Oxytrol for Women)
Do not confuse Ditropan with Detrol, diazepam, or Diprivan, or oxybutynin with OxyContin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Anticholinergic. **CLINICAL:** Antispasmodic.

USES

Relief of symptoms (urgency, incontinence, frequency, nocturia, urge incontinence) associated with uninhibited neurogenic bladder, reflex neurogenic bladder. Extended-release also indicated for treatment of symptoms associated with detrusor overactivity due to neurologic disorder (e.g., spina bifida).

PRECAUTIONS

Contraindications: Pts with or at risk for uncontrolled narrow-angle glaucoma, urinary retention, gastric retention, or conditions with severely decreased GI motility. **Cautions:** Renal/hepatic impairment, pts with bladder outflow obstruction, treated narrow-angle glaucoma, hyperthyroidism, coronary artery disease, HF, hypertension, arrhythmias, prostatic hyperplasia, myasthenia gravis, reduced GI motility, gastroesophageal reflux.

ACTION

Direct antispasmodic effect on smooth muscle; inhibits action of acetylcholine on smooth muscle. **Therapeutic Effect:** Increases bladder capacity, delays desire to void. Decreases urgency and frequency.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	0.5–1 hr	3–6 hrs	6–10 hrs

INTERVENTION/EVALUATION

Monitor for symptomatic relief. Monitor I&O; palpate bladder for urine retention. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

• Avoid alcohol. • May cause dry mouth (sugarless candy/gum may reduce effect). • Avoid tasks that require alertness, motor skills until response to drug is established (may cause drowsiness). • Avoid strenuous activity in warm environment.

oxycodone

TOP 100 HIGH ALERT

ox-ee-**koe**-done
(Oxecta, OxyContin, OxyIR, Roxicodone, Supeudol)

■ **BLACK BOX ALERT** ■ **OxyContin (controlled-release):** Not intended as an "as needed" analgesic or for immediate postop pain control. Extended-release should not be crushed, broken, or chewed (otherwise leads to rapid release and absorption of potentially fatal dose). Be alert to signs of abuse, misuse, and diversion. May cause potentially life-threatening respiratory depression.

Do not confuse oxycodone with hydrocodone, oxybutynin, or oxymorphone, OxyContin with MS Contin or oxybutynin, or Roxicodone with Roxanol.

FIXED-COMBINATION(S)

Combunox: oxycodone/ibuprofen (an NSAID): 5 mg/400 mg. **Endocet:** oxycodone/acetaminophen (a non-narcotic analgesic): 5 mg/325 mg, 7.5 mg/325 mg, 7.5 mg/500 mg, 10 mg/325 mg, 10 mg/650 mg. **Magnacet:** oxycodone/acetaminophen (a non-narcotic analgesic): 2.5 mg/400 mg, 7.5 mg/400 mg, 10 mg/400 mg. **Percocet:** oxycodone/acetaminophen: 2.5 mg/325 mg, 5 mg/325 mg, 5 mg/500 mg, 7.5 mg/325 mg, 7.5 mg/500 mg, 10 mg/325 mg, 10 mg/650 mg. **Percocet, Roxicet, Tylox:** oxycodone/acetaminophen (a non-narcotic analgesic): 5 mg/500 mg. **Percodan:** oxycodone/aspirin (a non-narcotic analgesic): 2.25 mg/325 mg, 4.5 mg/325 mg. **Targiniq ER:** oxycodone/naloxone (opioid antagonist): 10 mg/5 mg; 20 mg/10 mg; 40 mg/20 mg. **Xartemis XR:** oxycodone/acetaminophen (non-narcotic analgesic): 7.5 mg/325 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Opioid analgesic **(Schedule II). CLINICAL:** Narcotic analgesic.

USES

Relief of moderate to severe pain (usually in combination with nonopioid analgesics). **OxyContin:** Around-the-clock management of moderate to severe pain when continuous analgesic is needed.

PRECAUTIONS

Contraindications: Acute or severe bronchial asthma, hypercarbia, paralytic ileus, GI obstruction, significant respiratory depression. **Extreme Caution:** CNS depression, anoxia, hypercapnia, respiratory depression, seizures, acute alcoholism, shock, untreated myxedema, respiratory dysfunction. **Cautions:** Elevated ICP, hepatic/renal impairment, coma, debilitated pts, head injury, biliary tract disease, toxic psychosis, acute abdominal conditions, hypothyroidism, prostatic hypertrophy, Addison's disease, urethral stricture, COPD, history of substance abuse, elderly.

ACTION

Binds with opioid receptors within CNS, causing inhibition of ascending pain pathway. **Therapeutic Effect:** Alters perception of and emotional response to pain.

Dosage in Renal/Hepatic Impairment
Use caution.

SIDE EFFECTS

◄ALERT► Effects are dependent on dosage amount. Ambulatory pts, pts not in severe pain may experience dizziness, nausea, vomiting, hypotension more frequently than those in supine position or having severe pain. **Frequent:** Drowsiness, dizziness, hypotension (including orthostatic hypotension), anorexia. **Occasional:** Confusion, diaphoresis, facial flushing, urinary retention, constipation, dry mouth, nausea, vomiting, headache. **Rare:** Allergic reaction, depression, paradoxical CNS hyperactivity, nervousness in children, paradoxical excitement, restlessness in elderly, debilitated pts.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose results in respiratory depression, skeletal muscle flaccidity, cold/clammy skin, cyanosis, extreme drowsiness progressing to seizures, stupor, coma. Hepatotoxicity may occur with overdose of acetaminophen component of fixed-combination product. Tolerance to analgesic effect, physical dependence may occur with repeated use. **Antidote:** Naloxone (see Appendix K for dosage).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain. Effect of medication is reduced if full pain recurs before next dose. Obtain vital signs before giving medication. If respirations are 12/min or less (20/min or less in children), withhold medication, contact physician.

INTERVENTION/EVALUATION

Palpate bladder for urinary retention. Monitor daily pattern of bowel activity, stool consistency. Initiate deep breathing, coughing exercises, esp. in pts with pulmonary impairment. Monitor pain relief, respiratory rate, mental status, B/P, LOC.

PATIENT/FAMILY TEACHING

• May cause dry mouth, drowsiness. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • May be habit forming. • Do not chew, crush, dissolve or divide controlled-release tablets. • Report severe constipation, absence of pain relief.

oxymorphone

HIGH ALERT

ox-ee-**mor**-fone
(Opana, Opana ER)

■ **BLACK BOX ALERT** ■ Has abuse liability. Concern about increased risk of abuse, misuse, or diversion.
Do not confuse oxymorphone with oxycodone.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Opioid agonist **(Schedule II). CLINICAL:** Narcotic analgesic, antianxiety, preop anesthetic.

USES

Injection: Relief of moderate to severe pain. **PO (Immediate-release):** Relief of moderate to severe acute pain. **(Extended-release):** Relief of moderate to severe pain in pts requiring continuous treatment for extended period of time.

PRECAUTIONS

Contraindications: Hypersensitivity to morphine, acute severe bronchial asthma, severe respiratory depression, paralytic ileus, moderate to severe hepatic function impairment, hypercarbia. **Extreme Cautions:** Anoxia, hypercapnia, seizures, acute alcoholism, shock, untreated myxedema. **Cautions:** Hypothyroidism, prostatic hypertrophy, Addison's disease, urethral stricture, prostatic hyperplasia, toxic psychosis, renal impairment, COPD, biliary tract disease, acute pancreatitis, head injury, increased ICP,

◀ALERT▶ IM preferred over subcutaneous route (subcutaneous rate of absorption is less reliable).

IM/Subcutaneous: ADULTS 18 YRS AND OLDER, ELDERLY: Initially, 1–1.5 mg every 4–6 hrs as needed.

PO: ADULTS, ELDERLY: (IMMEDIATE-RELEASE): 5–10 mg q4–6h. **(EXTENDED-RELEASE):** Initially, 5 mg q12h. May increase by 5–10 mg q12h at intervals of every 3–7 days.

Analgesia during Labor

IM/Subcutaneous: ADULTS 18 YRS AND OLDER, ELDERLY: 0.5–1 mg.

Dosage in Renal Impairment

Reduce initial dose with creatinine clearance less than 50 ml/min.

Dosage in Hepatic impairment

Reduce initial dose with mild impairment (contraindicated in moderate to severe impairment).

SIDE EFFECTS

Note: Effects are dependent on dosage amount, route of administration. Ambulatory pts, pts not in severe pain may experience dizziness, nausea, vomiting, hypotension more frequently than those in supine position or having severe pain. **Frequent (10% or higher):** Drowsiness, hypotension, dizziness, nausea, vomiting, constipation, weakness. **Occasional (9%–2%):** Nervousness, headache, restlessness, malaise, confusion, anorexia, abdominal cramps, dry mouth, decreased urinary output, ureteral spasm, pain at injection site. **Rare (1% or less):** Depression, paradoxical CNS stimulation, hallucinations, rash, urticaria.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose results in respiratory depression, skeletal muscle flaccidity, cold/clammy skin, cyanosis, extreme drowsiness progressing to convulsions, stupor, coma. Tolerance to analgesic effect, physical dependence may occur with repeated use. Prolonged duration of action, cumulative effect may occur in those with hepatic/renal impairment.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain. Obtain vital signs before giving medication. If respirations are 12/min or lower, withhold medication, contact physician. Effect of medication is reduced if full pain recurs before next dose.

INTERVENTION/EVALUATION

Monitor vital signs 5–10 min after IV administration, 15–30 min after subcutaneous, IM. Be alert for decreased respirations, B/P. To prevent pain cycles, instruct pt to request pain medication as soon as discomfort begins. Assess for clinical improvement, record onset of pain relief. Consult physician if pain relief is not adequate.

PATIENT/FAMILY TEACHING

• Discomfort may occur with injection. • Slowly go from lying to standing to avoid postural hypotension. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • Tolerance/dependence may occur with prolonged use of high doses.

oxytocin

HIGH ALERT

ox-ee-**toe**-sin
(Pitocin, Syntocinon)

■ **BLACK BOX ALERT** ■ Not to be given for elective labor induction, but when medically indicated.

Do not confuse Pitocin with Pitressin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Uterine smooth muscle stimulant. **CLINICAL:** Oxytocic agent.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Occasional: Tachycardia, premature ventricular contractions, hypotension, nausea, vomiting. **Rare:** **Nasal:** Lacrimation/tearing, nasal irritation, rhinorrhea, unexpected uterine bleeding/contractions.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypertonicity may occur with tearing of uterus, increased bleeding, abruptio placentae (i.e., placental abruption), cervical/vaginal lacerations. **Fetal:** Bradycardia, CNS/brain damage, trauma due to rapid propulsion, low Apgar score at 5 min, retinal hemorrhage occur rarely. Prolonged IV infusion of oxytocin with excessive fluid volume has caused severe water intoxication with seizures, coma, death.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess baselines for vital signs, B/P, fetal heart rate. Determine frequency, duration, strength of contractions.

INTERVENTION/EVALUATION

Monitor B/P, pulse, respirations, fetal heart rate, intrauterine pressure, contractions (duration, strength, frequency) q15min. Notify physician of contractions that last longer than 1 min, occur more frequently than every 2 min, or stop. Maintain careful I&O; be alert to potential water intoxication. Check for blood loss.

PATIENT/FAMILY TEACHING

- Keep pt, family informed of labor progress.

Generic Drugs P

paclitaxel
palifermin
paliperidone
palivizumab
palonosetron
pamidronate
pancrelipase
panitumumab
pantoprazole
paroxetine
pazopanib
pegaspargase
pegfilgrastim
peginterferon alfa-2a
peginterferon alfa-2b
peginterferon beta-1a
pegloticase
pegvisomant
pembrolizumab
pemetrexed
penicillamine
penicillin G benzathine
penicillin G potassium
penicillin V potassium
pentamidine
perampanel
pertuzumab
phenazopyridine
phenelzine
phenobarbital
phenylephrine
phenytoin
phosphates potassium sodium
pioglitazone
piperacillin sodium/tazobactam sodium
piroxicam
pitavastatin
plerixafor
polyethylene glycol
polyethylene glycol-electrolyte solution (PEG-ES) (CoLyte, GoLYTELY)
pomalidomide
posaconazole
potassium acetate
potassium bicarbonate/citrate
potassium chloride
pralatrexate
pramipexole
pramlintide
prasugrel
pravastatin
prazosin
prednisoLONE
predniSONE
pregabalin
primidone
probenecid
procainamide
prochlorperazine
progesterone
promethazine
propafenone
propofol
propranolol
propylthiouracil
protamine
pseudoephedrine
psyllium
pyrazinamide
pyridostigmine
pyridoxine (vitamin B_6)

PHARMACOKINETICS

Does not readily cross blood-brain barrier. Protein binding: 89%–98%. Metabolized in liver. Eliminated by bile. Not removed by hemodialysis. **Half-life:** 3-hr infusion: 13.1–20.2 hrs; 24-hr infusion: 15.7–52.7 hrs.

Paclitaxel

Reconstitution • Dilute with 250–1,000 ml 0.9% NaCl, D_5W to final concentration of 0.3–1.2 mg/ml.

Rate of Administration • Administer at rate per protocol (range: 1-96 hrs) through in-line filter not greater than 0.22 microns. • Monitor vital signs during infusion, esp. during first hour. • Discontinue administration if severe hypersensitivity reaction occurs.

Storage • Store unopened vials at room temperature. • Reconstituted solution is stable at room temperature for 72 hrs. • Store diluted solutions in bottles or plastic bags. Administer through polyethylene-lined administration sets (avoid plasticized PVC equipment or devices).

Abraxane (Paclitaxel—Protein Bound)

Reconstitution • Reconstitute each vial with 20 ml 0.9% NaCl to provide concentration of 5 mg/ml. • Slowly inject onto inside wall of vial; gently swirl over 2 min to avoid foaming. • Inject appropriate amount into empty PVC-type bag.

Rate of Administration • Infuse over 30 min. Do not use in-line filter.

Storage • Store unopened vials at room temperature • Once reconstituted, use immediately but may refrigerate for up to 8 hrs.

P

IV INCOMPATIBILITIES

◄ALERT► **IV compatibility:** Data for Abraxane not known; avoid mixing with other medication. Amphotericin B complex (Abelcet, AmBisome, Amphotec), doxorubicin liposomal (Doxil), hydroxyzine (Vistaril), methylprednisolone (Solu-Medrol), mitoxantrone (Novantrone).

IV COMPATIBILITIES

Carboplatin (Paraplatin), cisplatin (Platinol AQ), cyclophosphamide (Cytoxan), cytarabine (Cytosar), dacarbazine (DTIC-Dome), dexamethasone (Decadron), diphenhydramine (Benadryl), doxorubicin (Adriamycin), etoposide (VePesid), gemcitabine (Gemzar), granisetron (Kytril), hydromorphone (Dilaudid), lipids, magnesium sulfate, mannitol, methotrexate, morphine, ondansetron (Zofran), potassium chloride, vinblastine (Velban), vincristine (Oncovin).

INDICATIONS/ROUTES/DOSAGE

Note: Premedication with dexamethasone, diphenhydramine, and cimetidine, famotidine, or ranitidine recommended. Refer to individual protocols.

Paclitaxel

Ovarian Cancer

IV: ADULTS: 135–175 mg/m^2/dose over 3 hrs q3wks, 135 mg/m^2 over 24 hrs q3wks, or 50–80 mg/m^2 over 1–3 hrs weekly.

Breast Cancer

IV: ADULTS, ELDERLY: 175–250 mg/m^2 over 3 hrs q3wks or 50–80 mg/m^2 over 1–3 hrs weekly.

Non–Small-Cell Lung Cancer

IV: ADULTS, ELDERLY: 135 mg/m^2 over 24 hrs.

Kaposi's Sarcoma

IV: ADULTS, ELDERLY: 135 mg/m^2/dose over 3 hrs q3wks or 100 mg/m^2/dose over 3 hrs q2wks.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Transaminase Level	Bilirubin	Dose
24-HR INFUSION		
Less than 2 times ULN	1.5 mg/dL or less	135 mg/m^2
2 to less than 10 times ULN	1.5 mg/dL or less	100 mg/m^2
Less than 10 times ULN	1.6–7.5 mg/dL or less	50 mg/m^2
3-HR INFUSION		
Less than 10 times ULN	1.25 mg/dL or less	175 mg/m^2

SIDE EFFECTS

Expected (90%–70%): Diarrhea, alopecia, nausea, vomiting. **Frequent (48%–46%):** Myalgia, arthralgia, peripheral neuropathy. **Occasional (20%–13%):** Mucositis, hypotension during infusion, pain/redness at injection site. **Rare (3%):** Bradycardia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Neutropenic nadir occurs at median of 11 days. Anemia, leukopenia occur commonly; thrombocytopenia occurs occasionally. Severe hypersensitivity reaction (dyspnea, severe hypotension, angioedema, generalized urticaria) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Offer emotional support. Use strict asepsis, protect pt from infection. Check blood counts, particularly neutrophil, platelet count, before each course of therapy or as clinically indicated.

INTERVENTION/EVALUATION

Monitor CBC, LFT, vital signs. Monitor for hematologic toxicity (fever, sore throat, signs of local infections, unusual bleeding/bruising), symptoms of anemia (excessive fatigue, weakness). Assess response to medication. Monitor daily pattern of bowel activity, stool consistency; report diarrhea. Avoid IM injections, rectal temperatures, other traumas that may induce bleeding. Hold pressure to injection sites for full 5 min.

PATIENT/FAMILY TEACHING

• Hair loss is reversible, but new hair may have different color, texture. • Do not have immunizations without physician's approval (drug lowers resistance). • Avoid crowds, persons with known infections. • Report signs of infection at once (fever, flu-like symptoms). • Report persistent nausea/vomiting. • Be alert for signs of peripheral neuropathy. • Avoid pregnancy. • Avoid tasks that may require alertness, motor skills until response to drug is established.

palifermin

pal-ee-**fer**-min
(Kepivance)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Keratinocyte growth factor. **CLINICAL:** Antineoplastic adjunct.

USES

Reduces incidence, duration, severity of severe oral mucositis in pts with hematologic malignancies receiving myelotoxic therapy requiring hematopoietic stem cell support.

PRECAUTIONS

Contraindications: None known. **Cautions:** None known.

ACTION

Binds to keratinocyte growth factor receptor, present on epithelial cells of buccal mucosa, tongue, resulting in proliferation, differentiation, migration of epithelial cells. **Therapeutic Effect:** Reduces incidence, duration of severe oral mucositis.

PHARMACOKINETICS

Clearance is higher in pts with cancer compared to healthy subjects. **Half-life:** 4.5 hrs.

Acute treatment of schizoaffective disorder as monotherapy or as adjunct to mood stabilizers and/or antidepressants. **Injection:** Acute and maintenance treatment of schizophrenia. **OFF-LABEL:** Psychosis/agitation related to Alzheimer's dementia.

PRECAUTIONS

Contraindications: Sensitivity to risperidone. **Cautions:** History of cardiac arrhythmias, mild renal impairment (not recommended in moderate to severe impairment), diabetes mellitus, HF, active seizures or predisposition to seizures, history of seizures, cardiovascular disease, congenital long QT syndrome, concomitant use with other medications that prolong QT interval (e.g., amiodarone, quinidine), pts at risk for aspiration pneumonia. May increase risk of stroke in pts with dementia-related psychosis. CNS depression, medications for hypertension, hypovolemia or dehydration, high risk for suicide. Pts with breast cancer, other prolactin-dependent tumors, children, adolescents.

ACTION

Exact mechanism of action is unknown, but may antagonize dopamine and serotonin receptors. **Therapeutic Effect:** Suppresses behavioral response in psychosis.

PHARMACOKINETICS

Absorbed from GI tract. Metabolized in liver. Primarily excreted in urine. **Half-life:** 23 hrs.

INTERACTIONS

DRUG: None significant. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase serum AST.

AVAILABILITY (Rx)

Injection Solution: 50 mg/0.5 ml, 100 mg/ml.

ADMINISTRATION/HANDLING

IM

• Refrigerate vials. • Give undiluted in anterolateral aspect of thigh.

INDICATIONS/ROUTES/DOSAGE

Prevention of Respiratory Syncytial Virus (RSV)

IM: CHILDREN: 15 mg/kg once/mo during RSV season. (First dose prior to commencement of RSV season.)

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (49%–22%): Upper respiratory tract infection, otitis media, rhinitis, rash. **Occasional (10%–2%):** Pain, pharyngitis. **Rare (Less Than 2%):** Cough, diarrhea, vomiting, injection site reaction.

ADVERSE EFFECTS/ TOXIC REACTIONS

Anaphylaxis, severe acute hypersensitivity reaction occur very rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess for sensitivity to palivizumab.

INTERVENTION/EVALUATION

Monitor for potential side effects, esp. otitis media, rhinitis, skin rash, upper respiratory tract infection.

PATIENT/FAMILY TEACHING

• Discuss the purpose, potential side effects of medication with family.

palonosetron

pal-oh-**noe**-se-tron

(Aloxi)

Do not confuse Aloxi with Eloxatin or oxaliplatin, or palonosetron with dolasetron, granisetron, or ondansetron.

FIXED-COMBINATION(S)

Akynzeo: palonosetron/netupitant (a substance P/neurokinin receptor antagonist): 0.5 mg/300 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: 5-HT_3 receptor antagonist. **CLINICAL:** Antiemetic.

USES

Prevention of acute and delayed nausea/vomiting associated with initial/repeated courses of moderately or highly emetogenic chemotherapy. Prevention of postop nausea/vomiting for up to 24 hrs following surgery.

PRECAUTIONS

Contraindications: None known. **Cautions:** History of cardiovascular disease; congenital long QT syndrome, risk factors for QT prolongation (hypokalemia, hypomagnesemia), medications that prolong QT interval or reduce potassium/magnesium levels, pts at risk for ventricular arrhythmias.

ACTION

Acts centrally in chemoreceptor trigger zone, peripherally at vagal nerve terminals. **Therapeutic Effect:** Prevents nausea/vomiting associated with chemotherapy.

PHARMACOKINETICS

Protein binding: 52%. Metabolized in liver. Eliminated in urine. **Half-life:** 40 hrs.

associated with androgen deprivation treatment in prostate cancer.

PRECAUTIONS

Contraindications: Hypersensitivity to other bisphosphonates (e.g., etidronate, tiludronate, risedronate, alendronate). **Cautions:** Renal impairment, concurrent use with other nephrotoxic medications, history of thyroid surgery. Preexisting anemia, leukopenia, thrombocytopenia.

ACTION

Inhibits bone resorption, decreases mineralization by disrupting activity of osteoclasts. **Therapeutic Effect:** Lowers serum calcium concentration.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	24–48 hrs	3–7 days	N/A

After IV administration, rapidly absorbed by bone. Slowly excreted unchanged in urine. Unknown if removed by hemodialysis. **Half-life:** 21–35 hrs.

amylase. 10,000 units lipase; 34,000 units protease; 55,000 units amylase. 15,000 units lipase; 51,000 units protease; 82,000 units amylase. 20,000 units lipase; 68,000 units protease; 109,000 units amylase. 25,000 units lipase; 85,000 units protease; 136,000 units amylase. **Pertyze:** 8,000 units lipase; 28,750 units protease; 30,250 units amylase. 16,000 units lipase; 57,500 units protease; 60,500 units amylase. **Ultresa:** 13,800 units lipase; 27,600 units protease; 27,600 units amylase. 20,700 units lipase; 41,400 units protease; 41,400 units amylase. 23,000 units lipase; 46,000 units protease; 46,000 units amylase.

SIDE EFFECTS

Common (65%–57%): Erythema, acneiform dermatitis, pruritus. **Frequent (26%–20%):** Fatigue, abdominal pain, skin exfoliation, paronychia (soft tissue infection around nailbed), nausea, rash, diarrhea, constipation, skin fissures. **Occasional (19%–10%):** Vomiting, acne, cough, peripheral edema, dry skin. **Rare (7%–2%):** Stomatitis, mucosal inflammation, eyelash growth, conjunctivitis, increased lacrimation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Pulmonary fibrosis, severe dermatologic toxicity (complicated by infectious sequelae), sepsis occur rarely. Severe infusion reactions manifested as bronchospasm, fever, chills, hypotension occur rarely. Hypomagnesemia occurs in 39% of pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess baseline serum magnesium, calcium prior to therapy, periodically during therapy, and for 8 wks after completion of therapy.

INTERVENTION/EVALUATION

Assess for skin, ocular, mucosal toxicity; report effects. Median time to development of skin/ocular toxicity is 14–15 days; resolution after last dosing is 84 days. Monitor serum electrolytes for hypomagnesemia, hypocalcemia. Offer antiemetic if nausea/vomiting occurs. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

• Do not have immunizations without physician's approval (drug lowers resistance). • Avoid contact with those who have recently received a live virus vaccine. • Avoid crowds, those with infection. • There is a potential risk for development of fetal abnormalities if pregnancy occurs; take measures to prevent pregnancy.

pantoprazole

TOP 100

pan-**toe**-pra-zole
(Apo-Pantoprazole, Protonix)
Do not confuse pantoprazole with aripiprazole.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Benzimidazole. **CLINICAL:** Proton pump inhibitor.

USES

PO: Treatment, maintenance of healing of erosive esophagitis associated with gastroesophageal reflux disease (GERD). Reduction of relapse rate of heartburn symptoms in GERD. Treatment of hypersecretory conditions including Zollinger-Ellison syndrome. **IV:** Short-term treatment of erosive esophagitis associated with GERD, treatment of hypersecretory conditions. **OFF-LABEL:** Peptic ulcer disease, active ulcer bleeding (injection), adjunct in treatment of *H. pylori,* stress ulcer prophylaxis in critically ill pts.

PRECAUTIONS

Contraindications: Hypersensitivity to proton pump inhibitors (e.g., omeprazole). **Cautions:** May increase risk of fractures, GI infections.

ACTION

Irreversibly binds to, inhibits hydrogen-potassium adenosine triphosphate, an enzyme on surface of gastric parietal cells. Inhibits hydrogen ion transport into gastric lumen. **Therapeutic Effect:** Increases gastric pH, reduces gastric acid production.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	N/A	N/A	24 hrs

Well absorbed from GI tract. Protein binding: 98% (primarily albumin). Primarily distributed into gastric parietal

PATIENT/FAMILY TEACHING

• Report headache, onset of black, tarry stools, diarrhea. • Avoid alcohol. • Swallow tablets whole; do not chew, crush, dissolve, or divide. • Best if given before breakfast. May give without regard to food.

paroxetine

par-**ox**-e-teen
(Apo-Paroxetine, Brisdelle, Novo-Paroxetine, Paxil, Paxil CR, Pexeva)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal thinking and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse paroxetine with piroxicam, fluoxetine or pyridoxine, or Paxil with Doxil, Plavix, Prozac, or Taxol.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin uptake inhibitor. **CLINICAL:** Antidepressant, antiobsessive-compulsive, antianxiety.

P

USES

Treatment of major depressive disorder (MDD). Treatment of panic disorder, obsessive-compulsive disorder (OCD). Treatment of social anxiety disorder (SAD), generalized anxiety disorder (GAD), premenstrual dysphoric disorder (PMDD), post-traumatic stress disorder (PTSD). **(Brisdelle):** Treatment of moderate to severe vasomotor symptoms associated with menopause. **OFF-LABEL:** Eating disorders, impulse control disorders, menopause symptoms, treatment of depression and OCD in children, mild dementia-associated agitation in nonpsychotic pts.

PRECAUTIONS

Contraindications: Use of MAOIs with or within 14 days, initiation in pts treated with linezolid; concomitant use with thioridazine. **Cautions:** History of seizures, renal/hepatic impairment, pts with suicidal tendencies, elderly, narrow-angle glaucoma; avoid use in first trimester of pregnancy, alcohol use.

ACTION

Selectively blocks uptake of neurotransmitter serotonin at CNS neuronal presynaptic membranes, increasing its availability at postsynaptic receptor sites. **Therapeutic Effect:** Relieves depression, reduces obsessive-compulsive behavior, decreases anxiety.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 95%. Widely distributed. Metabolized in liver. Excreted in urine. Not removed by hemodialysis. **Half-life:** 24 hrs.

confusion, diaphoresis, hallucinations, hyperreflexia) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess appearance, behavior, speech pattern, level of interest, mood.

INTERVENTION/EVALUATION

For pts on long-term therapy, renal function, LFT, CBC should be performed periodically. Assess mental status for depression, suicidal ideation (esp. at beginning of therapy or change in dosage), anxiety, social functioning, panic attacks. Assess appearance, behavior, speech pattern, level of interest, mood.

PATIENT/FAMILY TEACHING

• May cause dry mouth. • Avoid alcohol, St. John's wort. • Therapeutic effect may be noted within 1–4 wks. • Do not abruptly discontinue medication. • Avoid tasks that require alertness, motor skills until response to drug is established. • May impair reproductive function. • Inform physician of intention for pregnancy or if pregnancy occurs. • Report worsening depression, suicidal ideation, unusual changes in behavior.

P

pazopanib

paz-**oh**-pa-nib
(Votrient)

■ **BLACK BOX ALERT** ■ Severe, fatal hepatotoxicity has been observed.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tyrosine kinase inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of advanced renal cell carcinoma, advanced soft-tissue sarcoma (in pts previously treated with chemotherapy). **OFF-LABEL:** Advanced thyroid cancer.

PRECAUTIONS

Contraindications: None known. **Cautions:** Avoid use of strong CYP3A4 inhibitors (e.g., clarithromycin, ketoconazole, ritonavir) or CYP3A inducers (carbamazepine, dexamethasone, phenytoin, rifampin), and grapefruit products. Cautious use in pts with increased risk or history of arterial thrombotic events (e.g., angina, MI, ischemic stroke), QT prolongation, hypokalemia, hypomagnesemia, hypertension, severe hepatic impairment, concomitant use of medications that may prolong QT interval, history of hemoptysis, cerebral hemorrhage or significant GI hemorrhage.

ACTION

Interferes with proliferation of tumor vasculature, preventing tumor growth. **Therapeutic Effect:** Inhibits angiogenesis, blocks tumor growth.

PHARMACOKINETICS

Peak concentration occurs 2–4 hrs following oral administration. Metabolized in liver. Protein binding: greater than 99%. Eliminated in feces (60%), urine (23%). **Half-life:** 31 hrs.

USES

Treatment of acute lymphoblastic leukemia (ALL).

PRECAUTIONS

Contraindications: Hypersensitivity reaction to pegaspargase, history of hemorrhage, pancreatitis, or thrombosis with L-asparaginase therapy. **Cautions:** Pts with diabetes mellitus, underlying coagulopathy, hepatic impairment, concurrent hepatotoxic medications, previous hematologic complications with asparaginase.

ACTION

Inhibits protein synthesis by deaminating asparagine in plasma and extracellular fluid. **Therapeutic Effect:** Deprives tumor cells of amino acids necessary for protein synthesis, thereby inhibiting tumor cell growth.

PHARMACOKINETICS

Slowly absorbed following IM administration. Primarily excreted in urine elimination. **Half-life:** 6 days.

VALUES: May increase serum LDH, alkaline phosphatase, uric acid.

AVAILABILITY (Rx)

Injection Solution: 6 mg/0.6 ml syringe.

ADMINISTRATION/HANDLING

Subcutaneous

Storage • Store in refrigerator. Warm to room temperature prior to administering injection. Discard if left at room temperature for more than 48 hrs. • Protect from light. • Avoid freezing; but if accidentally frozen, may allow to thaw in refrigerator before administration. Discard if freezing takes place a second time. • Discard if discolored or precipitate forms.

INDICATIONS/ROUTES/DOSAGE

Myelosuppression

Subcutaneous: ADULTS, ELDERLY, CHILDREN 12–17 YRS, WEIGHING MORE THAN 45 KG: Give as single 6-mg injection once per chemotherapy cycle beginning 24–72 hrs after completion of chemotherapy. ◄ALERT► Do not administer between 14 days before and 24 hrs after cytotoxic chemotherapy. Do not use in infants, children, adolescents weighing less than 45 kg.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (72%–15%): Bone pain, nausea, fatigue, alopecia, diarrhea, vomiting, constipation, anorexia, abdominal pain, arthralgia, generalized weakness, peripheral edema, dizziness, stomatitis, mucositis, neutropenic fever.

ADVERSE EFFECTS/ TOXIC REACTIONS

Allergic reactions (anaphylaxis, rash, urticaria) occur rarely. Cytopenia resulting from antibody response to growth factors occurs rarely. Splenomegaly occurs rarely. Adult respiratory distress syndrome (ARDS) may occur in septic pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

CBC should be obtained before initiating therapy and routinely thereafter.

INTERVENTION/EVALUATION

Monitor for allergic reactions. Assess for peripheral edema. Assess mucous membranes for evidence of stomatitis, mucositis. Assess muscle strength. Monitor daily pattern of bowel activity, stool consistency. Adult respiratory distress syndrome (ARDS) may occur in septic pts.

PATIENT/FAMILY TEACHING

• Inform pt of possible side effects, signs/symptoms of allergic reaction. • Counsel pt on importance of compliance with pegfilgrastim treatment, including regular monitoring of blood counts. • Report unusual fever or chills, severe bone pain, chest pain or palpitations.

peginterferon alfa-2a

peg-in-ter-**feer**-on
(Pegasys)

■ **BLACK BOX ALERT** ■ Can cause or aggravate fatal or life-threatening autoimmune, neuropsychiatric (depression, suicidal ideation/behaviors), ischemic, including worsening hepatic function, and infectious disorders. Combination with ribavirin can cause fetal mortality, birth defects, hemolytic anemia. May be carcinogenic.

Do not confuse peginterferon alfa-2a with interferon alfa-2b, interferon alfa-n3, or peginterferon alfa-2b.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Immunomodulator. **CLINICAL:** Immunologic agent.

ADVERSE EFFECTS/ TOXIC REACTIONS

Serious, acute hypersensitivity reactions (urticaria, angioedema, bronchoconstriction, anaphylaxis), pancreatitis, colitis, endocrine disorders (diabetes mellitus, hyperthyroidism, hypothyroidism), ophthalmologic disorders, pulmonary abnormalities occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

CBC, urinalysis, renal function, LFT, EKG should be performed before initial therapy and routinely thereafter. Pts with diabetes, hypertension should have ophthalmologic exam before treatment begins.

INTERVENTION/EVALUATION

Monitor for evidence of depression. Offer emotional support. Monitor for abdominal pain, melena as evidence of colitis. Assess for pulmonary impairment. Monitor chest X-ray for pulmonary infiltrates. Encourage ample fluid intake, particularly during early therapy. Assess serum hepatitis C virus RNA levels after 24 wks of treatment.

PATIENT/FAMILY TEACHING

• Clinical response occurs in 1–3 mos. • Flu-like symptoms tend to diminish with continued therapy. • Immediately report symptoms of depression, suicidal ideation. • Avoid tasks requiring alertness, motor skills until response to drug is established. • Avoid alcohol.

peginterferon alfa-2b

peg-in-ter-**feer**-on
(PEG-Intron, PEG-Intron RediPen, Sylatron)

■ **BLACK BOX ALERT** ■ Can cause or aggravate fatal or life-threatening autoimmune, neuropsychiatric (depression, suicidal ideation/behaviors), ischemic, including worsening hepatic function, and infectious disorders. Combination with ribavirin can cause fetal mortality, birth defects, hemolytic anemia. May be carcinogenic.

Do not confuse peginterferon alfa-2b with interferon alfa-2b, interferon alfa-n3, or peginterferon alfa-2a.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Immunomodulator. **CLINICAL:** Immunologic agent.

USES

PEG-Intron: As monotherapy or in combination with ribavirin for treatment of chronic hepatitis C in pts not previously treated with interferon alfa who have compensated hepatic disease and are older than 18 yrs. **Sylatron:** Treatment of melanoma or gross nodal involvement within 84 days of definitive surgical resection including complete lymphadenectomy.

PRECAUTIONS

Contraindications: Autoimmune hepatitis, decompensated hepatic disease with cirrhosis. Hypersensitivity to interferon alfa-2b, other alfa interferons. **Cautions:** Renal impairment (creatinine clearance less than 50 ml/min), elderly, pulmonary disorders, history of psychiatric disorders, compromised CNS function, cardiac diseases, autoimmune disorders, endocrine disorders (diabetes, hyperthyroidism, hypothyroidism), ophthalmologic disorders, myelosuppression.

ACTION

Inhibits viral replication in virus-infected cells, suppresses cell proliferation, increases phagocytic action of macrophages, augments specific cytotoxicity of lymphocytes for target cells. **Therapeutic Effect:** Inhibits viral hepatitis.

PHARMACOKINETICS

Bioavailability is increased after multiple weekly doses. Excreted in urine. **Half-life:** 22–60 hrs.

(29%–18%): Psychiatric reactions (depression, anxiety, emotional lability, irritability), insomnia, alopecia, diarrhea. **Rare:** Rash, diaphoresis, dry skin, dizziness, flushing, vomiting, dyspepsia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Serious, acute hypersensitivity reactions (urticaria, angioedema, bronchoconstriction, anaphylaxis), pulmonary disorders, endocrine disorders (diabetes mellitus, hypothyroidism, hyperthyroidism) pancreatitis occur rarely. Ulcerative colitis may occur within 12 wks of starting treatment.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

CBC, urinalysis, renal function, LFT, EKG should be performed before initial therapy and routinely thereafter. Pts with diabetes, hypertension should have ophthalmologic exam before treatment begins.

INTERVENTION/EVALUATION

Monitor for abdominal pain, bloody diarrhea as evidence of colitis. Assess for pulmonary impairment. Monitor chest X-ray for pulmonary infiltrates. Encourage adequate fluid intake, particularly during early therapy. Assess serum hepatitis C virus RNA levels after 24 wks of treatment. Monitor for depression, suicidal ideation.

PATIENT/FAMILY TEACHING

• Maintain adequate hydration. • Avoid alcohol. • May experience flu-like syndrome (nausea, body aches, headache). • Report persistent abdominal pain, bloody diarrhea, fever, signs of depression, suicidal ideation, or infection, unusual bruising/bleeding.

peginterferon beta-1a

peg-**in**-ter-**feer**-on
(Plegridy)

Do not confuse peginterferon beta with peginterferon alfa or interferon beta.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Biologic response modifier. **CLINICAL:** Multiple sclerosis agent.

USES

Treatment of relapsing forms of multiple sclerosis.

PRECAUTIONS

Contraindications: History of hypersensitivity reaction to natural or recombinant interferon beta or peginterferon. **Cautions:** Pts with severe psychiatric disorders, history of depression, high risk for suicide. Pts with active/history of hepatic disease, alcohol consumption, or increased ALT at baseline; bone marrow suppression; preexisting cardiac disease (e.g., angina, arrhythmias, HF); seizure disorder.

ACTION

Exact mechanism of action unknown. May alter expression/response to surface antigens and enhance immune cell activity. **Therapeutic Effect:** Decreases progression of multiple sclerosis.

PHARMACOKINETICS

Peak plasma concentration: 24–36 hrs. Not extensively metabolized in liver. Eliminated primarily in urine. **Half-life:** 78 hrs.

you how to properly inject your medication. You must demonstrate correct injection technique before using at home. • Inject under skin (subcutaneously); do not inject into muscle or vein. • Rotate injection sites. • Injection site reactions such as itching, swelling, redness are common. • Report generalized rash, itching, hives; may indicate allergic reaction. • Discard used needles using regulated sharps container. • Treatment may cause worsening of autoimmune or liver disease. • Report any upper abdominal pain, body aches, bruising, dark-colored urine, fever, yellowing of skin or eyes. • Protect drug from light. • Do not freeze medication. • Do not breastfeed.

pegloticase

peg-**loe**-ti-kase
(Krystexxa)

■ **BLACK BOX ALERT** ■ Severe infusion reactions, anaphylaxis (bronchospasm, stridor, urticaria, hypotension, dyspnea, flushing, circumoral swelling) have occurred, especially within 2 hrs of first infusion. Premedicate pt with corticosteroids, antihistamines. Should be administered in health care setting by health care providers prepared to manage infusion reactions.

Do not confuse pegloticase with Activase, cholinesterase, or pegaspargase.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Uric acid enzyme. **CLINICAL:** Antigout agent.

USES

Treatment of chronic gout in adult pts refractory to conventional therapy. Not recommended for treatment of asymptomatic hyperuricemia.

PRECAUTIONS

Contraindications: Glucose-6-phosphate dehydrogenase (G6PD) deficiency due to hemodialysis, methemoglobinemia. **Cautions:** History of HF, elderly, debilitated.

ACTION

Decreases uric acid production by catalyzing oxidation of uric acid to allantoin, lowering serum uric acid. **Therapeutic Effect:** Lowers serum uric acid concentration.

PHARMACOKINETICS

Catalyzes oxidation of uric acid to allantoin, an inert and water-soluble purine metabolite. Readily eliminated, primarily by renal excretion. **Half-life:** 14.5 days.

PHARMACOKINETICS

Not distributed extensively into tissues after subcutaneous administration. Less than 1% excreted in urine. **Half-life:** 6 days.

Storage • Reconstituted solution should appear clear to slightly opalescent, colorless to slightly yellow. Refrigerate reconstituted or diluted solution up to 24 hrs, or at room temperature up to 4 hrs. Store time should not exceed total combined time of reconstitution, dilution, storage, and infusion.

INDICATIONS/ROUTES/DOSAGE

Metastatic or Unresectable Melanoma

IV: ADULTS, ELDERLY: 2 mg/kg every 21 days until disease progression or unacceptable toxicity. If clinically indicated, consider administration of corticosteroids for adverse event.

Dose Modification

Based on Common Terminology Criteria for Adverse Events (CTCAE). **Withhold Treatment for Any of the Following Adverse Events:** ALT or AST greater than 3–5 times upper limit of normal (ULN) or bilirubin 1.5–3 times ULN, grade 2 or 3 colitis, grade 3 hyperthyroidism, grade 2 nephritis, grade 2 pneumonitis, symptomatic hypophysitis; any grade 3 treatment-related adverse reaction. **Permanently Discontinue for Any of the Following Adverse Events:** ALT or AST greater than 5 times ULN or bilirubin 3 times ULN (or pts with liver metastasis who begin treatment with grade 2 ALT, AST, if ALT or AST increases greater than or equal to 50% from baseline and lasts for at least 1 wk), grade 3 or 4 infusion-related reaction, grade 3 or 4 nephritis, grade 3 or 4 pneumonitis; inability to reduce corticosteroid dose to 10 mg/day or less (or prednisone equivalent) after last dose; persistent grade 2 or 3 adverse reaction that does not recover to grade 0–1 within 12 wks after last dose; any severe or grade 3 treatment-related adverse reaction that reoccurs.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Mild: No dose adjustment. **Moderate to Severe:** Not studied, use caution.

SIDE EFFECTS

Frequent (47–20%): Fatigue, nausea, cough, pruritus, rash, decreased appetite, constipation, diarrhea, arthralgia. **Occasional (18%–11%):** Dyspnea, extremity pain, peripheral edema, vomiting, headache, chills, insomnia, myalgia, abdominal pain, back pain, pyrexia, vitiligo, dizziness, upper respiratory tract infection.

ADVERSE REACTIONS/ TOXIC EFFECTS

May cause severe immune-mediated events such as pneumonitis (2.9% of pts), colitis (1% of pts), hepatitis (0.5% of pts), hypophysitis (0.5% of pts), renal failure or nephritis (0.7% of pts), hyperthyroidism (1.2% of pts), hypothyroidism (8.3% of pts). Other reported events include adrenal insufficiency, arthritis, cellulitis, exfoliative dermatitis, hemolytic anemia, myositis, myasthenic syndrome, pancreatitis, partial seizures, pneumonia, optic neuritis, rhabdomyolysis, sepsis. Immunogenicity (anti-pembrolizumab antibody formation) may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, BMP, ionized calcium, LFT, TSH, free T4, vital signs, urine pregnancy. Obtain weight in kg. Screen for history of adrenal/pituitary/pulmonary/thyroid disease, autoimmune disorders, hepatic/renal impairment, allergy to prednisone. Question possibility of pregnancy, plans for breastfeeding. Along with routine assessment, conduct full dermatologic exam, visual acuity.

INTERVENTION/EVALUATION

Monitor CBC, LFT, serum electrolytes; thyroid panel if applicable. Monitor for immune-mediated adverse events. Notify physician if any CTCAE toxicities occur (see Appendix N) and initiate proper treatment. Obtain chest X-ray if pneumonitis suspected. Screen for tumor lysis syndrome in pts with high tumor burden.

ADMINISTRATION/HANDLING

CHILDREN YOUNGER THAN 12 YRS: Initially, 3 mg/kg/day (**maximum:** 250 mg) for 3 mos, then 6 mg/kg/day (**maximum:** 500 mg) in 2 divided doses for 3 mos. **Maximum:** 10 mg/kg/day (750 mg/day) in 3–4 divided doses.

Wilson's Disease

PO: ADULTS, CHILDREN 12 YRS AND OLDER: 750–1,500 mg/day in 4 divided doses. **Maximum:** 2 g/day. **ELDERLY:** 750 mg/day in 3–4 divided doses. **CHILDREN YOUNGER THAN 12 YRS:** 20 mg/kg/day in 2–4 doses. **Maximum:** 1 g/day.

◀ALERT▶ Dose that results in initial 24–hr urinary copper excretion greater than 2 mg/day should continue for 3 mos. **Maintenance dose:** less than 10 mcg serum-free copper/dL.

Cystinuria

PO: ADULTS, ELDERLY: Initially, 2 g/day in divided doses q6h. Range: 1–4 g/day. **CHILDREN:** 30 mg/kg/day in 4 divided doses. **Maximum:** 4 g/day.

◀ALERT▶ Titrate to maintain urinary cystine excretion at 100–200 mg/day.

Dosage in Renal Impairment

Use caution.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Rash (pruritic, erythematous, maculopapular, morbilliform), reduced/altered sense of taste (hypogeusia), GI disturbances (anorexia, epigastric pain, nausea, vomiting, diarrhea), oral ulcers, glossitis. **Occasional:** Proteinuria, hematuria, hot flashes, drug-induced hyperthermia (drug fever). **Rare:** Alopecia, tinnitus, pemphigoid rash (water blisters).

ADVERSE EFFECTS/ TOXIC REACTIONS

Aplastic anemia, agranulocytosis, thrombocytopenia, leukopenia, myasthenia gravis, bronchiolitis, erythematous-like syndrome, evening hypoglycemia, skin friability at sites of pressure/trauma producing extravasation or white papules at venipuncture, surgical sites were reported. Iron deficiency may develop, particularly in children, menstruating women.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

CBC with differential should be performed before beginning therapy, q2wks thereafter for first 6 mos, then monthly during therapy. LFT (GGT, ALT, AST, LDH), CT scan for renal stones may also be ordered by physician. A 2-hr interval is necessary between iron and penicillamine therapy. In event of upcoming surgery, dosage should be reduced to 250 mg/day until wound healing is complete.

INTERVENTION/EVALUATION

Encourage copious amounts of water in pts with cystinuria. Monitor WBC, differential, platelet count. If WBC less than 3,500, neutrophils less than 2,000/mm^3, monocytes more than 500/mm^3, or platelet counts less than 100,000 mm^3, or if progressive fall in platelet count or WBC in 3 successive determinations noted, inform physician (drug withdrawal necessary). Assess for evidence of hematuria. Monitor urinalysis for hematuria, proteinuria (if proteinuria exceeds 1 g/24 hrs, inform physician).

PATIENT/FAMILY TEACHING

• Promptly report any possibilities of pregnancy. • Report fever, sore throat, chills, bruising, bleeding, difficulty breathing on exertion, unexplained cough or wheezing. • Take medication 1 hr before or 2 hrs after meals or at least 1 hr before or after any other drug, food, or milk.

penicillin G benzathine

pen-i-**sil**-in G **benz**-ah-theen
(Bicillin LA)

penicillin G potassium

pen-i-**sil**-in G po-**tas**-ee-um
(Crystapen, Pfizerpen)
Do not confuse penicillin with penicillamine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Penicillin.
CLINICAL: Antibiotic.

USES

Treatment of susceptible infections including sepsis, meningitis, endocarditis, pneumonia. Active against gram-positive organisms (except *S. aureus*), some gram-negative organisms (e.g., *N. gonorrhoeae*), and some anaerobes and spirochetes.

PRECAUTIONS

Contraindications: Hypersensitivity to any penicillin. **Cautions:** Renal/hepatic impairment, seizure disorder, hypersensitivity to cephalosporins, pts with asthma.

ACTION

Inhibits bacterial cell wall synthesis by binding to one or more of the penicillin-binding proteins of bacteria. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Protein binding: 60%. Widely distributed (poor CNS penetration). Metabolized in liver. Primarily excreted in urine. **Half-life:** 0.5–1 hr (increased in renal impairment).

HERBAL: None significant. **FOOD:** None known. **LAB VALUES:** May cause positive Coombs' test. May increase serum ALT, AST, alkaline phosphatase, LDH. May decrease WBC count.

AVAILABILITY (Rx)

Powder for Oral Solution: 125 mg/5 ml, 250 mg/5 ml. **Tablets:** 250 mg, 500 mg.

ADMINISTRATION/HANDLING

PO

• Give on empty stomach 1 hr before or 2 hrs after meals (increases absorption). • After reconstitution, oral solution is stable for 14 days if refrigerated. • Space doses evenly around the clock.

INDICATIONS/ROUTES/DOSAGE

Usual Dosage

PO: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 125–500 mg q6–8h. **CHILDREN YOUNGER THAN 12 YRS:** 25–50 mg/kg/day in divided doses q6–8h. **Maximum:** 3 g/day.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

P

SIDE EFFECTS

Frequent: Mild hypersensitivity reaction (chills, fever, rash), nausea, vomiting, diarrhea. **Rare:** Bleeding, allergic reaction.

ADVERSE EFFECTS/ TOXIC REACTIONS

Severe hypersensitivity reactions, including anaphylaxis, may occur. Nephrotoxicity, antibiotic-associated colitis, other superinfections (abdominal cramps, severe watery diarrhea, fever) may result from high dosages, prolonged therapy.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of allergies, particularly penicillins, cephalosporins.

INTERVENTION/EVALUATION

Hold medication, promptly report rash (hypersensitivity), diarrhea (with fever, abdominal pain, mucus or blood in stool may indicate antibiotic-associated colitis). Be alert for superinfection: fever, vomiting, diarrhea, anal/genital pruritus, oral mucosal change (ulceration, pain, erythema). Review Hgb levels; check for bleeding (overt/occult bleeding, ecchymosis, swelling of tissue). Monitor I&O, urinalysis, renal function tests for nephrotoxicity.

PATIENT/FAMILY TEACHING

• Continue antibiotic for full length of treatment. • Space doses evenly. • Report immediately if rash, diarrhea, bleeding, bruising, other new symptoms occur.

pentamidine

pen-**tam**-i-deen
(NebuPent, Pentam)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antiinfective. **CLINICAL:** Antiprotozoal, antifungal agent.

USES

IM/IV: Treatment of pneumonia caused by *Pneumocystis jiroveci* (PCP). **Inhalation:** Prevention of PCP in high-risk HIV-infected pts either with history of PCP or with a CD4+ count 200/mm^3 or less. **OFF-LABEL:** Treatment of African trypanosomiasis, cutaneous/visceral leishmaniasis. Prevention of PCP in non–HIV-infected pts.

PRECAUTIONS

Contraindications: None known. **Cautions:** Diabetes mellitus, hepatic impairment, hypertension/hypotension, anemia, thrombocytopenia, preexisting cardiac disease, hypocalcemia, prolonged QT interval, ventricular tachycardia, severe renal impairment, concurrent use of other nephrotoxic drugs, history of seizures or pancreatic

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent: Injection (Greater Than 10%): Abscess, pain at injection site. **Inhalation (Greater Than 5%):** Fatigue, metallic taste, shortness of breath, decreased appetite, dizziness, rash, cough, nausea, vomiting, chills. **Occasional: Injection (10%–1%):** Nausea, decreased appetite, hypotension, fever, rash, altered taste, confusion. **Inhalation (5%–1%):** Diarrhea, headache, anemia, muscle pain. **Rare: Injection (less than 1%):** Neuralgia, thrombocytopenia, phlebitis, dizziness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Life-threatening/fatal hypotension, arrhythmias, hypoglycemia, leukopenia, nephrotoxicity, renal failure, anaphylactic shock, Stevens-Johnson syndrome, toxic epidural necrolysis occur rarely. Hyperglycemia, insulin-dependent diabetes mellitus (often permanent) may occur even mos after therapy has stopped.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Avoid concurrent use of nephrotoxic drugs. Establish baseline for B/P, serum glucose. Obtain specimens for diagnostic tests before giving first dose.

INTERVENTION/EVALUATION

Monitor B/P during administration until stable for both IM and IV administration (pt should remain supine). Check serum glucose levels; observe for clinical signs of hypoglycemia (diaphoresis, anxiety, tremor, tachycardia, palpitations, dizziness, headache, numbness of lips, double vision, incoordination), hyperglycemia (polyuria, polyphagia, polydipsia, malaise, visual changes, abdominal pain, headache, nausea/vomiting). Evaluate IM sites for pain, redness, induration; IV sites for phlebitis (heat, pain, red streaking over vein). Monitor renal, hepatic, hematology test results. Assess skin for rash. Evaluate equilibrium during ambulation. Be alert for respiratory difficulty when administering by inhalation route.

PATIENT/FAMILY TEACHING

• Remain flat in bed during administration of medication; get up slowly with assistance only when B/P stable. • Immediately report profuse sweating, shakiness, dizziness, palpitations. • Drowsiness, increased urination, thirst, anorexia may develop in mos following therapy. • Maintain adequate fluid intake. • Report fever, cough, shortness of breath. • Avoid alcohol.

perampanel

per-**am**-pa-nel
(Fycompa)

■ **BLACK BOX ALERT** ■ Risk for serious neuropsychiatric events, including irritability, aggression, anger, anxiety, paranoia, euphoric mood, agitation, mental status changes. Some of these events reported as serious and life-threatening. Violent thoughts or threatening behavior were also observed. Immediately report any changes in mood or behavior that are not typical for the patient are observed. Health care professionals should closely monitor patients during titration period when higher doses are used.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Noncompetitive AMPA glutamate receptive antagonist. **CLINICAL:** Anticonvulsant.

USES

Adjunctive treatment of partial-onset seizures with or without secondary generalized seizures.

PRECAUTIONS

Contraindications: None known. **Cautions:** Elderly (increased falls, dizziness, gait

ADVERSE EFFECTS/ TOXIC REACTIONS

Irritability, aggression, anger, anxiety, affect lability, agitation occurred rarely (2%). Increased risk for seizures when anticonvulsants are withdrawn abruptly.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Review history of seizure disorder (intensity, frequency, duration, LOC). Initiate seizure precautions. Obtain medication history (esp. use of other anticonvulsant therapy; dosage based on concurrent seizure medication). Observe clinically. Assist with ambulation until response to drug is established (32% experience dizziness).

INTERVENTION/EVALUATION

Assess mental status, cognitive abilities, behavioral changes. Monitor for clinical response, tolerability to medication, dosing level during treatment and for at least 1 mo after last therapy dose. Report persistent, severe, or worsening psychiatric symptoms or behaviors. Assess for clinical improvement (decrease in intensity, frequency of seizures).

PATIENT/FAMILY TEACHING

• Avoid alcohol (greater risk for adverse effects). • The combination of alcohol and perampanel may significantly worsen mood, increase anger. • Counsel pts, families, and caregivers of need to monitor for emergence of anger, aggression, hostility, unusual changes in mental status. • Avoid tasks that require alertness, motor skills until response to drug is established (greater risk for dizziness, sleepiness).

P

pertuzumab

per-**tue**-zue-mab
(Perjeta)

■ **BLACK BOX ALERT** ■ Can result in embryo-fetal death, birth defects. Pts must be made aware of danger to fetus, need for effective contraception. May result in cardiac failure. Assess left ventricular ejection fraction.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: *HER2* receptor antagonist. **CLINICAL:** Antineoplastic.

USES

Used in combination with trastuzumab and docetaxel for treatment of pts with *HER2*-positive metastatic breast cancer who have not received prior anti-*HER2* therapy or chemotherapy for metastatic disease. Neoadjuvant treatment of pts with *HER2*-positive, locally advanced inflammatory, or early-stage breast cancer.

PRECAUTIONS

Contraindications: None known. **Cautions:** Conditions that may impair left ventricular function (e.g., uncontrolled hypertension, recent MI, severe cardiac arrhythmia), history of sensitivity to medication, history of infusion-related reaction. Prior anthracycline therapy or irradiation.

ACTION

Targets human epidermal growth factor 2 (*HER2*), blocking ligand-initiated intercellular signaling, which can result in cell growth arrest and cell death. **Therapeutic Effect:** Inhibits proliferation of human tumor cells.

PHARMACOKINETICS

Peak plasma concentration reached after first maintenance dose. **Half-life:** 18 days.

infusion. Observe pt closely for 60 min after the first infusion and for 30 min after subsequent infusions. Offer antiemetics if nausea occurs.

PATIENT/FAMILY TEACHING

• Avoid pregnancy. • Use effective contraceptive measures, including barrier precautions during treatment and for 6 mos after treatment in women of childbearing potential. • If pregnancy occurs, inform physician immediately. • Do not breastfeed. • Alopecia is reversible, but new hair growth may have different color, texture.

phenazopyridine

fen-**ay**-zoe-**pir**-i-deen
(Azo-Gesic, Azo-Standard, Phenazo, Pyridium, Uristat)
Do not confuse phenazopyridine with pyridoxine, or Pyridium with Dyrenium or Perdiem.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Interstitial cystitis agent. **CLINICAL:** Urinary tract analgesic.

P

USES

Symptomatic relief of pain, burning, urgency, frequency resulting from lower urinary tract mucosa irritation (may be caused by infection, trauma, surgery).

PRECAUTIONS

Contraindications: Hepatic impairment, renal impairment (creatinine clearance less than 50 ml/min). **Cautions:** Renal impairment (creatinine clearance 50–80 ml/min).

ACTION

Exerts topical analgesic effect on urinary tract mucosa. **Therapeutic Effect:** Relieves urinary pain, burning, urgency, frequency.

PHARMACOKINETICS

Well absorbed from GI tract. Partially metabolized in liver. Primarily excreted in urine. **Half-life:** Unknown.

ELDERLY: Initially, 7.5 mg/day. May increase by 7.5–15 mg/day q3–4days up to 60 mg/day in 3–4 divided doses. **Maintenance:** After achieving maximum benefit, slowly reduce dose over several wks. Dose may be as low as 15 mg/day or every other day.

Dosage in Renal Impairment
No dose adjustment.

Dosage in Hepatic Impairment
Contraindicated.

SIDE EFFECTS

Frequent: Orthostatic hypotension, restlessness, GI upset, insomnia, dizziness, headache, lethargy, asthenia, dry mouth, peripheral edema. **Occasional:** Flushing, diaphoresis, rash, urinary frequency, increased appetite, transient impotence. **Rare:** Visual disturbances.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypertensive crisis occurs rarely, marked by severe hypertension, occipital headache radiating frontally, neck stiffness/soreness, nausea, vomiting, diaphoresis, fever, chills, clammy skin, dilated pupils, palpitations, tachycardia or bradycardia, constricting chest pain. **Antidote for hypertensive crisis:** 5–10 mg phentolamine IV.

P

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess appearance, behavior, speech pattern, level of interest, mood.

INTERVENTION/EVALUATION

Periodic LFT should be performed for pts requiring high dosage who are undergoing prolonged therapy. Assess appearance, behavior, speech pattern, level of interest, mood. Monitor for suicidal ideation, worsening depression. Monitor for occipital headache radiating frontally and/or neck stiffness/soreness (may be first signal of impending hypertensive crisis). Monitor B/P, heart rate, diet, weight.

PATIENT/FAMILY TEACHING

• Report worsening depression, suicidal ideation, or unusual changes in behavior. • Antidepressant relief may be noted during first wk of therapy; maximum benefit noted in 2–6 wks. • Report headache, neck stiffness/soreness immediately. • Avoid foods that require bacteria/molds for their preparation/preservation or those that contain tyramine (e.g., cheese, sour cream, beer, wine, yeast extracts, yogurt, papaya, meat tenderizers), excessive amounts of caffeine (coffee, tea, chocolate), OTC preparations for hay fever, colds, weight reduction.

phenobarbital

fee-noe-**bar**-bi-tal
(Luminal)
Do not confuse phenobarbital with Phenergan or phenytoin.

FIXED-COMBINATION(S)

Bellergal-S: phenobarbital/ergotamine/belladonna (an anticholinergic): 40 mg/0.6 mg/0.2 mg. **Dilantin with PB:** phenobarbital/phenytoin (an anticonvulsant): 15 mg/100 mg, 30 mg/100 mg. **Donnatal:** phenobarbital/atropine (an anticholinergic)/hyoscyamine (an anticholinergic)/scopolamine (an anticholinergic): 16.2 mg/0.0194 mg/0.1037 mg/0.0065 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Barbiturate **(Schedule IV). CLINICAL:** Anticonvulsant, hypnotic.

USES

Management of generalized tonic-clonic (grand mal) seizures, partial seizures, control of acute seizure episodes (status epilepticus, eclampsia, febrile seizures). **OFF-LABEL:** Prevention/treatment of neonatal hyperbilirubinemia and lowering of bilirubin in chronic cholestasis; neonatal seizures.

INDICATIONS/ROUTES/DOSAGE

Status Epilepticus

IV: ADULTS, ELDERLY: 10–20 mg/kg. May repeat dose in 20-min intervals. **Maximum total dose:** 30 mg/kg. **CHILDREN, INFANTS:** 15–20 mg/kg (**maximum:** 1,000 mg). May repeat q15–30min until seizures controlled or total dose of 40 mg/kg administered.

Seizure Control

PO, IV: ADULTS, ELDERLY, CHILDREN OLDER THAN 12 YRS: 1–3 mg/kg/day or 50–100 mg 2–3 times daily. **CHILDREN 5–12 YRS:** 4–6 mg/kg/day. **CHILDREN 1–5 YRS:** 6–8 mg/kg/day. **CHILDREN YOUNGER THAN 1 YR:** 5–8 mg/kg/day in 1–2 divided doses. **NEONATES:** 3–4 mg/kg/day given once daily.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (3%–1%): Drowsiness. **Rare (less than 1%):** Confusion, paradoxical CNS reactions (hyperactivity, anxiety in children; excitement, restlessness in elderly, generally noted during first 2 wks of therapy, particularly in presence of uncontrolled pain).

P

ADVERSE EFFECTS/ TOXIC REACTIONS

Abrupt withdrawal after prolonged therapy may produce increased dreaming, nightmares, insomnia, tremor, diaphoresis, vomiting, hallucinations, delirium, seizures, status epilepticus. Skin eruptions appear as hypersensitivity reaction. Blood dyscrasias, hepatic disease, hypocalcemia occur rarely. Overdose produces cold/clammy skin, hypothermia, severe CNS depression, cyanosis, tachycardia, Cheyne-Stokes respirations. Toxicity may result in severe renal impairment.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess B/P, pulse, respirations immediately before administration. **Hypnotic:** Raise bed rails, provide environment conducive to sleep (back rub, quiet environment, low lighting). **Seizures:** Review history of seizure disorder (length, presence of auras, LOC). Observe for recurrence of seizure activity. Initiate seizure precautions.

INTERVENTION/EVALUATION

Monitor CNS status, seizure activity, hepatic/renal function, respiratory rate, heart rate, B/P. Monitor for therapeutic serum level. **Therapeutic serum level:** 10–40 mcg/ml; **toxic serum level:** greater than 40 mcg/ml.

PATIENT/FAMILY TEACHING

• Avoid alcohol, limit caffeine. • May be habit forming. • Do not discontinue abruptly. • May cause dizziness/drowsiness; avoid tasks that require alertness, motor skills until response to drug is established.

phenylephrine

HIGH ALERT

fen-il-**ef**-rin

(AK-Dilate, Mydfrin, Neo-Synephrine, Sudafed PE)

■ **BLACK BOX ALERT** ■ Intravenous use should be administered by adequately trained individuals familiar with its use.

Do not confuse Mydfrin with Midrin, or Sudafed PE with Sudafed.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Sympathomimetic, alpha-receptor stimulant.
CLINICAL: Nasal decongestant, mydriatic, vasopressor.

USES

Nasal decongestant: Topical application to nasal mucosa reduces nasal secretion, promoting drainage of sinus secretions. **Ophthalmic:** Topical application to conjunctiva relieves congestion, itching, minor irritation; whitens sclera of eye. **Parenteral:** Vascular failure in

Intranasal: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 1–2 drops or 1–2 sprays of 0.25%–0.5% solution into each nostril q4h as needed. **CHILDREN 6–11 YRS:** 1–2 drops or 1–2 sprays of 0.25% solution into each nostril q4h as needed. **CHILDREN 2–5 YRS:** 1 drop of 0.125% solution (dilute 0.5% solution with 0.9% NaCl to achieve 0.125%) in each nostril. Repeat q2–4h as needed.
PO: ADULTS, ELDERLY, CHILDREN 13 YRS AND OLDER: 10 mg q4h as needed for up to 7 days. **CHILDREN 6–11 YRS:** 5 mg q4h as needed for up to 7 days. **CHILDREN 4–5 YRS:** 2.5 mg q4h as needed for up to 7 days.

Hypotension, Shock
IV Bolus: ADULTS, ELDERLY: 0.1–0.5 mg/dose q10–15min as needed. **CHILDREN:** 5–20 mcg/kg/dose q10–15min as needed. **IV Infusion: ADULTS, ELDERLY:** 100–180 mcg/min or 0.5 mcg/kg/min. Titrate to desired response. **CHILDREN:** 0.1–0.5 mcg/kg/min. Titrate to desired effect.

SIDE EFFECTS

Frequent: Nasal: Rebound nasal congestion due to overuse, esp. when used longer than 3 days. **Occasional:** Mild CNS stimulation (restlessness, nervousness, tremors, headache, insomnia, particularly in those hypersensitive to sympathomimetics, such as elderly pts). **Nasal:** Stinging, burning, drying of nasal mucosa. **Ophthalmic:** Transient burning/stinging, brow ache, blurred vision.

ADVERSE EFFECTS/ TOXIC REACTIONS

Large doses may produce tachycardia, palpitations (particularly in pts with cardiac disease), dizziness, nausea, vomiting. Overdose in pts older than 60 yrs may result in hallucinations, CNS depression, seizures. Prolonged nasal use may produce chronic swelling of nasal mucosa, rhinitis. If phenylephrine 10% ophthalmic is instilled into denuded/damaged corneal epithelium, corneal clouding may result.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline symptomology, vital signs.

INTERVENTION/EVALUATION

Monitor B/P, heart rate. For severe hypotension or shock states, monitor central venous pressure.

PATIENT/FAMILY TEACHING

• Discontinue drug if adverse reactions occur. • Do not use for nasal decongestion for longer than 3 days (rebound congestion). • Discontinue drug if insomnia, dizziness, weakness, tremor, palpitations occur. • **Nasal:** Stinging/burning of nasal mucosa may occur. • **Ophthalmic:** Blurring of vision with eye instillation generally subsides with continued therapy. • Discontinue medication if redness/swelling of eyelids, itching occurs.

phenytoin

fen-i-toyn
(Dilantin, Novo-Phenytoin, Phenytek)

■ **BLACK BOX ALERT** ■ Do not exceed IV rate of 50 mg/min in adults and 1–3 mg/kg/min in pediatric pts.
Do not confuse Dilantin with Dilaudid or diltiazem, or phenytoin with phenelzine or fosphenytoin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Hydantoin. **CLINICAL:** Anticonvulsant, antiarrhythmic.

USES

Management of generalized tonic-clonic seizures (grand mal), complex partial seizures, status epilepticus. Prevention of seizures following head trauma/neurosurgery. **OFF-LABEL:** Prevention of early post-traumatic seizures following traumatic brain injury.

at room temperature). • Slight yellow discoloration of parenteral form does not affect potency, but do not use if solution is cloudy or precipitate forms. Discard if not used within 4 hrs of preparation.

PO

• Give with food if GI distress occurs. • Tablets may be chewed. • Shake oral suspension well before using. • Separate administration of phenytoin with antacids or tube feeding by 2 hrs.

IV INCOMPATIBILITIES

Diltiazem (Cardizem), dobutamine (Dobutrex), enalapril (Vasotec), heparin, hydromorphone (Dilaudid), insulin, lidocaine, morphine, nitroglycerin, norepinephrine (Levophed), potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Status Epilepticus

IV: ADULTS, ELDERLY: Loading dose: 15–20 mg/kg. **Maintenance dose:** IV/PO: 100 mg q6–8h. Range: 300–600 mg/day. **INFANTS, CHILDREN:** Loading dose: 15–20 mg/kg. **Maintenance dose:** IV/PO: 5 mg/kg/day in 2–3 divided doses. Range: 4–8 mg/kg. **Maximum:** 300 mg/day. **NEONATES:** 10 mg/kg as single dose. **Maintenance:** IV/PO: 5 mg/kg/day in 2 divided doses. Range: 4–8 mg/kg/day.

Seizure Control

PO: ADULTS, ELDERLY, CHILDREN: Loading dose: 15–20 mg/kg in 3 divided doses 2–4 hrs apart. **Maintenance dose:** Same as for status epilepticus.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Drowsiness, lethargy, confusion, slurred speech, irritability, gingival hyperplasia, hypersensitivity reaction (fever, rash, lymphadenopathy), constipation, dizziness, nausea. **Occasional:** Headache, hirsutism, coarsening of facial features, insomnia, muscle twitching.

ADVERSE EFFECTS/ TOXIC REACTIONS

Abrupt withdrawal may precipitate status epilepticus. Blood dyscrasias, lymphadenopathy, osteomalacia (due to interference of vitamin D metabolism) may occur. Toxic phenytoin blood concentration (25 mcg/ml or more) may produce ataxia (muscular incoordination), nystagmus (rhythmic oscillation of eyes), diplopia. As level increases, extreme lethargy to comatose state occurs.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Anticonvulsant: Review history of seizure disorder (intensity, frequency, duration, LOC). Initiate seizure precautions. LFT, CBC should be performed before beginning therapy and periodically during therapy. Repeat CBC 2 wks following initiation of therapy and 2 wks following administration of maintenance dose.

INTERVENTION/EVALUATION

Observe frequently for recurrence of seizure activity. Assess for clinical improvement (decrease in intensity/frequency of seizures). Monitor for signs/symptoms of depression, suicidal tendencies, unusual behavior. Monitor CBC with differential, renal function, LFT, B/P (with IV use). Assist with ambulation if drowsiness, lethargy occurs. Monitor for therapeutic serum level (10–20 mcg/ml). **Therapeutic serum level:** 10–20 mcg/ml; **toxic serum level:** greater than 20 mcg/ml.

PATIENT/FAMILY TEACHING

• Pain may occur with IV injection. • To prevent gingival hyperplasia (bleeding, tenderness, swelling of gums), maintain good oral hygiene, gum massage, regular dental visits. • Serum levels should be performed every mo for 1 yr after maintenance dose is established and q3mos thereafter. • Report sore throat, fever, glandular swelling, skin reaction (hematologic toxicity). • Drowsiness

INDICATIONS/ROUTES/DOSAGE

Hypophosphatemia

Potassium/Sodium Phosphate: (Phosphate level 2.3–3 mg/dL): 0.16–0.32 mmol/kg over 4–6 hr. (Phosphate level 1.6–22 mg/dL): 0.32–0.64 mmol/kg over 4–6 hr. (Phosphate level <1.5 mg/dL): 0.64–1 mmol/kg over 8–12 hr.

SIDE EFFECTS

Frequent: Mild laxative effect (in first few days of therapy). **Occasional:** Diarrhea, nausea, abdominal pain, vomiting. **Rare:** Headache, dizziness, confusion, heaviness of lower extremities, fatigue, muscle cramps, paresthesia, peripheral edema, arrhythmias, weight gain, thirst.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hyperphosphatemia may produce extraskeletal calcification.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Routinely monitor serum calcium, phosphorus, potassium, sodium, ALT, AST, alkaline phosphatase, bilirubin.

PATIENT/FAMILY TEACHING

- Report diarrhea, nausea, vomiting.

pioglitazone

HIGH ALERT

pye-oh-**glit**-a-zone
(Actos, Apo-Pioglitazone, Novo-Pioglitazone)

■ **BLACK BOX ALERT** ■ May cause or exacerbate HF.

Do not confuse Actos with Actidose or Actonel.

FIXED-COMBINATION(S)

Actoplus Met: pioglitazone/metformin (an antidiabetic): 15 mg/500 mg, 15 mg/850 mg. **Duetact:** pioglitazone/glimepiride (an antidiabetic): 30 mg/2 mg, 30 mg/4 mg. **Oseni:** pioglitazone/alogliptin (an antidiabetic): 15 mg/25 mg, 30 mg/25 mg, 45 mg/25 mg, 15 mg/12.5 mg, 30 mg/12.5 mg, 45 mg/12.5 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Thiazolidinedione antihyperglycemic. **CLINICAL:** Antidiabetic agent.

USES

Adjunct to diet and exercise to lower serum glucose in those with type 2 non–insulin-dependent diabetes mellitus (NIDDM). Used as monotherapy or combination therapy.

PRECAUTIONS

Contraindications: NYHA class III/IV heart failure (at initiation of therapy). **Cautions:** Hepatic impairment, anemia, pts with edema; avoid in pts with bladder cancer. For premenopausal, anovulatory women may result in ovulation resumption, increased risk of pregnancy.

ACTION

Improves target-cell response to insulin without increasing pancreatic insulin secretion. Action dependent on presence of insulin. **Therapeutic Effect:** Lowers serum glucose concentration.

PHARMACOKINETICS

Rapidly absorbed. Protein binding: 99%. Metabolized in liver. Excreted in urine. Unknown if removed by hemodialysis. **Half-life:** 16–24 hrs.

OFF-LABEL: Treatment of UTI, bone and joint infections, septicemia, endocarditis, cystic fibrosis exacerbations.

PRECAUTIONS

Contraindications: Hypersensitivity to any penicillin. **Cautions:** History of allergies (esp. cephalosporins, other drugs), renal impairment, preexisting seizure disorder.

ACTION

Piperacillin: Inhibits cell wall synthesis by binding to bacterial cell membranes. **Therapeutic Effect:** Bactericidal. **Tazobactam:** Inactivates bacterial beta-lactamase. **Therapeutic Effect:** Protects piperacillin from enzymatic degradation, extends its spectrum of activity, prevents bacterial overgrowth.

PHARMACOKINETICS

Protein binding: 16%–30%. Widely distributed. Primarily excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 0.7–1.2 hrs (increased in hepatic cirrhosis, renal impairment).

GI bleeding. **Cautions:** Advanced renal disease, hepatic impairment, asthma, coagulation disorders, concomitant use of anticoagulants, poor CYP2C9 metabolizers.

ACTION

Produces analgesic, anti-inflammatory effects by inhibiting prostaglandin synthesis. **Therapeutic Effect:** Reduces inflammatory response, intensity of pain.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1 hr	3–5 hrs	—

Well absorbed following PO administration. Protein binding: 99%. Metabolized in liver. Primarily excreted in urine; small amount eliminated in feces. **Half-life:** 50 hrs.

ADMINISTRATION/HANDLING

PO

• Give without regard to meals or time of day.

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Before initiating therapy, pt should be on standard cholesterol-lowering diet for minimum of 3–6 mos. Continue diet throughout pitavastatin therapy.

Usual Dosage

PO: ADULTS: Initially, 2 mg/day. **Maximum:** 4 mg/day. Range: 1–4 mg/day. **Dosage with erythromycin:** 1 mg/day; with rifampin: 2 mg/day.

Dosage in Renal Impairment

CrCl 15–59 or end-stage renal disease in pts on hemodialysis: Initially, 1 mg/day. **Maximum:** 2 mg/day. **Severe renal disease not on hemodialysis:** Not recommended.

Dosage in Hepatic Impairment

See contraindications.

SIDE EFFECTS

Generally well tolerated. Side effects usually mild and transient. **Rare (Less Than 4%):** Myalgia, constipation/diarrhea, back/extremity pain, arthralgia, headache, nasopharyngitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity (rash, pruritus, urticaria) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for possibility of pregnancy before initiating therapy (Pregnancy Category X). Assess baseline lab results: cholesterol, triglycerides, LFT.

INTERVENTION/EVALUATION

Monitor cholesterol and triglyceride levels. Monitor LFT. Monitor daily pattern of bowel activity, stool consistency. Check for myalgia, arthralgia, headache. Assess for rash, pruritus. Be alert for malaise, muscle cramping/weakness.

PATIENT/FAMILY TEACHING

• Follow special diet (important part of treatment). • Periodic lab tests are essential part of therapy. • Report promptly any muscle pain/weakness. • Use nonhormonal contraception.

plerixafor

pler-**ix**-a-for
(Mozobil)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Chemokine receptor inhibitor. **CLINICAL:** Hematopoietic stem cell mobilizer.

USES

Indicated in combination with granulocyte colony-stimulating factor (G-CSF) to mobilize stem cells to peripheral blood for collection and transplantation in pts with non-Hodgkin's lymphoma and multiple myeloma.

PRECAUTIONS

Contraindications: None known. **Cautions:** Avoid use in leukemic pts, in pts with neutrophil count greater than 50,000/mm^3, those with moderate to severe renal impairment.

ACTION

Immobilizes hematopoietic stem cells in bone marrow. Once in the marrow, acts to help anchor these cells to marrow matrix through induction of adhesion molecules. **Therapeutic Effect:** Results in leukocytosis, elevation in circulating hematopoietic progenitor cells in peripheral blood system.

PHARMACOKINETICS

Readily absorbed after subcutaneous administration. Generally confines to extravascular fluid space. Protein binding: 58%.

Canadian trade name

Do not confuse MiraLax with Mirapex.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Osmotic/laxative. **CLINICAL:** Bowel evacuant.

USES

Polyethylene glycol-electrolyte solution: Bowel cleansing before GI examination, colon surgery. **Polyethylene glycol:** Treatment of occasional constipation.

PRECAUTIONS

Contraindications: Bowel perforation, gastric retention, GI obstruction, megacolon, toxic colitis, toxic ileus. **Cautions:** **(Propylene glycol):** Renal impairment. **(Propylene glycol–electrolyte solution):** Ulcerative colitis, medications altering electrolytes, hyponatremia, cardiac arrhythmias, impaired gag reflex, history of seizures, elderly.

ACTION

Osmotic effect. **Therapeutic Effect:** Induces diarrhea, cleanses bowel without depleting electrolytes.

P

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (bowel cleansing)	1–2 hrs	N/A	N/A
PO (constipation)	2–4 days	N/A	N/A

effects, renal failure, electrolyte imbalance.

INTERACTIONS

DRUG: **CYP3A4, P-glycoprotein inhibitors (e.g., erythromycin, ketoconazole)** may increase concentration/effects. **CYP3A4, P-glycoprotein inducers (e.g., carbamazepine, rifampin)** may decrease concentration/effects. **HERBAL:** None significant. **FOOD:** All foods may reduce absorption/concentration. **LAB VALUES:** May decrease Hgb, Hct, neutrophils, platelets, leukocytes, lymphocytes, serum calcium, potassium, sodium. May increase serum calcium, creatinine, glucose.

AVAILABILITY (Rx)

binding: 98%. Not significantly metabolized. Primarily excreted in feces. **Half-life:** 20–66 hrs.

Canadian trade name

AVAILABILITY (Rx)

POTASSIUM ACETATE
Injection, Solution: 2 mEq/ml.
POTASSIUM BICARBONATE AND POTASSIUM CITRATE
Tablets for Solution: **(Effer-K):** 10 mEq, 20 mEq, 25 mEq. **(Klor-Con EF):** 25 mEq.
POTASSIUM CHLORIDE
Injection, Solution: 2 mEq/ml. **Oral Solution:** 20 mEq/15 ml, 40 mEq/15 ml. **Powder for Oral Solution:** 20 mEq/packet, 25 mEq/packet.

P

◀ALERT▶ Pt should begin taking oral folic acid (1 mg) daily starting 10 days prior to first IV pralatrexate dose and continue for 30 days after last dose. Pt should also receive vitamin B_{12} (1 mg) IM injection no more than 10 wks prior to first IV pralatrexate dose and every 8–10 wks thereafter.

more frequently than 5–7 days. **Maximum:** 4.5 mg once daily. **Note:** May switch overnight from immediate-release to extended-release at same daily dose.

Restless Legs Syndrome

PO: ADULTS, ELDERLY: Initially, 0.125 mg once daily 2–3 hrs before bedtime. May increase to 0.25 mg after 4–7 days, then to 0.5 mg after 4–7 days (interval is 14 days in pts with renal impairment). **Maximum:** 0.5 mg/day.

Dosage in Renal Impairment

Dosage and frequency are modified based on creatinine clearance.

Mirapex (Parkison's Disease)

Creatinine Clearance	Dosage	
	Initial	Maximum
30–50 ml/min	0.125 mg twice daily	0.75 mg 3 times/day
15–29 ml/min	0.125 mg once daily	1.5 mg once daily

Restless Legs Syndrome

No dose adjustment.

Mirapex ER

Creatinine Clearance 30–50 ml/min: Initially, 0.375 mg q every other day. May increase to 0.375 mg daily after 1 wk, then 0.375 mg/dose not more frequently than q7days. **Maximum:** 2.25 mg/day.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Early Parkinson's disease (28%–10%): Nausea, asthenia, dizziness, drowsiness, insomnia, constipation. **Advanced Parkinson's disease (53%–17%):** Orthostatic hypotension, extrapyramidal reactions, insomnia, dizziness, hallucinations. **Occasional: Early Parkinson's disease (5%–2%):** Edema, malaise, confusion, amnesia, akathisia, anorexia, dysphagia, peripheral edema, vision changes, impotence. **Advanced Parkinson's disease (10%–7%):** Asthenia, drowsiness, confusion, constipation, abnormal gait, dry mouth. **Rare: Advanced Parkinson's disease (6%–2%):** General edema, malaise, angina, amnesia, tremor, urinary frequency/incontinence, dyspnea, rhinitis, vision changes. **Restless legs syndrome: Frequent (16%):** Headache, nausea. **Occasional (13%–9%):** Insomnia, fatigue. **Rare (6%–3%):** Drowsiness, constipation, diarrhea, dry mouth.

ADVERSE EFFECTS/ TOXIC REACTIONS

Vascular disease, atrial fibrillation, arrhythmias, pulmonary embolism, impulsive/compulsive behavior (pathological gambling, hypersexuality, binge eating) have been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Parkinson's disease: Assess for tremor, muscle weakness and rigidity, ataxia. **Restless legs syndrome:** Assess frequency of symptoms, sleep pattern.

INTERVENTION/EVALUATION

Instruct pt to rise from lying to sitting or sitting to standing position slowly to prevent risk of postural hypotension. Assess for clinical improvement. Assist with ambulation if dizziness occurs. Assess for constipation; encourage fiber, fluids, exercise.

PATIENT/FAMILY TEACHING

• Inform pt that hallucinations may occur, esp. in the elderly. • Go from lying to standing slowly. • Avoid tasks that require alertness, motor skills until response to drug is established. • If nausea occurs, take medication with food. • Avoid abrupt withdrawal. • Avoid alcohol. • Report new or increased impulsive/compulsive behaviors (e.g., gambling, sexual urges, compulsive eating or buying).

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Initially, current insulin dosage in all pts with type 1, type 2 diabetes mellitus should be reduced by 50%. This includes preprandial, rapid-acting, short-acting, fixed-mixed insulins.

Type 1 Diabetes Mellitus

Subcutaneous: ADULTS, ELDERLY: Initially, 15 mcg immediately before major meal. Titrate in 15-mcg increments every 3 days (if no significant nausea occurs) to target dose of 30–60 mcg.

Type 2 Diabetes Mellitus

Subcutaneous: ADULTS, ELDERLY: Initially, 60 mcg immediately before major meal. After 3–7 days, increase to 120 mcg if no significant nausea occurs (if nausea occurs at 120 mcg dose, reduce to 60 mcg).

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

TYPE 1 DIABETES MELLITUS

Frequent (48%): Nausea. **Occasional (17%–11%):** Anorexia, vomiting. **Rare (7%–5%):** Fatigue, arthralgia, allergic reaction, dizziness.

TYPE 2 DIABETES MELLITUS

Frequent (28%): Nausea. **Occasional (13%–8%):** Headache, anorexia, vomiting, abdominal pain. **Rare (7%–5%):** Fatigue, dizziness, cough, pharyngitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose produces severe nausea, vomiting, diarrhea, vasodilation, dizziness. No hypoglycemia was reported. Increased risk of severe hypoglycemia when given concurrently with nontitrated insulin.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check serum glucose concentration before administration, both before and after meals and at bedtime. Discuss lifestyle to determine extent of learning, emotional needs. Ensure follow-up instruction if pt, family does not thoroughly understand diabetes management, glucose testing technique.

INTERVENTION/EVALUATION

Risk for hypoglycemia occurs within first 3 hrs following drug administration if given concurrently with insulin. Assess for hypoglycemia (diaphoresis, tremors, dizziness, anxiety, headache, tachycardia, numbness in mouth, hunger, diplopia, difficulty concentrating). Be alert to conditions that alter glucose requirements (fever, increased activity, stress, surgical procedures).

PATIENT/FAMILY TEACHING

• Diabetes mellitus requires lifelong control. • Prescribed diet, exercise are principal parts of treatment; do not skip/delay meals. • Continue to adhere to dietary instructions, regular exercise program, regular testing of serum glucose. • When taking combination drug therapy, have source of glucose available to treat symptoms of low blood sugar.

prasugrel

TOP 100

pra-soo-grel
(Effient)

■ **BLACK BOX ALERT** ■ Serious, sometimes fatal, hemorrhage may occur.

Do not confuse Effient with Effexor, or prasugrel with praziquantel.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Thienopyridine derivative inhibitor. **CLINICAL:** Antiplatelet agent.

USES

Reduction of thrombotic cardiovascular events (MI, CVA, stent thrombosis) in pts with acute coronary syndrome (unstable

INTERVENTION/EVALUATION

Monitor vital signs for changes in B/P, pulse. Assess for signs of unusual bleeding or hemorrhage, pain. Monitor platelet count, LFT, EKG for changes from baseline.

PATIENT/FAMILY TEACHING

• It may take longer to stop minor bleeding during drug therapy. Report unusual bleeding/bruising, blood noted in stool or urine, chest/back pain, extremity pain. • Monitor for dyspnea. • Report fever, weakness, extreme skin paleness, purple skin patches, yellowing of skin or eyes, changes in mental status. • Do not discontinue drug therapy without physician approval. • Inform physicians, dentists before undergoing any invasive procedure or surgery.

pravastatin

TOP 100

pra-va-sta-tin
(Apo-Pravastatin, Novo-Pravastatin, Pravachol)
Do not confuse pravastatin with atorvastatin, lovastatin, nystatin, pitavastatin, or simvastatin, or Pravachol with Prevacid, Prinivil, or propranolol.

FIXED-COMBINATION(S)

Pravigard: pravastatin/aspirin (anticoagulant): 20 mg/81 mg, 40 mg/81 mg, 80 mg/81 mg, 20 mg/325 mg, 40 mg/325 mg, 80 mg/325 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Hydroxymethylglutaryl CoA (HMG-CoA) reductase inhibitor. **CLINICAL:** Antihyperlipidemic.

USES

Treatment of primary hyperlipidemias and mixed dyslipidemias to reduce total cholesterol, LDL cholesterol, apolipoprotein B, triglycerides; increase HDL cholesterol. Reduces risk of MI, revascularization, and mortality in hypercholesterolemia without clinically evident CHD. Reduces mortality risk in pts with CHD. Reduces elevated triglycerides in hypertriglyceridemia. Treatment of heterozygous familial hypercholesterolemia in pediatric pts 8–18 yrs.

PRECAUTIONS

Contraindications: Active hepatic disease or unexplained, persistent elevations of hepatic function test results. Pregnancy, breastfeeding. **Cautions:** History of hepatic disease, substantial alcohol consumption. Withholding/discontinuing pravastatin may be necessary when pt is at risk for renal failure secondary to rhabdomyolysis, elderly.

ACTION

Interferes with cholesterol biosynthesis by preventing conversion of HMG-CoA reductase to mevalonate, a precursor to cholesterol. **Therapeutic Effect:** Lowers LDL, VLDL cholesterol, plasma triglycerides; increases HDL.

PHARMACOKINETICS

Rapidly absorbed from GI tract. Protein binding: 50%. Metabolized in liver. Primarily excreted in feces via biliary system. Not removed by hemodialysis. **Half-life:** 2–3 hrs.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Alpha-adrenergic blocker. **CLINICAL:** Antihypertensive, antidote, vasodilator.

USES

Treatment of mild to moderate hypertension. Used alone or in combination with other antihypertensives. **OFF-LABEL:** Treatment of benign prostate hyperplasia, Raynaud's phenomenon, post-traumatic stress disorder with related nightmares and sleep disruption.

PRECAUTIONS

Contraindications: Hypersensitivity to quinazolines. **Cautions:** Chronic renal failure, hepatic impairment.

ACTION

Selectively blocks $alpha_1$-adrenergic receptors, decreasing peripheral vascular resistance. **Therapeutic Effect:** Produces vasodilation of veins, arterioles; decreases total peripheral resistance; reduces B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (B/P reduction)	2 hrs	2–4 hrs	10–24 hrs

Well absorbed following PO administration. Protein binding: 92%–97%. Metabolized in liver. Primarily excreted in feces. **Half-life:** 2–4 hrs.

recumbent for 3–4 hrs. Assess B/P, pulse immediately before each dose and q15–30min until stabilized (be alert to B/P fluctuations).

INTERVENTION/EVALUATION

Monitor B/P, pulse diligently (first-dose syncope may be preceded by tachycardia). Monitor daily pattern of bowel activity, stool consistency. Assist with ambulation if dizziness occurs.

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Slowly go from lying to standing. • Report continued dizziness, palpitations.

*prednisoLONE

pred-**niss**-oh-lone
(Millipred, Novo-Prednisolone, Omnipred, Orapred, Orapred ODT, Pediapred, Pred Forte, Pred Mild, Prelone, Veripred)
Do not confuse Pediapred with Pediazole, prednisolone with prednisone or primidone, or Prelone with Prozac.

FIXED-COMBINATION(S)

Blephamide: prednisolone/sulfacetamide (an anti-infective): 0.2%/10%. **Vasocidin:** prednisolone/sulfacetamide: 0.25%/10%.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Adrenal corticosteroid. **CLINICAL:** Glucocorticoid.

USES

Systemic: Endocrine, rheumatic, hematologic disorders; collagen, respiratory, neoplastic, GI diseases; allergic states; acute or chronic solid organ rejection. **Ophthalmic:** Treatment of conjunctivitis, corneal injury (from chemical/thermal burns, foreign body).

PRECAUTIONS

Contraindications: Acute superficial herpes simplex keratitis, systemic fungal infections, varicella, live or attenuated virus vaccines. **Cautions:** Hyperthyroidism, cirrhosis, ocular herpes simplex, respiratory tuberculosis, untreated systemic infections, renal/hepatic impairment, diabetes, cataracts, glaucoma, history of seizure disorder, peptic ulcer disease, osteoporosis, myasthenia gravis, hypertension, HF, ulcerative colitis, thromboembolic disorders, elderly.

ACTION

Inhibits accumulation of inflammatory cells at inflammation sites, phagocytosis, lysosomal enzyme release/synthesis, release of mediators of inflammation. **Therapeutic Effect:** Prevents/suppresses cell-mediated immune reactions. Decreases/prevents tissue response to inflammatory process.

PHARMACOKINETICS

Protein binding: 65%–91%. Metabolized in liver. Excreted in urine. **Half-life:** 3.6 hrs.

have immunostimulant properties. **Echinacea** may decrease level/effects. **FOOD:** None known. **LAB VALUES:** May increase serum glucose, lipids, sodium, uric acid. May decrease serum calcium, WBC, hypothalamic pituitary adrenal (HPA) axis function, potassium.

AVAILABILITY (Rx)

Solution, Ophthalmic: 1%. **Solution, Oral (Orapred):** 15 mg/5 ml. **(Pediapred):** 5 mg/5 ml. **(Millipred):** 10 mg/5 ml. **(Veripred):** 20 mg/5 ml. **Suspension, Ophthalmic (Pred Forte):** 1%; **(Pred Mild):** 0.12%. **Syrup (Prelone):** 5 mg/5 ml, 15 mg/5 ml. **Tablets:** 5 mg.

of appetite, fatigue. • Avoid alcohol, limit caffeine. • Maintain fastidious oral hygiene. • Do not abruptly discontinue without physician's approval. • Avoid exposure to chickenpox, measles.

*predniSONE

pred-ni-sone
(Apo-Prednisone, Novo-Prednisone, Prednisone Intensol, Rayos, Winpred)
Do not confuse prednisone with methylprednisolone, prazosin, prednisolone, Prilosec, primidone, or promethazine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Adrenal corticosteroid. **CLINICAL:** Glucocorticoid.

USES

Substitution therapy in deficiency states: Acute or chronic adrenal insufficiency, congenital adrenal hyperplasia, adrenal insufficiency secondary to pituitary insufficiency. **Nonendocrine disorders:** Arthritis, rheumatic carditis; allergic, collagen, intestinal tract, multiple sclerosis exacerbations; liver, ocular, renal, skin diseases; bronchial asthma, cerebral edema, malignancies. **OFF-LABEL:** Prevention of postherpetic neuralgia, relief of acute pain in pts with herpes zoster, autoimmune hepatitis.

PRECAUTIONS

Contraindications: Acute superficial herpes simplex keratitis, systemic fungal infections, varicella, administration of live or attenuated virus vaccines. **Cautions:** Hyperthyroidism, cirrhosis, ocular herpes simplex, respiratory tuberculosis, untreated systemic infections, renal/hepatic impairment; following acute MI, diabetes, cataracts, glaucoma, seizures, peptic ulcer disease, osteoporosis, myasthenia gravis, hypertension, HF, ulcerative colitis, thromboembolic disorders, elderly.

ACTION

Inhibits accumulation of inflammatory cells at inflammation sites, phagocytosis, lysosomal enzyme release/synthesis, release of mediators of inflammation. **Therapeutic Effect:** Prevents/suppresses cell-mediated immune reactions. Decreases/prevents tissue response to inflammatory process.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 70%–90%. Widely distributed. Metabolized in liver, converted to prednisolone. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 2.5–3.5 hrs.

AVAILABILITY (Rx)

Solution, Oral: 1 mg/ml. **Solution, Oral Concentrate (Prednisone Intensol):** 5 mg/ml. **Tablets:** 1 mg, 2.5 mg, 5 mg, 10 mg, 20 mg, 50 mg.

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (32%–12%): Dizziness, drowsiness, ataxia, peripheral edema. **Occasional (12%–5%):** Weight gain, blurred vision, diplopia, difficulty with concentration, attention, cognition; tremor, dry mouth, headache, constipation, asthenia. **Rare (4%–2%):** Abnormal gait, confusion, incoordination, twitching, flatulence, vomiting, edema, myopathy.

ADVERSE EFFECTS/ TOXIC REACTIONS

Abrupt withdrawal increases risk of seizure frequency in pts with seizure disorders; withdraw gradually over a minimum of 1 wk.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Seizure: Review history of seizure disorder (type, onset, intensity, frequency, duration, LOC). **Pain:** Assess onset, type, location, and duration of pain.

INTERVENTION/EVALUATION

Provide safety measures as needed. Assess for seizure activity. Assess for clinical improvement; record onset of relief of pain. Assess for evidence of peripheral edema behind medial malleolus (usually first area of edema). Question for changes in visual acuity.

PATIENT/FAMILY TEACHING

• Do not abruptly stop taking drug; seizure frequency may be increased. • Avoid tasks that require alterness, motor skills until response to drug is established. • Avoid alcohol. • Carry identification card, bracelet to note seizure disorder, anticonvulsant therapy.

primidone

prim-i-done
(Apo-Primidone, Mysoline)

Do not confuse primidone with prednisone or pyridoxine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Barbiturate. **CLINICAL:** Anticonvulsant.

USES

Management of partial seizures, generalized tonic-clonic (grand mal) seizures, focal seizures. **OFF-LABEL:** Treatment of essential tremor (familial tremor).

PRECAUTIONS

Contraindications: Hypersensitivity to phenobarbital, porphyria. **Cautions:** Renal/hepatic impairment, pulmonary insufficiency, elderly, debilitated, children, hypoadrenalism, pts at risk for suicidal thoughts/behavior, depression, history of drug abuse.

ACTION

Decreases neuron excitability. **Therapeutic Effect:** Reduces seizure activity.

PHARMACOKINETICS

Rapidly, usually completely absorbed following PO administration. Protein binding: 99%. Extensively metabolized in liver to phenobarbital and phenylethylmalonamide (PEMA). Minimal excretion in urine. **Half-life:** 10–12 hrs.

USES

Treatment of hyperuricemia associated with gout, gouty arthritis. Adjunctive therapy with penicillins, cephalosporins to elevate/prolong antibiotic plasma levels. **OFF-LABEL:** Prolongation/elevation of beta-lactam plasma levels.

PRECAUTIONS

Contraindications: Blood dyscrasias, children younger than 2 yrs, concurrent high-dose aspirin therapy, uric acid calculi, initial dosing during acute gout attack. **Cautions:** Peptic ulcer, severe renal impairment (creatinine clearance less than 30 ml/min), pts with G6PD deficiency.

ACTION

Competitively inhibits reabsorption of uric acid at proximal convoluted tubule. Inhibits renal tubular secretion of weak organic acids (e.g., penicillins). **Therapeutic Effect:** Promotes uric acid excretion, reduces serum uric acid level, increases plasma levels of penicillins, cephalosporins.

PHARMACOKINETICS

Rapidly absorbed following PO administration. Metabolized in liver. Excreted in urine. Excretion is dependent upon urinary pH, is increased in alkaline urine. **Half-life:** 6–12 hrs.

HERBAL: **Ephedra** may worsen arrhythmias. **FOOD:** None known. **LAB VALUES:** May cause EKG changes, positive ANA titer, positive Coombs' test. May increase serum alkaline phosphatase, bilirubin, ALT, AST, LDH. **Therapeutic serum level:** 4–8 mcg/ml; **toxic serum level:** greater than 10 mcg/ml.

AVAILABILITY (Rx)

Injection Solution: 100 mg/ml, 500 mg/ml.

ADMINISTRATION/HANDLING

ADMINISTRATION/HANDLING

AVAILABILITY (Rx)

Capsules (Prometrium): 100 mg, 200 mg. **Injection Oil:** 50 mg/ml. **Vaginal Gel (Crinone, Prochieve):** 4% (45 mg/dose), 8% (90 mg/dose). **Vaginal Insert (Endometrin Vaginal Insert):** 100 mg. **Vaginal suppository:** 25 mg, 50 mg, 100 mg, 200 mg, 400 mg.

ADMINISTRATION/HANDLING

IM

• Store at room temperature. • Administer only deep IM in large muscle mass.

PO

• If given in morning, administer 2 hrs after breakfast with full glass of water.

Vaginal Gel

• Remove applicator from sealed wrapper. Do not remove twist-off tab at this time. • Hold applicator by thick end. Shake down several times (like a thermometer) to ensure contents are at thin end. • Hold applicator by flat section of thick end and twist off tab at other end. Do not squeeze thick end while twisting tab (could force some gel to be released before insertion). • Insert applicator into vagina either in sitting position or lying on back with knees bent. • Insert thin end well into vagina. • Squeeze thick end of applicator to deposit gel. • Remove applicator, discard.

INDICATIONS/ROUTES/DOSAGE

Amenorrhea

PO: ADULTS: 400 mg daily in evening for 10 days.

IM: ADULTS: 5–10 mg for 6–8 days. Withdrawal bleeding expected in 48–72 hrs if ovarian activity produced proliferative endometrium.

Vaginal: ADULTS: Apply 45 mg (4% gel) every other day for 6 or fewer doses.

Abnormal Uterine Bleeding

IM: ADULTS: 5–10 mg/day for 6 days. When estrogen given concomitantly, begin progesterone after 2 wks of estrogen therapy; discontinue when menstruation begins.

Prevention of Endometrial Hyperplasia

PO: ADULTS: 200 mg in evening for 12 days per 28-day cycle, in combination with daily conjugated estrogen.

Infertility

Vaginal: ADULTS: 90 mg (8% gel) once daily (twice daily in women with partial or complete ovarian failure). If pregnancy occurs, may continue up to 10–12 wks.

Support of Embryo/Early Pregnancy

Vaginal Insert: 100 mg 2–3 times/day for up to 10 wks.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Contraindicated.

SIDE EFFECTS

Frequent: Breakthrough bleeding/spotting at beginning of therapy, amenorrhea, change in menstrual flow, breast tenderness. **Gel:** Drowsiness. **Occasional:** Edema, weight gain/loss, rash, pruritus, photosensitivity, skin pigmentation. **Rare:** Pain/swelling at injection site, acne, depression, alopecia, hirsutism.

ADVERSE EFFECTS/ TOXIC REACTIONS

Thrombophlebitis, cerebrovascular disorders, retinal thrombosis, pulmonary embolism occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for possibility of pregnancy, hypersensitivity to progestins before initiating therapy. Obtain baseline weight, serum glucose level, B/P.

INTERVENTION/EVALUATION

Check weight daily; report weekly gain over 5 lbs. Assess skin for rash, urticaria.

Well absorbed from GI tract after IM administration. Protein binding: 83%. Widely distributed. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 9–16 hrs.

USES

Treatment of life-threatening ventricular arrhythmias (e.g., sustained ventricular tachycardias). Treatment of paroxysmal atrial fibrillation/flutter (PAF) or paroxysmal supraventricular tachycardia (PSVT) in pts with disabling symptoms and without structural heart disease. **Rythmol SR:** Maintenance of normal sinus rhythm in pts with symptomatic atrial fibrillation. **OFF-LABEL:** Treatment following cardioversion of recent-onset atrial fibrillation; supraventricular tachycardia in pts with Wolff-Parkinson-White syndrome.

PRECAUTIONS

Contraindications: Bradycardia, bronchospastic disorders, cardiogenic shock, electrolyte imbalance, sinoatrial, AV, intraventricular impulse generation or conduction disorders (e.g., sick sinus syndrome, AV block) without pacemaker, uncontrolled HF, hypotension. **Cautions:** Renal/hepatic impairment, myasthenia gravis, concurrent use of other medications that prolong QT interval, hypokalemia, hypomagnesemia.

ACTION

Decreases fast sodium current in Purkinje/myocardial cells. Decreases excitability, automaticity; prolongs conduction velocity, refractory period. **Therapeutic Effect:** Suppresses arrhythmias.

PHARMACOKINETICS

Nearly completely absorbed following PO administration. Protein binding: 85%–97%. Metabolized in liver. Primarily excreted in feces. **Half-life:** 2–10 hrs.

ADMINISTRATION/HANDLING

INTERACTIONS

DRUG: **Diuretics, other antihypertensives** may increase hypotensive effect. May mask symptoms of hypoglycemia, prolong hypoglycemic effect of **insulin, oral hypoglycemics. Digoxin** may increase risk for bradycardia. **NSAIDs** may decrease antihypertensive effect. **HERBAL:** **Ephedra, ginger, licorice, ginseng, yohimbe** may worsen hypertension. **Licorice** may increase water retention. **Garlic, periwinkle** have antihypertensive effects. **FOOD:** None known. **LAB VALUES:** May increase serum antinuclear antibody (ANA) titer, serum BUN, LDH, lipoprotein, alkaline phosphatase, potassium, uric acid, ALT, AST, triglycerides.

AVAILABILITY (Rx)

Injection Solution: 1 mg/ml. **Oral Solution:** 20 mg/5 ml, 40 mg/5 ml. **Oral Solution (Hemangeol):** 4.28 mg/ml. **Tablets:** 10 mg, 20 mg, 40 mg, 60 mg, 80 mg.

established. • Report excessively slow pulse rate (less than 50 beats/min), peripheral numbness, dizziness. • Do not use nasal decongestants, OTC cold preparations (stimulants) without physician approval. • Restrict salt, alcohol intake.

propylthiouracil

proe-pil-**thye**-oh-**ure**-a-sil
(Propyl-Thyracil)

■ **BLACK BOX ALERT** ■ May cause severe hepatic injury, acute hepatic failure, death.

Do not confuse propylthiouracil with purinethol.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Thiourea derivative. **CLINICAL:** Antithyroid agent.

USES

Palliative treatment of hyperthyroidism; adjunct to ameliorate hyperthyroidism in preparation for surgical treatment, radioactive iodine therapy. **OFF-LABEL:** Management of thyrotoxic crises, Graves' disease, thyroid storm.

P

PRECAUTIONS

Contraindications: None known. **Cautions:** In combination with other agranulocytosis-inducing drugs. **Pregnancy Category D.**

ACTION

Blocks oxidation of iodine in thyroid gland, blocks synthesis of thyroxine, triiodothyronine. **Therapeutic Effect:** Inhibits synthesis of thyroid hormone.

PHARMACOKINETICS

Readily absorbed from GI tract. Protein binding: 80%. Metabolized in liver. Excreted in urine. **Half-life:** 1.5–5 hrs.

INTERACTIONS

DRUG: May increase concentration of **digoxin** (as pt becomes euthyroid). May increase effect of **oral anticoagulants.** **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase LDH, serum alkaline phosphatase, bilirubin, ALT, AST, prothrombin time.

AVAILABILITY (Rx)

Tablets: 50 mg.

ADMINISTRATION/HANDLING

PO

• Give with food.

INDICATIONS/ROUTES/DOSAGE

Hyperthyroidism

PO: ADULTS, ELDERLY: Initially, 300–400 mg/day (**ELDERLY:** 150–300 mg/day) in divided doses q8h. **Maintenance:** 100–150 mg/day in divided doses q8–12h. **CHILDREN:** Initially, 5–7 mg/kg/day in divided doses q8h. **Maintenance:** 33%–66% of initial dose in divided doses q8–12h. **NEONATES:** Initially, 5 mg/kg/day in divided doses q8h. May increase in 36–48 hrs by 50% if no response. Range: 5–10 mg/kg/day in divided doses q8h.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Urticaria, rash, pruritus, nausea, skin pigmentation, hair loss, headache, paresthesia. **Occasional:** Drowsiness, lymphadenopathy, vertigo. **Rare:** Drug fever, lupus-like syndrome.

ADVERSE EFFECTS/ TOXIC REACTIONS

Agranulocytosis (may occur as long as 4 mos after therapy), pancytopenia, fatal hepatitis have occurred.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline weight, pulse.

INTERVENTION/EVALUATION

Monitor pulse, weight daily. Check for skin eruptions, pruritus, swollen lymph glands. Be alert for signs, symptoms of hepatic

ADVERSE EFFECTS/ TOXIC REACTIONS

Too-rapid IV administration may produce acute hypotension, bradycardia, pulmonary hypertension, dyspnea, transient flushing, feeling of warmth. Heparin rebound may occur several hrs after heparin has been neutralized by protamine (usually evident 8–9 hrs after protamine administration). Heparin rebound occurs most often after arterial/cardiac surgery.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check PT, aPTT, Hct; assess for bleeding.

INTERVENTION/EVALUATION

Monitor coagulation tests, aPTT or ACT, B/P, cardiac function.

pseudoephedrine

soo-doe-e-**fed**-rin
(Balminil Decongestant, Nexafed, PMS-Pseudoephedrine, Robidrine, Sudafed, Sudafed 12 Hour, Sudafed 24 Hour, Sudafed Children's)

FIXED-COMBINATION(S)

Advil Cold, Motrin Cold: pseudoephedrine/ibuprofen (an NSAID): 30 mg/200 mg, 15 mg/100 mg per 5 ml. **Allegra-D:** pseudoephedrine/fexofenadine (an antihistamine): 120 mg/60 mg. **Allegra-D 24 Hour:** pseudoephedrine/fexofenadine: 240 mg/180 mg. **Claritin-D:** pseudoephedrine/loratadine (an antihistamine): 120 mg/5 mg, 240 mg/10 mg. **Clarinex-D 24-Hour:** pseudoephedrine/desloratadine (an antihistamine): 240 mg/5 mg. **Clarinex-D 12-Hour:** pseudoephedrine/desloratadine: 120 mg/2.5 mg. **Rezira:** pseudoephedrine/hydrocodone (an opioid analgesic): 60 mg/5 mg per 5 ml. **Zyrtec-D:** pseudoephedrine/cetirizine (an antihistamine): 120 mg/5 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Sympathomimetic. **CLINICAL:** Nasal decongestant.

USES

Temporary relief of nasal congestion due to common cold, upper respiratory allergies, sinusitis. Enhances nasal, sinus drainage.

PRECAUTIONS

Contraindications: Use of MAOIs within 14 days. **Cautions:** Elderly, hyperthyroidism, diabetes, ischemic heart disease, prostatic hypertrophy, mild to moderate hypertension, arrhythmias, renal impairment, seizure disorder, increased intraocular pressure.

ACTION

Directly stimulates alpha-adrenergic, beta-adrenergic receptors. **Therapeutic Effect:** Produces vasoconstriction; causes bronchial relaxation, increased heart rate/contractility.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (tablets, syrup)	15–30 min	30–60 min	4–6 hrs
PO (extended-release)	N/A	N/A	8–12 hrs

Well absorbed from GI tract. Partially metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 9–16 hrs.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	12–24 hrs	2–3 days	N/A

Acts in small, large intestines.

pyridostigmine

peer-id-oh-**stig**-meen
(Mestinon, Mestinon SR, Regonol)
Do not confuse pyridostigmine with physostigmine, or Regonol with Reglan or Renagel.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Anticholinesterase. **CLINICAL:** Cholinergic muscle stimulant.

USES

Improvement of muscle strength in control of myasthenia gravis, reversal of effects of nondepolarizing neuromuscular blocking agents after surgery.

PRECAUTIONS

Contraindications: Mechanical GI/urinary tract obstruction. **Cautions:** Bronchial asthma, bradycardia, epilepsy, recent coronary occlusion, hyperthyroidism, cardiac arrhythmias, peptic ulcer, renal impairment.

P

ACTION

Prevents destruction of acetylcholine by inhibiting the enzyme acetylcholinesterase, enhancing impulse transmission across myoneural junction. **Therapeutic Effect:** Produces miosis; increases intestinal, skeletal muscle tone; stimulates salivary, sweat gland secretions.

PHARMACOKINETICS

Poorly absorbed from GI tract. Metabolized in liver. Excreted primarily unchanged in urine. **Half-life:** 1–2 hrs.

Canadian trade name

Removed by hemodialysis. **Half-life:** 15–20 days.

Generic Drugs Q

quetiapine
quinapril
quinupristin-dalfopristin

ACTION

Antagonizes dopamine, serotonin, histamine, alpha$_1$-adrenergic receptors. **Therapeutic Effect:** Diminishes psychotic disorders. Produces moderate sedation, few extrapyramidal effects. No anticholinergic effects.

PHARMACOKINETICS

Rapidly, well absorbed after PO administration. Protein binding: 83%. Widely distributed in tissues; CNS concentration exceeds plasma concentration. Metabolized in liver. Primarily excreted in urine. **Half-life:** 6 hrs.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1 hr	N/A	24 hrs

Readily absorbed from GI tract. Protein binding: 97%. Rapidly hydrolyzed to active metabolite. Primarily excreted in urine. Minimal removal by hemodialysis. **Half-life:** 1–2 hrs; metabolite, 3 hrs (increased in renal impairment).

LAB VALUES: May increase serum bilirubin, creatinine, LDH, ALT, AST, BUN, alkaline phosphatase, glucose. May decrease Hgb, Hct; alter platelets.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution: 500-mg vial (150 mg quinupristin/350 mg dalfopristin).

ADMINISTRATION/HANDLING

Generic Drugs R

rabeprazole
raloxifene
raltegravir
ramelteon
ramipril
ramucirumab
ranitidine
ranolazine
rasagiline
rasburicase
regorafenib
repaglinide
reteplase
Rh_o (D) immune globulin
ribavirin
rifabutin
rifampin
rifaximin
rilpivirine
riociguat
risedronate
risperidone
ritonavir
rituximab
rivaroxaban
rivastigmine
rizatriptan
roflumilast
romidepsin
romiplostim
ropinirole
rosiglitazone
rosuvastatin
rufinamide
ruxolitinib

as delayed-release tablet. Protein binding: 96%. Metabolized in liver. Primarily excreted in urine. Unknown if removed by hemodialysis. **Half-life:** 1–2 hrs (increased with hepatic impairment).

(LESS THAN 15 KG): 5 mg once daily; may increase to 10 mg once daily.

Duodenal Ulcer

PO: ADULTS, ELDERLY: 20 mg/day after morning meal for 4 wks.

Pathologic Hypersecretory Conditions

PO: ADULTS, ELDERLY: Initially, 60 mg once daily. May increase to 60 mg twice daily.

H. Pylori Infection

PO: ADULTS, ELDERLY: 20 mg twice a day for 10–14 days (given with amoxicillin 1,000 mg and clarithromycin 500 mg).

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Caution with severe impairment.

SIDE EFFECTS

Rare (less than 2%): Headache, nausea, dizziness, rash, diarrhea, malaise.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hyperglycemia, hypokalemia, hyponatremia, hyperlipemia occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline lab values, esp. serum chemistries.

INTERVENTION/EVALUATION

Monitor ongoing laboratory results. Evaluate for therapeutic response (relief of GI symptoms). Question if GI discomfort, nausea, diarrhea, headache occurs. Assess skin for evidence of rash. Observe for evidence of dizziness; utilize appropriate safety precautions.

PATIENT/FAMILY TEACHING

- Swallow tablets whole; do not break, chew, dissolve, or divide tablets.
- Report headache.

raloxifene

TOP 100

ra-**lox**-i-feen

(Evista, Apo-Raloxifene, Novo-Raloxifene)

■ **BLACK BOX ALERT** ■ Increases risk of deep vein thrombosis, pulmonary embolism. Women with coronary heart disease or pts at risk for coronary events are at increased risk for death due to stroke.

Do not confuse Evista with Avinza.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Selective estrogen receptor modulator. **CLINICAL:** Osteoporosis preventive.

USES

Prevention/treatment of osteoporosis in postmenopausal women. Reduces risk of invasive breast cancer in postmenopausal women with osteoporosis and postmenopausal women at high risk for invasive breast cancer.

PRECAUTIONS

Contraindications: Active or history of venous thromboembolic events, such as deep vein thrombosis (DVT), pulmonary embolism, retinal vein thrombosis; women who are or may become pregnant, breastfeeding. **Cautions:** Cardiovascular disease, renal/hepatic impairment, risk for venous thromboembolism, unexplained uterine bleeding, elevated triglycerides in response to oral estrogen therapy.

ACTION

Selective estrogen receptor modulator (SERM) that binds to estrogen receptors, increasing bone mineral density. Blocks estrogen effects in breast/uterus. **Therapeutic Effect:** Reduces bone resorption, increases bone mineral density, reduces incidence of fractures.

agents. **OFF-LABEL:** Postexposure prophylaxis for occupational exposure to HIV.

PRECAUTIONS

Contraindications: None known. **Cautions:** Elderly, pts at risk for creatine kinase (CK) elevations and/or skeletal muscle abnormalities.

ACTION

Inhibits activity of HIV-1 integrase, an enzyme that incorporates viral DNA into host cell. **Therapeutic Effect:** Prevents integration and replication of viral HIV-1.

PHARMACOKINETICS

Variably absorbed following PO administration. Protein binding: 83%. Metabolized in liver (primarily hepatic glucuronidation mediated by UGT1A1). Eliminated in feces (51%), urine (32%). **Half-life:** 9 hrs.

Dosage in Renal Impairment
No dose adjustment.

Dosage in Hepatic Impairment
Not recommended with severe impairment.

SIDE EFFECTS

Frequent (7%–5%): Headache, dizziness, drowsiness (expected effect). **Occasional (4%–3%):** Fatigue, nausea, exacerbated insomnia. **Rare (2%):** Diarrhea, myalgia, depression, altered taste, arthralgia.

ADVERSE EFFECTS/ TOXIC REACTIONS

May affect reproductive hormones in adults (decreased testosterone levels, increased prolactin levels), resulting in unexplained amenorrhea, galactorrhea, decreased libido, impaired fertility.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess B/P, pulse, respirations. Raise bed rails, provide call light. Provide environment conducive to sleep (quiet environment, low/no lighting, TV off).

INTERVENTION/EVALUATION

Assess sleep pattern of pt. Evaluate for therapeutic response: rapid induction of sleep onset, decrease in number of nocturnal awakenings.

PATIENT/FAMILY TEACHING

• Take within 30 min before going to bed; confine activities to those necessary to prepare for bed. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • Do not take medication with or immediately after a high-fat meal.

ramipril

ram-i-pril
(Altace, Apo-Ramipril)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

Do not confuse Altace with alteplase, Amaryl, or Artane, or ramipril with enalapril or Monopril.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Renin-angiotensin system antagonist. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension. Used alone or in combination with other antihypertensives. Treatment of HF following MI. Reduce risk of heart attack, stroke in pts at increased risk for these events. **OFF-LABEL:** HF. Delay progression of nephropathy, reduce risks of cardiovascular events in hypertensive pts with type 1 or type 2 diabetes.

PRECAUTIONS

Contraindications: Hypersensitivity to ACE inhibitors. History of ACE-inhibitor induced angioedema, concomitant use with aliskiren in pts with diabetes. **Cautions:** Renal impairment, collagen vascular disease, hyperkalemia, hypertrophic cardiomyopathy with outflow tract obstruction; unstented unilateral, bilateral renal artery stenosis; severe aortic stenosis; before, during, or immediately after major surgery, concomitant potassium supplements.

ACTION

Suppresses renin-angiotensin-aldosterone system. Decreases plasma angiotensin II, increases plasma renin activity, decreases aldosterone secretion. **Therapeutic Effect:** Reduces peripheral arterial resistance, decreasing B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1–2 hrs	3–6 hrs	24 hrs

(be alert to fluctuations). If excessive reduction in B/P occurs, place pt in supine position with legs elevated. Renal function tests should be performed before beginning therapy. In pts with prior renal disease, urine test for protein (by dipstick method) should be made with first urine of day before beginning therapy and periodically thereafter. In pts with renal impairment, autoimmune disease, or taking drugs that affect leukocytes or immune response, CBC, differential count should be performed before beginning therapy and q2wks for 3 mos periodically thereafter.

INTERVENTION/EVALUATION

Monitor B/P, renal function, serum potassium, WBC. Assess for cough (frequent effect). Assist with ambulation if dizziness occurs. Assess lung sounds for rales, wheezing in pts with HF. Monitor urinalysis for proteinuria. Monitor serum potassium in pts on concurrent diuretic therapy.

PATIENT/FAMILY TEACHING

• Do not discontinue medication without physician's approval. • Slowly go from lying to standing to minimize hypotensive effect. • Report palpitations, cough, chest pain. • Dizziness may occur in first few days. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol.

R

ramucirumab

ra-mue-**sir**-ue-mab
(Cyramza)

■ **BLACK BOX ALERT** ■ May increase risk of severe, and sometimes fatal, hemorrhagic events. Permanently discontinue if severe bleeding occurs.

Do not confuse ramucirumab with ranibizumab.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Vascular endothelial growth factor 2 antagonist. **CLINICAL:** Antineoplastic.

USES

As a single agent or in combination with paclitaxel, for treatment of advanced or metastatic gastric or gastroesophageal junction adenocarcinoma with disease progression on or after prior fluoropyrimidine- or platinum-containing chemotherapy. In combination with docetaxel, for treatment of metastatic non small cell lung cancer (NSCLC) with disease progression on or after platinum based chemotherapy.

PRECAUTIONS

Contraindications: None known. **Cautions:** History of arterial/venous thromboembolism (e.g., MI, cardiac arrest, CVA, cerebral ischemia) hepatic cirrhosis, electrolyte imbalance, hypertension, GI bleeding/perforation, chronic/unhealed wounds; baseline neutropenia, thrombocytopenia.

ACTION

Binds vascular endothelial growth factor (VEGF) receptor 2 and blocks binding of VEGF ligands, VEGF-A, VEGF-C, and VEGF-D. **Therapeutic Effect:** Inhibits ligand-induced proliferation and migration of human endothelial cells.

PHARMACOKINETICS

Metabolism not specified. Elimination not specified.

Ramucirumab plus Paclitaxel: Frequent (57%–20%): Fatigue, diarrhea, peripheral edema, hypertension, stomatitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Severe, and sometimes fatal, hemorrhagic events including GI bleeding occurred in 3.4% of pts receiving single agent and in 4.3% of pts receiving combo therapy. GI perforations occurred in 0.7% of pts receiving single agent and in 1.2% of pts receiving combo therapy. Thromboembolic events including arterial thromboembolism, CVA, MI reported in 1.7% of pts. Severe hypertension occurred in 8% of pts receiving single agent and in 15% of pts receiving combo therapy despite medical management. Severe infusion-related reactions such as back pain/spasms, bronchospasm, chest pain, chills, dyspnea, flushing, hypotension, hypoxia, paresthesia, rigors/tremors, supraventricular tachycardia, wheezing occurred in 16% of pts. May cause ineffective wound healing or wound dehiscence requiring medical intervention. Reversible posterior leukoencephalopathy syndrome (RPLS) reported in less than 1% of pts. Proteinuria may indicate nephrotic syndrome. Clinical deterioration of hepatic cirrhosis, manifested by new-onset or worsening encephalopathy, ascites, or hepatorenal syndrome, was reported in pts receiving single agent. Other adverse reactions include epistaxis, intestinal obstruction neutropenia, severe rash, thrombocytopenia. Immunogenicity (anti-ramucirumab antibodies) occurred in 6% of pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, BMP, urinalysis, urine protein, vital signs. Assess skin for open wounds. Question possibility of pregnancy, current breastfeeding status. Receive full medication history including vitamins, supplements, herbal products. Question history of CVA, hepatic impairment/cirrhosis hypertension, MI, prior hypersensitivity reaction.

INTERVENTION/EVALUATION

Monitor CBC, electrolytes, urinalysis, urine protein. Routinely assess vital signs and report hypertension. Persistent diastolic hypertension may indicate hypertensive emergency. Obtain EKG for arrhythmia, chest pain palpitation. Consider RPLS in pts with altered mental status, confusion, headache, seizure, visual disturbances. Encourage PO intake. Screen for GI bleeding, GI perforation. Notify physician if any CTCAE toxicities occur (see Appendix N). Monitor for hypersensitivity reaction. Once infusion completed, IV access must be flushed with NS.

PATIENT/FAMILY TEACHING

• Blood levels will be routinely monitored. • Treatment may cause severe allergic reaction or infusion-related reaction. • Avoid pregnancy; treatment may cause birth defects or miscarriage. Do not breastfeed. Contraception should be taken during treatment and up to 3 mos after discontinuation. • Neurologic changes, including altered mental status, headache, seizures, trouble speaking, may indicate high blood pressure crisis or life-threatening brain swelling. • Immediately report abdominal pain, GI bleeding, vomiting blood; may indicate gastrointestinal tear. • Therapy may cause severe blood-clotting events such as heart attack or stroke.

ranitidine

ra-**nit**-i-deen
(Apo-Ranitidine, Zantac, Zantac-75, Zantac-150)
Do not confuse ranitidine with amantadine or rimantadine, or Zantac with Xanax, Ziac, Zofran, or Zyrtec.

IV INCOMPATIBILITIES

Amphotericin B complex (Abelcet, AmBisome, Amphotec).

IV COMPATIBILITIES

Dexmedetomidine (Precedex), diltiazem (Cardizem), dobutamine (Dobutrex), dopamine (Intropin), heparin, hydromorphone (Dilaudid), insulin, lidocaine, lorazepam (Ativan), morphine, norepinephrine (Levophed), potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Duodenal Ulcer, Gastric Ulcer

PO: ADULTS, ELDERLY: Treatment: 150 mg twice daily or 300 mg once daily. **Maintenance:** 150 mg once daily at bedtime. **CHILDREN 1 MO TO 16 YRS: Treatment:** 4–8 mg/kg/day in 2 divided doses. **Maximum:** 300 mg. **Maintenance:** 2–4 mg/kg/day once daily. **Maximum:** 150 mg.

H. Pylori

PO: ADULTS, ELDERLY: 150 mg twice daily (in combination therapy).

Hypersecretory Conditions

PO: ADULTS, ELDERLY: 150 mg twice daily up to 6 g/day. **IV Infusion:** Initially, 1 mg/kg/hr. May increase by 0.5 mg/kg/hr up to 2.5 mg/kg/hr.

GERD

PO: ADULTS, ELDERLY: 150 mg twice daily. **CHILDREN 1 MO TO 16 YRS:** 5–10 mg/kg/day in 2 divided doses. **Maximum:** 300 mg/day.

Erosive Esophagitis

PO: ADULTS, ELDERLY: Treatment: 150 mg four times/day. **Maintenance:** 150 mg twice daily. **CHILDREN 1 MO TO 16 YRS: Treatment:** 5–10 mg/kg/day in 2 divided doses. **Maximum:** 600 mg/day.

Prevention of Heartburn

PO: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 75 mg 30–60 min before eating or drinking beverages that cause heartburn. **Maximum:** 150 mg/24 hrs for 14 days.

Usual Parenteral Dosage

IV Infusion: ADULTS, ELDERLY: 6.25 mg/hr. **CHILDREN:** 1 mg/kg for one dose then 0.08–0.17 mg/kg/hr (2–4 mg/kg/day).

Usual Neonatal Dosage

PO: NEONATES: 2 mg/kg/day in divided doses q12h.

IV: NEONATES: Initially, 1.5 mg/kg/dose, then 1.5–2 mg/kg/day in divided doses q12h.

IV Infusion: NEONATES: Loading dose: 1.5 mg/kg, then 1–2 mg/kg/day (0.04–0.08 mg/kg/hr).

Dosage in Renal Impairment

Creatinine clearance less than 50 ml/min: Give 150 mg PO q24h or 50 mg IV or IM q18–24h.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (2%): Diarrhea. **Rare (1%):** Constipation, headache (may be severe).

ADVERSE EFFECTS/ TOXIC REACTIONS

Reversible hepatitis, blood dyscrasias occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain history of epigastric/abdominal pain. Obtain baseline renal function, LFT.

INTERVENTION/EVALUATION

Monitor serum ALT, AST levels, BUN, creatinine. Assess mental status in elderly. Question present abdominal pain, GI distress.

PATIENT/FAMILY TEACHING

• Smoking decreases effectiveness of medication. • Do not take medicine

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose manifested as confusion, diplopia, dizziness, paresthesia, syncope.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Record onset, type (sharp, dull, squeezing), radiation, location, intensity, duration of anginal pain, precipitating factors (exertion, emotional stress). Obtain baseline EKG.

INTERVENTION/EVALUATION

Assist with ambulation if dizziness occurs. Give with food if nausea occurs. Monitor daily pattern of bowel activity, stool consistency. Assess for relief of anginal pain. Monitor EKG, pulse for irregularities.

PATIENT/FAMILY TEACHING

• Avoid grapefruit products. • Do not chew, crush, dissolve, or divide extended-release tablets. • Avoid tasks requiring alertness, motor skills until response to drug is established.

rasagiline

ra-**sa**-ji-leen
(Azilect)
Do not confuse Azilect with Aricept.

R

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: MAOI.
CLINICAL: Antiparkinson agent.

USES

Treatment of signs/symptoms of Parkinson's disease as initial monotherapy or as adjunct therapy with or without levodopa.

PRECAUTIONS

Contraindications: Concurrent use with methadone, tramadol, dextromethorphan, St. John's wort, cyclobenzaprine, meperidine, MAOIs within 14 days of rasagiline.

Cautions: Hepatic impairment; cardiovascular, cerebrovascular disease, pts with hypotension. Avoid foods high in tyramine. Do not use within 5 wks of stopping fluoxetine; do not start tricyclic, SSRI, or SNRI within 2 wks of stopping rasagiline.

ACTION

Inhibits monoamine oxidase type B, an enzyme that plays a major role in catabolism of dopamine. Inhibition of dopamine depletion reduces symptomatic motor deficits of Parkinson's disease. **Therapeutic Effect:** Reduces symptoms of Parkinson's disease, appears to delay disease progression.

PHARMACOKINETICS

Rapidly absorbed following PO administration. Protein binding: 88%–94%. Metabolized in liver. Eliminated in urine (62%), feces (7%). **Half-life:** 1.3–3 hrs.

rasburicase

ras-**bure**-i-kase
(Elitek, Fasturtec)

■ **BLACK BOX ALERT** ■ Severe hypersensitivity reactions including anaphylaxis reported. May cause severe hemolysis in pts with glucose-6-phosphate dehydrogenase (G6PD) deficiency. Screen pts at high risk for G6PD (African or Mediterranean descent) prior to therapy. Methemoglobinemia has been reported. Blood samples left at room temperature may interfere with uric acid measurements. Must collect blood samples in prechilled tubes containing heparin and immediately immerse in ice water bath. Assay plasma samples within 4 hrs of collection. Elitek enzymatically degrades uric acid in blood samples left at room temperature.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Urate-oxidase inhibitor. **CLINICAL:** Antihyperuricemic.

USES

Initial management of uric acid levels in pts with leukemia, lymphoma, and solid tumor malignancies who are receiving chemotherapy expected to result in tumor lysis and subsequent elevation of plasma uric acid.

R

PRECAUTIONS

Contraindications: Prior drug reaction including hypersensitivity reactions, hemolysis, methemoglobinemia; G6PD deficiency. **Cautions:** Pts at high risk for G6PD deficiency (e.g., African, Mediterranean, or Southeast Asian descent).

ACTION

Catalyzes enzymatic oxidation of poorly soluble uric acid into soluble, inactive metabolites by converting uric acid into allantoin. Does not inhibit formation of uric acid. **Therapeutic Effect:** Decreases uric acid levels.

PHARMACOKINETICS

Half-life: 16–23 hrs.

binding: 99.5%. Peak plasma concentration: 4 hrs. Excreted in feces (71%), urine (19%). **Half-life:** 28 hrs (Range: 14–58 hrs).

PHARMACOKINETICS

Rapidly, completely absorbed from GI tract. Protein binding: 98%. Metabolized in liver. Excreted in feces (90%), urine (8%). Unknown if removed by hemodialysis. **Half-life:** 1 hr.

INDICATIONS/ROUTES/DOSAGE

Note: Administer within 30 min of arrival at hospital. Administer concurrent aspirin, clopidogrel, and anticoagulant therapy when appropriate.

Acute MI, HF

IV Bolus: ADULTS, ELDERLY: 10 units over 2 min; repeat in 30 min.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Bleeding at superficial sites, such as venous injection sites, catheter insertion sites, venous cutdowns, arterial punctures, sites of recent surgical procedures, gingival bleeding.

ADVERSE EFFECTS/ TOXIC REACTIONS

Bleeding at internal sites (intracranial, retroperitoneal, GI, GU, respiratory) occurs occasionally. Lysis of coronary thrombi may produce atrial or ventricular arrhythmias, stroke.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline B/P, apical pulse. Evaluate 12-lead EKG, CPK, CPK-MB, serum electrolytes. Assess Hct, platelet count, thrombin time (TT), aPTT, PT, serum plasminogen, fibrinogen levels before therapy is instituted. Type, hold blood.

INTERVENTION/EVALUATION

Carefully monitor all needle puncture sites, catheter insertion sites for bleeding. Observe continuous cardiac monitoring for arrhythmias; monitoring B/P, pulse, respiration is essential until pt is stable. Check peripheral pulses, lung sounds. Monitor for chest pain relief; notify physician of continuation/recurrence of chest pain (note location, type, intensity). Avoid any trauma that may increase risk of bleeding (injections, shaving).

Rh_o (D) immune globulin

row D im-**myoon glob**-yoo-lin (Hyper-RHO S/D Full Dose, Hyper-RHO S/D Mini Dose, MICRhoGAM UF Plus, RhoGAM UF Plus, Rhophylac, WinRho SDF)

■ **BLACK BOX ALERT** ■ May cause intravascular hemolysis in pts treated for idiopathic thrombocytopenic purpura (ITP).

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Immune globulin. **CLINICAL:** Immunizing agent, vaccine.

USES

Suppression of Rh isoimmunization: Used in situations when an Rh_o(D)-negative individual is exposed to Rh_o(D)-positive blood: delivery of an Rh_o(D)-positive infant, abortion, amniocentesis, chorionic villus sampling, ruptured tubal pregnancy, abdominal pregnancy, transplacental hemorrhage. Used when the mother is Rh_o(D) negative, the father is either Rh_o(D) positive or Rh_o(D) unknown, the baby is either Rh_o(D) positive or Rh_o(D) unknown. **Transfusion:** Suppression of Rh isoimmunization in Rh_o(D)-negative female children and female adults in their childbearing years transfused with Rh_o(D) antigen-positive RBCs or blood components containing Rh_o(D) antigen-positive RBCs. **Treatment of ITP:** Children with acute or chronic ITP, adults with chronic ITP, children and adults with ITP secondary to HIV infection.

PRECAUTIONS

Contraindications: Hypersensitivity to any component, IgA deficiency, mothers whose Rh group or immune status is uncertain, prior sensitization to Rh_o(D), Rh_o(D)-positive mother or pregnant woman, transfusion of Rh_o(D)-positive

Canadian trade name

IV: ADULTS: 3,000 units (600 mcg) q8h until total dose given.
IM: ADULTS: 6,000 units (1,200 mcg) q12h until total dose given.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Hypotension, pallor, vasodilation (IV formulation), fever, headache, chills, dizziness, drowsiness, lethargy, rash, pruritus, abdominal pain, diarrhea, discomfort/swelling at injection site, back pain, myalgia, arthralgia, asthenia (loss of strength, energy).

ADVERSE EFFECTS/ TOXIC REACTIONS

Acute renal failure occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Determine existence of bleeding disorders. Assess pt's Hgb level; give drug cautiously to pts with Hgb level less than 8 g/dL.

INTERVENTION/EVALUATION

Monitor CBC (esp. Hgb, platelet count), serum BUN, creatinine, reticulocyte count, urinalysis results. Assess for signs/symptoms of hemolysis.

PATIENT/FAMILY TEACHING

• IM injection may be painful. • Report chills, dizziness, fever, headache, rash.

R

ribavirin

rye-ba-**vye**-rin
(Copegus, Rebetol, Ribasphere, Virazole)

■ **BLACK BOX ALERT** ■ Pregnancy Category X. Significant teratogenic/embryocidal effects. Hemolytic anemia is significant toxicity, usually occurring within 1–2 wks. May worsen cardiac disease and lead to fatal or nonfatal MI. Inhalation may interfere with safe and effective assisted ventilation. Monotherapy not effective for chronic hepatitis C.
Do not confuse ribavirin with riboflavin, rifampin, or Robaxin.

FIXED-COMBINATION(S)

With interferon alfa 2b (**Rebetron**). Individually packaged.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Synthetic nucleoside. **CLINICAL:** Antiviral.

USES

Inhalation: Treatment of respiratory syncytial virus (RSV) infections (esp. in pts with underlying compromising conditions such as chronic lung disorders, congenital heart disease, recent transplant recipients). **Capsule/tablet/oral solution:** Treatment of chronic hepatitis C in pts with compensated hepatic disease. **OFF-LABEL:** Treatment of influenza A or B. **Inhalation:** Treatment for respiratory syncytial virus (RSV) in adult hematopoietic stem cell or heart/lung transplant recipients.

PRECAUTIONS

Contraindications: **Inhalation:** Women who are pregnant or may become pregnant. **Oral formulations:** Autoimmune hepatitis, creatinine clearance less than 50 ml/min, hemoglobinopathies (e.g., sickle cell anemia), men whose female partner is pregnant, women of childbearing age who are pregnant or may become pregnant. Concomitant use of didanosine. **Cautions:** **Inhalation:** Pts requiring assisted ventilation, COPD, asthma. **PO:** Cardiac or pulmonary disease, elderly, history of psychiatric disorders, renal impairment, pts with sarcoidosis, pts with baseline risk of severe anemia. **Pregnancy Category X.**

Copegus, Ribasphere (Oral Tablet) (In Combination with Peginterferon alfa-2b)
PO: ADULTS, ELDERLY: Genotype 1, 4 (more than 75kg): 1,200 mg daily (600 mg in morning and evening); **(75 kg or less):** 1,000 mg daily (400 mg in morning, 600 mg in evening). Duration: 48 wks. **Genotype 2, 3:** 800 mg daily (400 mg in morning and evening). Duration: 24 wks. **CHILDREN 5 YRS AND OLDER: (75 kg or greater):** 1,200 mg daily (600 mg in morning and evening); **(60–74 kg):** 1000 mg daily (400 mg in morning, 600 mg in evening; **(47–59 kg):** 800 mg daily (400 mg in morning and evening); **(34–46 kg):** 600 mg daily (200 mg in morning, 400 mg in evening; **(23–33 kg):** 400 mg daily (200 mg in morning and evening). Duration: 24 wks for genotypes 2, 3; 48 wks for genotypes 1, 4.

Dosage in Renal Impairment
Rebetol Capsules/Oral Solution; Ribasphere Capsules
ADULTS: CrCl less than 50 ml/min: Contraindicated. **CHILDREN: Serum creatinine more than 2 mg/dL:** Discontinue treatment.
Ribasphere Tablets
ADULTS: CrCl less than 50 ml/min: Not recommended.
Copegus Tablets
CrCl 30–50 ml/min: Alternate 200 mg and 400 mg every other day. **CrCl less than 30 ml/min, end-stage renal disease:** 200 mg once daily.

Dosage in Hepatic Impairment
Contraindicated.

Severe Lower Respiratory Tract Infection Caused by Respiratory Syncytial Virus (RSV)
Inhalation: CHILDREN, INFANTS: Use with Viratek small-particle aerosol generator at concentration of 20 mg/ml (6 g reconstituted with 300 ml Sterile Water for Injection) over 12–18 hrs/day for 3–7 days.

SIDE EFFECTS

Frequent (greater than 10%): Dizziness, headache, fatigue, fever, insomnia, irritability, depression, emotional lability, impaired concentration, alopecia, rash, pruritus, nausea, anorexia, dyspepsia, vomiting, decreased hemoglobin, hemolysis, arthralgia, musculoskeletal pain, dyspnea, sinusitis, flu-like symptoms. **Occasional (10%–1%):** Nervousness, altered taste, weakness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Cardiac arrest, apnea, ventilator dependence, bacterial pneumonia, pneumonia, pneumothorax occur rarely. If treatment exceeds 7 days, anemia may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain sputum specimens before giving first dose or at least during first 24 hrs of therapy. Assess respiratory status for baseline. **PO:** Obtain CBC with differential, pretreatment and monthly pregnancy test for women of childbearing age.

INTERVENTION/EVALUATION

Monitor Hgb, Hct, platelets, LFT, I&O, fluid balance carefully. Check hematology reports for anemia due to reticulocytosis when therapy exceeds 7 days. For ventilator-assisted pts, watch for "rain-out" in tubing and empty frequently; be alert to impaired ventilation/gas exchange due to drug precipitate. Assess skin for rash. Monitor B/P, respirations; assess lung sounds.

PATIENT/FAMILY TEACHING

• Report immediately any difficulty breathing, itching/swelling/redness of eyes, severe abdominal pain, bloody diarrhea, unusual bleeding/bruising. • Female pts should take measures to avoid pregnancy. • Male pts must use condoms during sexual activity.

R

corneal deposits. **Rare (Less Than 2%):** Anorexia, flatulence, fever, myalgia, vomiting, insomnia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hepatitis, anemia, thrombocytopenia, neutropenia occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain chest X-ray; sputum, blood cultures. Biopsy of suspicious node(s) must be done to rule out active tuberculosis. Obtain baseline CBC, serum hepatic function tests.

INTERVENTION/EVALUATION

Monitor serum LFT, platelet count, Hgb, Hct. Avoid IM injections, rectal temperatures, other trauma that may induce bleeding. Check temperature; notify physician of flu-like syndrome, rash, GI intolerance.

PATIENT/FAMILY TEACHING

• Urine, feces, saliva, sputum, perspiration, tears, skin may be discolored brown-orange. • Soft contact lenses may be permanently discolored. • Rifabutin may decrease efficacy of oral contraceptives; nonhormonal methods should be considered. • Avoid crowds, those with infection. • Report flu-like symptoms, nausea, vomiting, dark urine, unusual bruising/bleeding from any site, any visual disturbances.

R

rifampin

rif-**am**-pin
(Rifadin, Rofact)
Do not confuse Rifadin with Rifater or Ritalin, or rifampin with ribavirin, rifabutin, Rifamate, rifapentine, rifaximin, or Ritalin.

FIXED-COMBINATION(S)

Rifamate: rifampin/isoniazid (an antitubercular): 300 mg/150 mg. **Rifater:** rifampin/isoniazid/pyrazinamide (an antitubercular): 120 mg/50 mg/300 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Antitubercular, antibiotic. **CLINICAL:** Antibiotic, antitubercular, anti-infective.

USES

In combination with other antitubercular agents for initial treatment, re-treatment of active tuberculosis. Eliminates meningococci from nasopharynx of asymptomatic carriers. **OFF-LABEL:** Prophylaxis of *H. influenzae* type b infection, *Legionella* pneumonia, serious infections caused by *Staphylococcus* spp. (in combination with other agents).

PRECAUTIONS

Contraindications: Concomitant therapy with amprenavir, saquinavir, ritonavir; hypersensitivity to other rifamycins. **Cautions:** Hepatic impairment, active or treated alcoholism, porphyria. Concurrent medications associated with hepatotoxicity.

ACTION

Interferes with bacterial RNA synthesis by binding to DNA-dependent RNA polymerase, preventing attachment to DNA, thereby blocking RNA transcription. **Therapeutic Effect:** Bactericidal in susceptible microorganisms.

PHARMACOKINETICS

Well absorbed from GI tract (food delays absorption). Protein binding: 80%. Widely distributed. Metabolized in liver. Primarily eliminated by biliary system. Not removed by hemodialysis. **Half-life:** 3–5 hrs (increased in hepatic impairment).

ADVERSE EFFECTS/ TOXIC REACTIONS

Hepatotoxicity (risk is increased when rifampin is taken with isoniazid), hepatitis, blood dyscrasias, Stevens-Johnson syndrome, antibiotic-associated colitis occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for hypersensitivity to rifampin, rifamycins. Ensure collection of diagnostic specimens. Evaluate initial CBC renal function, LFT.

INTERVENTION/EVALUATION

Assess IV site at least hourly during infusion; restart at another site at the first sign of irritation or inflammation. Monitor LFT, assess for hepatitis: jaundice, anorexia, nausea, vomiting, fatigue, weakness (hold rifampin, inform physician at once). Report hypersensitivity reactions promptly: any type of skin eruption, pruritus, flu-like syndrome with high dosage. Monitor daily pattern of bowel activity, stool consistency (potential for antibiotic-associated colitis). Monitor CBC results for blood dyscrasias, be alert for infection (fever, sore throat), unusual bruising/bleeding, unusual fatigue/weakness.

PATIENT/FAMILY TEACHING

- Preferably take on empty stomach with 8 oz of water 1 hr before or 2 hrs after meal (with food if GI upset). • Avoid alcohol. • Do not take **any** other medications without consulting physician, including antacids; must take rifampin at least 1 hr before antacid. • Urine, feces, sputum, sweat, tears may become red-orange; soft contact lenses may be permanently stained. • Report **any** new symptom immediately such as yellow eyes/skin, fatigue, weakness, nausea/vomiting, sore throat, fever, flu, unusual bruising/bleeding. • If taking oral contraceptives, check with physician (reliability may be affected).

R

rifaximin

rif-**ax**-i-min
(Xifaxan)
Do not confuse rifaximin with rifampin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Anti-infective. **CLINICAL:** Site-specific antibiotic.

USES

Treatment of traveler's diarrhea caused by noninvasive strains of *E. coli*. Reduction of risk for recurrence of overt hepatic encephalopathy. **OFF-LABEL:** Treatment of hepatic encephalopathy. Treatment of *C. difficile*–associated diarrhea.

PRECAUTIONS

Contraindications: Hypersensitivity to other rifamycin antibiotics. **Cautions:** Severe hepatic impairment.

ACTION

Inhibits bacterial RNA synthesis by binding to a subunit of bacterial DNA-dependent RNA polymerase. **Therapeutic Effect:** Bactericidal.

PHARMACOKINETICS

Less than 0.4% absorbed after PO administration. Primarily eliminated in feces. **Half-life:** 5.85 hrs.

PHARMACOKINETICS

Readily absorbed after PO administration. Peak concentration: 4–5 hrs. Protein binding: 99.7%. Metabolized in liver. Excreted primarily in feces. **Half-life:** 50 hrs.

ADMINISTRATION/HANDLING

PO

- Give without regard to meals.

INDICATIONS/ROUTES/DOSAGE

Pulmonary Arterial Hypertension

PO: ADULTS/ELDERLY: Initially, 1 mg every 8 hrs (3 mg/day). May increase dose by 0.5 mg every 8 hrs at 2-wk increments (if systolic B/P greater than 95 mm Hg and no signs/symptoms of hypotension). **Maximum:** 2.5 mg every 8 hrs (7.5 mg/day). Re-titrate dose for any treatment interruption greater than 3 days.

Dose Modification

Pts with Possible Hypotensive Reaction or Concomitant Use of Strong CYP and P-Glycoprotein Inhibitors:

Initial dose of 0.5 mg every 8 hrs and titrate accordingly.

Pts Who Smoke:

Consider titrating doses higher than 2.5 mg every 8 hrs. A decrease in dosage may be required for pts who quit smoking.

Hypotension Risk:

Gradually decrease dose by increments of 0.5 mg every 8 hrs.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (27%–14%): Headache, dyspepsia, dizziness. **Occasional (14%–5%):** Nausea, diarrhea, hypotension, vomiting, constipation.

ADVERSE EFFECTS/ TOXIC REACTIONS

May cause severe symptomatic hypotension. Severe bleeding events including hematemesis, hemoptysis, intra-abdominal hemorrhage, subdural hematoma, vaginal hemorrhage reported in 2.4% of pts. May worsen cardiovascular status of pts with pulmonary veno-occlusive disease (PVOD). Gastritis and gastrointestinal reflux occurred in 21% and 5%, respectively. Other possible adverse effects including palpitations, epistaxis, dysphagia, abdominal distention, and peripheral edema reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline vitals signs, CBC. Assess hydration status. Confirm negative pregnancy status before initiating treatment. (Pregnancy Category X.) Receive full medication history including herbal products. Question history of anemia, baseline hypotension, CAD, HF, hepatic/renal impairment, smoking, past hemorrhagic events, pulmonary disease.

INTERVENTION/EVALUATION

Monitor vital signs (esp. B/P), CBC routinely. Monitor pregnancy status every mo during treatment and for at least 1 mo after discontinuation. Notify physician to obtain appropriate radiologic test if dyspnea occurs and screen for veno-occlusive disease or pulmonary embolism. Obtain EKG for palpitations, dyspnea. Offer antiemetics for nausea, vomiting. Encourage hydration. Immediately report altered mental status, CVA symptoms (aphagia, hemiplegia, homonymous hemianopsia [blindness of one half of vision on same side of both eyes]), hemorrhagic events.

PATIENT/FAMILY TEACHING

• May cause fetal harm. Immediately report suspected pregnancy. • Do not breastfeed. • Do not have unprotected sexual intercourse if taking only oral hormonal birth control. Consult with gynecologist for appropriate birth control methods. • Do not take nitrates for chest pain or medications for erectile dysfunction (may cause low BP). • Do not take antacids within 1 hr of medication administration. • Go from lying to standing slowly (risk of orthostatic hypotension). • Report bleeding of any kind, changes in mental status, difficulty breathing, stroke-like symptoms. • Smokers may require lowered doses of medication if smoking cessation occurs.

Prophylaxis, Treatment of Postmenopausal Osteoporosis

PO *(Actonel)*: ADULTS, ELDERLY: 5 mg/day or 35 mg once weekly or 150 mg once per mo.

Treatment of Postmenopausal Osteoporosis

PO *(Atelvia)*: ADULTS, ELDERLY: 35 mg once weekly.

Treatment of Male Osteoporosis

PO *(Actonel)*: ADULTS, ELDERLY: 35 mg once weekly.

Glucocorticoid-Induced Osteoporosis

PO *(Actonel)*: ADULTS, ELDERLY: 5 mg/day.

Dosage in Renal Impairment

Not recommended with creatinine clearance less than 30 ml/min.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (30%): Arthralgia. **Occasional (12%–8%):** Rash, diarrhea, constipation, nausea, abdominal pain, dyspepsia, flu-like symptoms, peripheral edema. **Rare (5%–3%):** Bone pain, sinusitis, asthenia, dry eye, tinnitus.

R

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose produces hypocalcemia, hypophosphatemia, significant GI disturbances, osteonecrosis of jaw.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess symptoms of Paget's disease (bone pain, bone deformities). Hypocalcemia, vitamin D deficiency must be corrected before therapy begins. Obtain baseline laboratory studies, esp. serum electrolytes, renal function.

INTERVENTION/EVALUATION

Check serum electrolytes (esp. calcium, ionized calcium, phosphorus, alkaline phosphatase levels). Monitor I&O, BUN, creatinine in pts with renal impairment.

PATIENT/FAMILY TEACHING

• Expected benefits occur only when medication is taken with full glass (6–8 oz) of plain water, first thing in the morning and at least 30 min before first food, beverage, medication of the day. Any other beverage (mineral water, orange juice, coffee) significantly reduces absorption of medication. • Do not lie down for at least 30 min after taking medication (potentiates delivery to stomach, reduces risk of esophageal irritation). • Report swallowing difficulties, pain when swallowing, chest pain, new/worsening heartburn. • Consider weight-bearing exercises, modify behavioral factors (cigarette smoking, alcohol consumption). • Report jaw pain, incapacitating bone, joint, or muscle pain.

risperidone

ris-**per**-i-done
(Apo-Risperidone, Risperdal, Risperdal Consta, Risperdal M-Tabs)

■ **BLACK BOX ALERT** ■ Increased risk of mortality in elderly pts with dementia-related psychosis, mainly due to pneumonia, HF.

Do not confuse Risperdal with Restoril, or risperidone with ropinirole.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Benzisoxazole derivative. **CLINICAL:** Antipsychotic.

USES

(Oral): Treatment of schizophrenia, irritability/aggression associated with autistic disease in children. Treatment of acute mania associated with bipolar disorder. Short-term treatment of bipolar disorder

INDICATIONS/ROUTES/DOSAGE

Psychotic Disorders

PO: ADULTS: Initially, 1 mg twice daily. May increase gradually (1–2 mg/day at intervals of at least 24 hrs) to target dose of 6 mg/day. Range: 4–8 mg/day. **Maintenance:** Target dose of 4 mg once daily (range: 2–8 mg/day). **ELDERLY:** Initially, 0.5 mg twice daily. May increase slowly at increments of no more than 0.5 mg twice daily. Range: 2–6 mg/day. **CHILDREN 13–17 YRS:** Initially, 0.5 mg/day (as single daily dose). May increase by 0.5–1 mg/day at intervals of greater than 24 hrs to recommended dose of 3 mg/day.

IM: ADULTS, ELDERLY: Initially, 12.5–25 mg q2wks. **Maximum:** 50 mg q2wks. Dosage adjustments should not be made more frequently than every 4 wks.

Bipolar Mania

PO: ADULTS, ELDERLY: Initially, 2–3 mg as a single daily dose. May increase by 1 mg/day at 24-hr intervals. Range: 1–6 mg/day.

PO: CHILDREN 10–17 YRS: Initially, 0.5 mg/day. May increase by 0.5 mg/day at intervals of greater than 24 hrs to recommended dose of 2.5 mg/day. **IM: ADULTS, ELDERLY:** 25 mg q2wks. **Maximum:** 50 mg q2wks. Dosage adjustments should not be made more frequently than every 4 wks.

R

Autism

CHILDREN 5 YRS AND OLDER WEIGHING MORE THAN 19 KG: Initially, 0.5 mg/day. May increase to 1 mg after 4 days. May further increase dose by 0.5 mg/day in greater than 2-wk intervals. **CHILDREN 5 YRS AND OLDER WEIGHING 15–19 KG:** Initially, 0.25 mg/day. May increase to 0.5 mg/day after 4 days. May further increase dose by 0.25 mg/day in greater than 2-wk intervals.

Dosage in Renal/Hepatic Impairment

Initial dosage for adults, elderly pts is 0.25–0.5 mg twice daily. Dosage is titrated slowly to desired effect.

SIDE EFFECTS

Frequent (26%–13%): Agitation, anxiety, insomnia, headache, constipation. **Occasional (10%–4%):** Dyspepsia, rhinitis, drowsiness, dizziness, nausea, vomiting, rash, abdominal pain, dry skin, tachycardia. **Rare (3%–2%):** Visual disturbances, fever, back pain, pharyngitis, cough, arthralgia, angina, aggressive behavior, orthostatic hypotension, breast swelling.

ADVERSE EFFECTS/ TOXIC REACTIONS

Rare reactions include tardive dyskinesia (characterized by tongue protrusion, puffing of the cheeks, chewing or puckering of mouth), neuroleptic malignant syndrome (marked by hyperpyrexia, muscle rigidity, altered mental status, irregular pulse or B/P, tachycardia, diaphoresis, cardiac arrhythmias, rhabdomyolysis, acute renal failure). Hyperglycemia, in some cases, life-threatening events such as ketoacidosis, hyperosmolar coma, death, has been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Serum renal function, LFT should be performed before therapy begins. Assess behavior, appearance, emotional status, response to environment, speech pattern, thought content, baseline weight. Obtain fasting serum glucose.

INTERVENTION/EVALUATION

Monitor B/P, heart rate, weight, LFT, EKG. Monitor for fine tongue movement (may be first sign of tardive dyskinesia, which may be irreversible). Monitor for suicidal ideation. Assess for therapeutic response (greater interest in surroundings, improved self-care, increased ability to concentrate, relaxed facial expression). Monitor for potential neuroleptic malignant syndrome: fever, muscle rigidity, irregular B/P or pulse, altered mental status. Monitor fasting serum glucose periodically during therapy.

AVAILABILITY (Rx)

Capsules: 100 mg. **Oral Solution:** 80 mg/ml.

and increased by 100 mg/hr increments q30min to maximum 400 mg/hr.
Storage • Refrigerate vials. • Diluted solution is stable for 24 hrs if refrigerated or at room temperature.

IV INCOMPATIBILITIES

Do not mix with any other medications.

INDICATIONS/ROUTES/DOSAGE

Note: Refer to specific protocols.

NHL (Relapsed/Refractory, Low-Grade or Follicular CD20-Positive B-cell)
IV: ADULTS: 375 mg/m^2 weekly for 4 or 8 doses.

NHL (Diffuse Large B-cell)
IV: ADULTS: 375 mg/m^2 on day 1 of each cycle up to 8 doses.

NHL (Follicular, CD20-Positive, B-cell, Previously Untreated)
IV: ADULTS: 375 mg/m^2 on day 1 of each cycle up to 8 doses. **Maintenance (single agent):** 375 mg/m^2 q8 wks for 12 doses.

NHL (Nonprogressive, CD20-Positive, B-cell Following 6–8 Cycles of Cyclophosphamide, Vincristine, and Prednisolone [CVP Therapy])
IV: ADULTS: 375 mg/m^2 once weekly for 4 doses q6 mos. **Maximum:** 16 doses.

NHL (Combination with Ibritumomab)
IV: ADULTS: 250 mg/m^2 day 1; repeat in 7–9 days with ibritumomab.

Rheumatoid Arthritis
IV: ADULTS: 1,000 mg every 2 wks times 2 doses in combination with methotrexate. May repeat course q24 wks (if needed, no sooner than 16 wks).

CLL
IV: ADULTS: 375 mg/m^2 in first cycle (on day prior to fludarabine/cyclophosphamide) and 500 mg/m^2 in cycles 2–6, administered every 28 days.

GPA, MPA
IV: ADULTS: 375 mg/m^2 once weekly for 4 wks (in combination with methylprednisolone IV for 1–3 days, then daily prednisone).

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (49%–10%): Fever, chills, nausea, asthenia, headache, angioedema, hypotension, rash/pruritus. **Occasional (less than 10%):** Myalgia, dizziness, weakness, abdominal pain, throat irritation, vomiting, neutropenia, rhinitis, bronchospasm, urticaria.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reaction produces hypotension, bronchospasm, angioedema. Arrhythmias may occur, particularly in pts with history of preexisting cardiac conditions.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Pretreatment with acetaminophen and diphenhydramine before each infusion may prevent infusion-related effects. CBC should be obtained at regular intervals during therapy.

INTERVENTION/EVALUATION

Monitor for an infusion-related symptoms complex consisting mainly of fever, chills, rigors that generally occurs within 30 min–2 hrs of beginning first infusion. Slowing infusion resolves symptoms. Monitor renal function, LFT, CBC, platelet count.

PATIENT/FAMILY TEACHING

• Report fever, sore throat, abdominal pain, yellowing of eyes/skin, unusual bruising/bleeding.

R

INDICATIONS/ROUTES/DOSAGE

DVT Prophylaxis, Knee Replacement

PO: ADULTS: 10 mg daily for minimum 10–14 days. Initiate at least 6–10 hrs after surgery once hemostasis established. **CrCl less than 30 ml/min:** Avoid use.

DVT Prophylaxis, Hip Replacement

PO: ADULTS: 10 mg daily for 35 days. Initiate at least 6–10 hrs after surgery once hemostasis established. **CrCl less than 30 ml/min:** Avoid use.

Nonvalvular Atrial Fibrillation

PO: ADULTS: CrCl greater than 50 ml/min: 20 mg daily. **CrCl 15–50 ml/min:** 15 mg daily. **CrCl less than 15 ml/min:** Avoid use.

Recurrence of DVT/PE, Treatment of DVT/PE

PO: ADULTS, ELDERLY: 15 mg twice daily for 3 wks, then 20 mg once daily.

Reduce Risk of DVT/PE

PO: ADULTS, ELDERLY: 20 mg once daily.

Dosage in Renal Impairment

Creatinine clearance less than 30 ml/min: Avoid use in DVT/PE; postoperative thromboprophylaxis. ***Nonvalvular atrial fibrillation:*** **Creatinine clearance 15–50 ml/min:** 15 mg once daily with evening meal. **Less than 15 ml/min:** Avoid use.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Rare (3%–1%): Wound secretion/oozing, extremity pain, muscle spasm, syncope, pruritus.

ADVERSE EFFECTS/ TOXIC REACTIONS

Increased risk of bleeding/hemorrhagic events including retroperitoneal hemorrhage, cerebral hemorrhage, subdural hematoma, epidural/spinal hematoma (esp. with epidural catheters, spinal trauma). Serious reactions including jaundice, cholestasis, cytolytic hepatitis, Stevens-Johnson syndrome, hypersensitivity reaction, anaphylaxis reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, serum chemistries, PT/INR, vital signs, urine pregnancy if applicable. Obtain EKG for pts with a history of atrial fibrillation. Question for history of bleeding disorders, recent surgery, spinal punctures, intracranial hemorrhage, bleeding ulcers, open wounds, anemia, renal/hepatic impairment. Receive full medication history including herbal products.

INTERVENTION/EVALUATION

Monitor CBC, serum chemistries, renal function, occult urine/stool. Be alert for complaints of abdominal/back pain, headache, confusion, weakness, vision change (may indicate hemorrhage). Question for increased menstrual bleeding/discharge. Assess peripheral pulses; skin for ecchymosis, petechiae. Check for excessive bleeding from minor cuts, scratches. Assess urine output for hematuria. Immediately report suspected pregnancy.

PATIENT/FAMILY TEACHING

• Do not take/discontinue any medication except on advice of physician. • Avoid alcohol, aspirin, NSAIDs. • Consult physician before surgery, dental work. • Use electric razor, soft toothbrush to prevent bleeding. • Report any unusual bleeding/bruising, spinal/epidural hematomas (e.g., tingling, numbness, muscular weakness). • Report if pregnant or planning to become pregnant. • Avoid grapefruit products.

rivastigmine

riv-a-**stig**-meen
(Apo-Rivastigmine, Exelon, Novo-Rivastigmine)

Parkinson Dementia: 9.5–13.3 mg/24hrs. **Severe Alzheimer Dementia:** 13.3 mg/hr.

Dosage in Renal Impairment
No dose adjustment.

Dosage in Hepatic Impairment
Oral: No dose adjustment. **Transdermal:** Maximum dose: 4.6 mg/24 hrs.

SIDE EFFECTS

Frequent (47%–17%): Nausea, vomiting, dizziness, diarrhea, headache, anorexia. **Occasional (13%–6%):** Abdominal pain, insomnia, dyspepsia (heartburn, indigestion, epigastric pain), confusion, UTI, depression. **Rare (5%–3%):** Anxiety, drowsiness, constipation, malaise, hallucinations, tremor, flatulence, rhinitis, hypertension, flu-like symptoms, weight loss, syncope.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose can produce cholinergic crisis, characterized by severe nausea/vomiting, increased salivation, diaphoresis, bradycardia, hypotension, respiratory depression, seizures.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline vital signs. Assess history for peptic ulcer, urinary obstruction, asthma, COPD. Assess cognitive, behavioral, functional deficits.

INTERVENTION/EVALUATION

Monitor for cholinergic reaction: GI discomfort/cramping, feeling of facial warmth, excessive salivation, diaphoresis, lacrimation, pallor, urinary urgency, dizziness. Monitor for nausea, diarrhea, headache, insomnia.

PATIENT/ FAMILY TEACHING

• Take with meals (at breakfast, dinner). • Swallow capsule whole. Do not break, chew, or divide capsules. • Report nausea, vomiting, diarrhea, diaphoresis, increased salivary secretions, severe abdominal pain, dizziness.

rizatriptan

rye-za-trip-tan
(Apo-Rizatriptan, Maxalt, Maxalt-MLT, Maxalt RPD)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin receptor agonist. **CLINICAL:** Antimigraine.

USES

Treatment of acute migraine headache with or without aura.

PRECAUTIONS

Contraindications: Basilar or hemiplegic migraine, history of stroke or transient ischemic attack; peripheral vascular disease, ischemic bowel disease, uncontrolled hypertension, use within 24 hrs of ergotamine-containing preparations or another serotonin receptor agonist, MAOI use within 14 days. **Cautions:** Mild to moderate renal/hepatic impairment, dialysis pts, elderly, pt profile suggesting cardiovascular risks (e.g., hypertension, diabetes, hypercholesterolemia).

ACTION

Binds selectively to serotonin receptors in cranial arteries producing vasoconstriction. **Therapeutic Effect:** Relieves migraine headache.

PHARMACOKINETICS

Well absorbed after PO administration. Protein binding: 14%. Crosses blood-brain barrier. Metabolized by liver. Eliminated primarily in urine (82%), feces (12%). **Half-life:** 2–3 hrs.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Phosphodiesterase 4 (PDE4) inhibitor. **CLINICAL:** Anti-COPD agent.

USES

ALERT Not indicated as bronchodilator or relief of acute bronchospasm. Adjunct to bronchodilator therapy for maintenance treatment of severe COPD-associated with chronic bronchitis.

PRECAUTIONS

Contraindications: Moderate to severe hepatic impairment. **Cautions:** Mild hepatic impairment, history of depression, suicidal ideation.

ACTION

Selectively inhibits PDE4, causing an accumulation of cyclic AMP within inflammatory/structural cells necessary in pathogenesis of COPD. Produces anti-inflammatory effects. **Therapeutic Effect:** Slows progression of COPD.

PHARMACOKINETICS

Readily absorbed after PO administration. Maximum plasma concentration: 0.5–2 hrs. Protein binding: 99%. Metabolized in liver. Primarily excreted in urine (70%). **Half-life:** 17 hrs.

INDICATIONS/ROUTES/DOSAGE

CTCL, PTCL

IV: ADULTS, ELDERLY: 14 mg/m^2 administered over 4 hrs on days 1, 8, and 15 of a 28-day cycle. Repeat cycles every 28 days if pt continues to benefit from and tolerates therapy.

Dose Modification for Toxicity

Hematologic Toxicity

Grade 3 or 4 Neutropenia or Thrombocytopenia: Delay treatment until ANC 1,500/mm^3 or more and/or platelets 75,000/mm^3 less or more (or baseline); restart at 14 mg/m^2.

Grade 4 Neutropenia or Thrombocytopenia Requiring Platelet Transfusion: Delay treatment until grade 1 or better (or baseline); permanently reduce dose to 10 mg/m^2.

Nonhematolic Toxicity (Excluding Alopecia)

Grade 2 or 3: Delay treatment until toxicity returns to grade 1 or better (or baseline); may restart at 14 mg/m^2.

Grade 4, Recurrent Grade 3: Delay treatment until toxicity returns to grade 1 or better (or baseline); permanently reduce dose to 10 mg/m^2.

Recurrent Grade 3 or 4 Toxicity (with Dose Reduction): Permanently discontinue.

Dosage in Renal Impairment

Caution in end-stage-renal disease.

Dosage in Hepatic Impairment

Caution with moderate to severe impairment.

SIDE EFFECTS

Frequent (57%–23%): Nausea, fatigue, vomiting, anorexia. **Occasional (20%–7%):** Diarrhea, fever, distorted sense of taste, constipation, hypotension, pruritus. **Rare (4%–2%):** Dermatitis, T-wave and ST-wave changes on EKG.

ADVERSE EFFECTS/ TOXIC REACTIONS

Infection is very common (47%), including sepsis, arrhythmias, acute respiratory distress syndrome, acute renal failure. Anemia occurs in 19% of pts, thrombocytopenia in 17%, neutropenia in 11%.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Provide emotional support. Baseline PT, INR, CBC, serum chemistries, esp. potassium, sodium, calcium, magnesium, glucose, renal function, LFT, EKG, should be obtained prior to therapy at baseline and routinely thereafter. Inform women of childbearing potential of risk to fetus if pregnancy occurs.

INTERVENTION/EVALUATION

Calculate daily absolute neutrophil count (ANC) using the formula: % neutrophils + % bands × WBC = ANC. Closely monitor hematologic, chemistry parameters, EKG. Diligently monitor for fever and obtain blood cultures times 2 if occurs. Provide antiemetics to control nausea/vomiting.

PATIENT/FAMILY TEACHING

• Diarrhea may cause dehydration, electrolyte depletion. • Do not have immunizations without physician's approval (lowers body's resistance). • Avoid contact with those who recently received live virus vaccine. • Avoid crowds, those with infection. • May reduce effectiveness of estrogen-containing contraceptives. • Report excessive nausea or vomiting, palpitations, chest pain, shortness of breath. Seek immediate medical attention if unusual bleeding occurs.

romiplostim

roe-mye-**ploe**-stim
(Nplate)
Do not confuse romiplostim with romidepsin.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (35%–26%): Headache, arthralgia. **Occasional (17%–6%):** Dizziness, insomnia, myalgia, extremity pain, abdominal pain, shoulder pain, paresthesia, dyspepsia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Reticulin fiber deposits within the bone marrow, progressing to bone marrow fibrosis may occur. Worsening thrombocytopenia may be noted. Discontinuation of therapy may result in thrombocytopenia of greater severity than baseline, increasing risk of bleeding. Thromboembolic effects may occur. Increases risk of hematologic malignancies.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Establish baseline CBC differential count prior to initiation, weekly during therapy and for 2 wks following discontinuation. Assess extent of RBC, WBC abnormalities.

INTERVENTION/EVALUATION

Monitor CBC differential count weekly during dose adjustment phase and then monthly following establishment of a stable dose.

PATIENT/FAMILY TEACHING

- Report if bruising, bleeding occur.
- Essential to receive drug therapy at scheduled times or risk of bleeding may occur.

ropinirole

roe-**pin**-i-role
(Requip, Requip XL)
Do not confuse ropinirole with Risperdal or risperidone.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Dopamine agonist. **CLINICAL:** Antiparkinson agent.

USES

Treatment of signs/symptoms of idiopathic Parkinson's disease. Treatment of moderate to severe primary restless legs syndrome (RLS).

PRECAUTIONS

Contraindications: None known. **Cautions:** History of orthostatic hypotension, cardiovascular or cerebrovascular disease, syncope, hallucinations (esp. in elderly), concurrent use of CNS depressants, preexisting dyskinesia, hepatic or severe renal dysfunction, major psychotic disorder.

ACTION

Stimulates postsynaptic dopamine receptors in caudate putamen in the brain. **Therapeutic Effect:** Relieves signs/symptoms of Parkinson's disease.

PHARMACOKINETICS

Rapidly absorbed after PO administration. Protein binding: 40%. Widely distributed. Extensively metabolized. Steady-state concentrations achieved within 2 days. Eliminated in urine. Unknown if removed by hemodialysis. **Half-life:** 6 hrs.

initial therapy. Slowly go from lying to standing. • Avoid tasks that require alertness, motor skills until response to drug is established. • If nausea occurs, take medication with food. • Hallucinations may occur, more so in the elderly than in younger pts with Parkinson's disease. • Report occurrence of falling asleep during activities of daily living, new or worsening symptoms, changes in B/P, fainting, unusual urges. • Avoid alcohol.

rosiglitazone HIGH ALERT

roe-zi-**glit**-a-zone
(Avandia)

■ **BLACK BOX ALERT** ■ May cause or exacerbate heart failure.

Do not confuse Avandia with Avalide or Avinza, or Avandaryl with Benadryl.

FIXED-COMBINATION(S)

Avandamet: rosiglitazone/metformin: 1 mg/500 mg, 2 mg/500 mg, 4 mg/500 mg, 2 mg/1 g, 4 mg/1 g.
Avandaryl: rosiglitazone/glimepiride (an antidiabetic): 4 mg/1 mg, 4 mg/2 mg, 4 mg/4 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Thiazolidinedione. **CLINICAL:** Antidiabetic agent.

R

USES

Adjunct to diet/exercise to lower serum glucose in those with type 2 non–insulin-dependent diabetes mellitus (NIDDM). Used as monotherapy or in combination with metformin, sulfonylurea to improve glycemic control.

PRECAUTIONS

Contraindications: NYHA class III or IV HF. **Cautions:** Hepatic impairment, elevated transaminases, preexisting macular edema or diabetic retinopathy, pts at risk for cardiovascular events, edema, anemia, premenopausal or anovulatory women.

ACTION

Improves target-cell response to insulin without increasing pancreatic insulin secretion. Decreases hepatic glucose output, increases insulin-dependent glucose utilization in skeletal muscle. **Therapeutic Effect:** Lowers serum glucose.

PHARMACOKINETICS

Rapidly absorbed. Protein binding: 99%. Metabolized in liver. Excreted in urine (64%), feces (23%). Not removed by hemodialysis. **Half-life:** 3–4 hrs.

ACTION

Interferes with cholesterol biosynthesis by inhibiting conversion of the enzyme HMG-CoA to mevalonate, a precursor to cholesterol. **Therapeutic Effect:** Decreases LDL, VLDL, plasma triglyceride levels; increases HDL concentration.

PHARMACOKINETICS

Protein binding: 88%. Minimal hepatic metabolism. Primarily eliminated in feces. **Half-life:** 19 hrs (increased in severe renal dysfunction).

AVAILABILITY (Rx)

Oral Suspension: 40 mg/ml. **Tablets, Film-Coated:** 200 mg, 400 mg.

ADMINISTRATION/HANDLING

PO

• Give with food. • Film-coated tablets may be cut or crushed for dosing flexibility. • Shake oral suspension well before each dose; use bottle adapter and dosing syringes provided.

INDICATIONS/ROUTES/DOSAGE

Lennox-Gastaut Seizures

PO: ADULTS, ELDERLY: Initially, 400–800 mg/day, given in 2 equally divided doses. Dose should be increased by 400–800 mg/day every 2 days. **Maximum:** 3,200 mg/day, administered in 2 equally divided doses. **CHILDREN 1 YR AND OLDER:** Treatment should be initiated at a daily dose of 10 mg/kg/day, given in 2 equally divided doses. Increase by 10-mg/kg increments every other day to a target dose of 45 mg/kg/day or 3,200 mg/day, whichever is less, administered in 2 equally divided doses.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Use with caution; not recommended in severe impairment.

R

SIDE EFFECTS

CHILDREN: Frequent (27%–11%): Headache, dizziness, fatigue, nausea, drowsiness, diplopia. **Occasional (6%–4%):** Tremor, nystagmus, blurred vision, vomiting. **Rare (3%):** Ataxia, upper abdominal pain, anxiety, constipation, dyspepsia, back pain, gait disturbance, vertigo.

ADULTS: Frequent (17%–7%): Lethargy, vomiting, headache, fatigue, dizziness, nausea. **Occasional (5%–4%):** Influenza, nasopharyngitis, anorexia, rash, ataxia, diplopia. **Rare (3%):** Bronchitis, sinusitis, psychomotor hyperactivity, upper abdominal pain, aggression, ear infection, inattention, pruritus.

ADVERSE EFFECTS/ TOXIC REACTIONS

Suicidal ideation or behavior occur rarely, noted as early as 1 wk after initiation of therapy and persisting for at least 24 wks. Shortening of the QT interval (up to 20 msec), hypersensitivity reaction (rash, fever, urticaria) have been noted. Abrupt withdrawal may precipitate seizure, status epilepticus.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Review history of seizure disorder (intensity, frequency, duration, level of consciousness). Initiate seizure precautions.

INTERVENTION/EVALUATION

Provide safety measures as needed. Observe frequently for recurrence of seizure activity. Assess for clinical improvement (decrease in intensity, frequency of seizures). Assist with ambulation if drowsiness, lethargy occur. Question for evidence of headache.

PATIENT/FAMILY TEACHING

• Do not abruptly withdraw medication (may precipitate seizures). • Avoid tasks that require alertness, motor skills until response to drug is established. • Strict maintenance of drug therapy is essential for seizure control. • Avoid alcohol. • Female pts of childbearing age should be informed that concurrent use of rufinamide with hormonal contraceptives may render contraceptive less effective; non-hormonal forms of contraception are recommended. • Be alert for any unusual changes in mood/behavior (may increase risk of suicidal ideation/behavior).

Dosage in Renal Impairment

Creatinine clearance 15–59 ml/min	Platelets 100,000–150,000/mm^3	10 mg twice daily
Creatinine clearance 15–59 ml/min	Platelets less than 100,000/mm^3	Avoid use
End-stage renal disease (ESRD) on dialysis	Platelets 100,000–200,000/mm^3	15 mg after dialysis on days of dialysis
ESRD on dialysis	Platelets greater than 200,000/mm^3	20 mg after dialysis on days of dialysis
ESRD not requiring dialysis		Avoid use

Dosage in Hepatic Impairment

Hepatic impairment	Platelets 100,000–150,000/mm^3	10 mg twice daily
Hepatic impairment	Platelets less than 100,000/mm^3	Avoid use

SIDE EFFECTS

Frequent (23%–14%): Bruising, dizziness, vertigo, labyrinthitis, headache. **Occasional (9%–7%):** Weight gain, flatulence.

R

ADVERSE EFFECTS/ TOXIC REACTIONS

May cause severe thrombocytopenia (70%), anemia (96%), neutropenia (18%), which may improve with reduced dose or temporarily withholding regimen. Anemic pts may require blood transfusions. Increased risk of developing opportunistic bacterial, mycobacterial, fungal, viral infections including herpes zoster, urinary tract infection, urosepsis, renal infection, pyuria. Increased risk of bleeding disorders including ecchymosis, hematoma, injection site hematoma, periorbital hematoma, petechiae, purpura.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC, serum chemistries, renal function, LFT, urinalysis, cholesterol level. Assess recent vaccinations status. Receive full medication history including herbal products. Question for possibility of pregnancy, renal/hepatic impairment, HIV.

INTERVENTION/EVALUATION

Monitor CBC (every 2–4 wks until doses stabilized), serum chemistries, renal function, LFT, cholesterol. Obtain urinalysis with reflex culture for suspected UTI. Routinely assess vital signs, I&O, breath sounds, gait. Monitor temperature; be alert for fever, infectious process. Avoid IM injections, rectal temperatures, other traumas that induce bleeding. Assess skin for petechiae, hematoma, purpura.

PATIENT/FAMILY TEACHING

• Report any new bruising/bleeding, bloody stools or urine, fever, chills, rash, painful urination, suspected infection, fatigue, shortness of breath. • Do not breastfeed. • Avoid grapefruit products. • Open skin lesions, blisters may signal herpes infection. • Blood work will be routinely monitored; if on dialysis, take only following dialysis.

Generic Drugs S

salmeterol
sargramostim (granulocyte macrophage colony-stimulating factor, GM-CSF)
saxagliptin
scopolamine
selegiline
senna
sertraline
sevelamer
sildenafil
silodosin
simeprevir
simvastatin
sirolimus
sitagliptin
sodium bicarbonate
sodium chloride
sodium ferric gluconate complex
sodium polystyrene sulfonate
sofosbuvir
solifenacin
somatropin
sorafenib
sotalol
spironolactone
sucralfate
sucroferric oxyhydroxide
sulfamethoxazole-trimethoprim
sulfasalazine
sulindac
sumatriptan
sunitinib
suvorexant

insufficiency, arrhythmias, hypertension), seizure disorders, diabetes, hyperthyroidism, hepatic impairment, hypokalemia.

ACTION

Stimulates beta$_2$-adrenergic receptors in lungs, resulting in relaxation of bronchial smooth muscle. **Therapeutic Effect:** Relieves bronchospasm, reducing airway resistance.

PHARMACOKINETICS

Route	Onset	Peak	Duration
Inhalation (asthma)	30–45 min	2–4 hrs	12 hrs
Inhalation (COPD)	2 hrs	3.25–4.75 hrs	12 hrs

Low systemic absorption; acts primarily in lungs. Protein binding: 95%. Metabolized in liver by hydroxylation. Eliminated in urine (25%), feces (60%). **Half-life:** 5.5 hrs.

ADMINISTRATION/HANDLING

Inhalation

• Shake container well, instruct pt to exhale completely through mouth; place mouthpiece between lips, holding inhaler upright. • Inhale deeply through mouth while fully depressing top of canister. Pt should hold breath as long as possible before exhaling slowly. • Allow at least 2 min before second dose (allows for deeper bronchial penetration). • Rinse mouth with water immediately after inhalation (prevents mouth/throat dryness).

INDICATIONS/ROUTES/DOSAGE

Maintenance and Prevention Therapy for Asthma

Inhalation ***(Diskus):*** **ADULTS, ELDERLY, CHILDREN 4 YRS AND OLDER:** 1 inhalation (50 mcg) q12h (used in combination with inhaled corticosteroids not as monotherapy).

Prevention of Exercise-Induced Bronchospasm

Inhalation ***(Diskus):*** **ADULTS, ELDERLY, CHILDREN 4 YRS AND OLDER:** 1 inhalation at least 30 min before exercise. Additional doses should not be given for 12 hrs. Do not administer if already giving salmeterol twice daily.

Maintenance Therapy for COPD

Inhalation ***(Diskus):*** **ADULTS, ELDERLY:** 1 inhalation (50 mcg) q12h.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (28%): Headache. **Occasional (7%–3%):** Cough, tremor, dizziness, vertigo, throat dryness/irritation, pharyngitis. **Rare (less than 3%):** Palpitations, tachycardia, nausea, heartburn, GI distress, diarrhea.

ADVERSE EFFECTS/ TOXIC REACTIONS

May prolong QT interval (can precipitate ventricular arrhythmias). Hypokalemia, hyperglycemia may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline EKG and monitor for changes.

INTERVENTION/EVALUATION

Monitor rate, depth, rhythm, type of respiration; quality/rate of pulse, B/P. Assess lungs for wheezing, rales, rhonchi. Periodically evaluate serum potassium levels.

PATIENT/FAMILY TEACHING

• Not for relief of acute episodes. • Keep canister at room temperature (cold decreases effects). • Do not stop medication or exceed recommended dosage. • Report chest pain, dizziness. • Wait at least 1 full min before second inhalation. • Administer dose 30–60 min before exercise when used to prevent exercise-induced bronchospasm. • Avoid excessive use of caffeine derivatives (coffee, tea, colas, chocolate).

sargramostim (granulocyte macrophage colony-stimulating factor, GM-CSF)

sar-**gra**-moe-stim
(Leukine)
Do not confuse Leukine with leucovoran or Leukerin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Colony-stimulating factor. **CLINICAL:** Hematopoietic, antineutropenic agent.

USES

Acute Myelogenous Leukemia (AML): Shortens time to neutrophil recovery; reduces incidence of severe infections. **Bone Marrow Transplant:** For graft failure, engraftment delay.

Canadian trade name

INDICATIONS/ROUTES/DOSAGE

Neutrophil Recovery Following Chemotherapy in AML

IV Infusion: ADULTS, ELDERLY: 250 mcg/m^2/day (as 4-hr infusion) starting approximately 4 days following completion of induction chemotherapy. Continue until ANC is greater than 1,500 cells/mm^3 for 3 consecutive days to a maximum of 42 days.

Myeloid Recovery Following Bone Marrow Transplant (BMT)

IV Infusion: ADULTS, ELDERLY: Usual parenteral dosage: 250 mcg/m^2/day (as 2-hr infusion). Begin 2–4 hrs after autologous bone marrow infusion and not less than 24 hrs after last dose of chemotherapy or last radiation treatment. Continue until ANC greater than 1,500 cells/mm^3 for 3 consecutive days. Discontinue if blast cells appear or underlying disease progresses.

Bone Marrow Transplant Failure, Engraftment Delay

IV Infusion: ADULTS, ELDERLY: 250 mcg/m^2/day for 14 days. Infuse over 2 hrs. May repeat after 7 days off therapy if engraftment has not occurred. A third course with 500 mcg/m^2/day for 14 days may be tried if engraftment still has not occurred.

Stem Cell Transplant, Mobilization of Peripheral Blood Progenitor Cells

IV, Subcutaneous: ADULTS: 250 mcg/m^2/day (IV as 24-hr infusion). Continue until ANC greater than 1,500 cells/mm^3 for 3 consecutive days.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: GI disturbances (nausea, diarrhea, vomiting, stomatitis, anorexia, abdominal pain), arthralgia or myalgia, headache, malaise, rash, pruritus. **Occasional:** Peripheral edema, weight gain, dyspnea, asthenia, fever, leukocytosis, capillary leak syndrome (fluid retention, irritation at local injection site, peripheral edema). **Rare:** Tachycardia, arrhythmias, thrombophlebitis.

ADVERSE EFFECTS/ TOXIC REACTIONS

Pleural/pericardial effusion occurs rarely after infusion.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline pulmonary function testing, weight, vital signs. Obtain baseline chemistry studies (CBC with differential, serum renal function, LFT).

INTERVENTION/EVALUATION

Monitor CBC with differential, serum renal/hepatic function, pulmonary function, vital signs, weight. Monitor for supraventricular arrhythmias during administration (particularly in pts with history of cardiac arrhythmias). Assess closely for dyspnea during and immediately following infusion (particularly in pts with history of lung disease). If dyspnea occurs during infusion, cut infusion rate by half. If dyspnea continues, stop infusion immediately. If neutrophil count exceeds 20,000 cells/mm^3 or platelet count exceeds 500,000/mm^3, stop infusion or reduce dose by half, based on clinical condition of pt. Blood counts return to normal or baseline 3–7 days after discontinuation of therapy.

saxagliptin

sax-a-**glip**-tin
(Onglyza)
Do not confuse saxagliptin with sitagliptin or sumatriptan.

FIXED-COMBINATION(S)

Kombiglyze XR: saxagliptin/metformin (an antidiabetic): 2.5 mg/1,000 mg, 5 mg/500 mg, 5 mg/1,000 mg.

needs. Ensure follow-up instruction if pt or family does not thoroughly understand diabetes management or glucose-testing technique.

INTERVENTION/EVALUATION

Assess for hypoglycemia (diaphoresis, tremors, dizziness, anxiety, headache, tachycardia, perioral numbness, hunger, diplopia, difficulty concentrating), hyperglycemia (polyuria, polyphagia, polydipsia, nausea, vomiting, dim vision, fatigue, deep, rapid breathing). Be alert to conditions that alter glucose requirements (fever, increased activity or stress, surgical procedures).

PATIENT/FAMILY TEACHING

• Diabetes mellitus requires lifelong control. Prescribed diet and exercise are principal parts of treatment; do not skip or delay meals. • Continue to adhere to dietary instructions, regular exercise program, regular testing of blood glucose. • When taking combination drug therapy or when glucose demands are altered (fever, infection, trauma, stress, heavy physical activity), have a source of glucose available to treat symptoms of hypoglycemia.

scopolamine

skoe-**pol**-a-meen
(Trans-Derm Scop, Transderm-V 🍁)

FIXED-COMBINATION(S)

Donnatal: scopolamine/atropine (anticholinergic)/hyoscyamine (anticholinergic)/phenobarbital (sedative): 0.0065 mg/0.0194 mg/0.1037 mg/16.2 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Anticholinergic. **CLINICAL:** Antinausea, antiemetic.

USES

Prevention of motion sickness, postop nausea/vomiting. **OFF-LABEL:** Breakthrough treatment of nausea/vomiting associated with chemotherapy.

PRECAUTIONS

Contraindications: Narrow-angle glaucoma. **Cautions:** Hepatic/renal impairment, cardiac disease (hypertension, HF), seizures, psychoses, coronary artery disease, prostatic hyperplasia, urinary retention, reflux esophagitis, ulcerative colitis, hyperthyroidism.

ACTION

Competitively inhibits action of acetylcholine at muscarinic receptors. Reduces excitability of labyrinthine receptors, depressing conduction in vestibular cerebellar pathway. **Therapeutic Effect:** Prevents motion-induced nausea/vomiting.

breaks down dopamine), thereby increasing dopaminergic action. **Therapeutic Effect:** Relieves signs/symptoms of Parkinson's disease (tremor, akinesia, posture/equilibrium disorders, rigidity).

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1 hr	—	24–72 hrs

Rapidly absorbed from GI tract. Crosses blood-brain barrier. Protein binding: 90%. Metabolized in liver. Primarily excreted in urine. **Half-life:** **PO:** 10 hrs. **Transdermal:** 18–25 hrs.

Category C. Children: Safety and efficacy not established in those younger than 6 yrs. **Elderly:** No age-related precautions noted; monitor for signs of dehydration, electrolyte loss.

INTERACTIONS

DRUG: May decrease transit time of concurrently administered **oral medications,** decreasing absorption. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** May increase serum glucose. May decrease serum potassium.

AVAILABILITY (OTC)

Syrup (Senokot): 8.8 mg/5 ml. **Tablets (Senexon, Senna-Gen, Senokot):** 8.6 mg. **(Ex-Lax, Perdiem):** 15 mg.

ADMINISTRATION/HANDLING

PO

• Give on an empty stomach (decreases time to effect). • Offer at least 6–8 glasses of water/day (aids stool softening). • Avoid giving within 1 hr of other oral medication (decreases drug absorption). • Syrup can be mixed with juice, milk, ice cream.

INDICATIONS/ROUTES/DOSAGE

Constipation

PO ***(Tablets):*** **ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER:** 2 tablets at bedtime. **Maximum:** 4 tablets twice daily. **CHILDREN 6–11 YRS:** 1 tablet at bedtime. **Maximum:** 2 tablets twice daily. **CHILDREN 2–5 YRS:** ½ tablet at bedtime. **Maximum:** 1 tablet twice daily.

PO ***(Syrup):*** **ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER:** 10–15 ml at bedtime. **Maximum:** 15 ml twice daily. **CHILDREN 6–11 YRS:** 5–7.5 ml at bedtime. **Maximum:** 7.5 ml twice daily. **CHILDREN 2–5 YRS:** 2.5–3.75 ml at bedtime. **Maximum:** 3.75 ml twice daily.

Bowel Evacuation

PO: ADULTS, ELDERLY, CHILDREN OLDER THAN 1 YR: 75 ml between 2 PM and 4 PM on day prior to procedure.

SIDE EFFECTS

Frequent: Red, brown discoloration of urine. **Occasional:** Some degree of abdominal discomfort, nausea, mild cramping, faintness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Long-term use may result in laxative dependence, chronic constipation, loss of normal bowel function. Prolonged use/overdose may result in electrolyte, metabolic disturbances (e.g., hypokalemia, hypocalcemia, metabolic acidosis or alkalosis), vomiting, muscle weakness, persistent diarrhea, malabsorption, weight loss.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Encourage adequate fluid intake. Assess bowel sounds for peristalsis. Monitor daily pattern of bowel activity, stool consistency. Assess for GI disturbances. Monitor serum electrolytes in pts exposed to prolonged, frequent, excessive use of medication.

PATIENT/FAMILY TEACHING

• Urine may turn red or brown (only temporary and not harmful). • Institute measures to promote defecation (increase fluid intake, exercise, high-fiber diet). • Laxative effect generally occurs in 6–12 hrs but may take 24 hrs. • Do not take other oral medication within 1 hr of taking senna (decreased effectiveness).

sertraline

ser-tra-leen
(Apo-Sertraline, PMS-Sertraline, Zoloft)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal ideation and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

mg/day. May increase by 25–50 mg/day at 7-day intervals up to 200 mg/day.

Obsessive-Compulsive Disorder (OCD)
PO: ADULTS, CHILDREN 13–17 YRS: Initially, 50 mg/day with morning or evening meal. May increase by 50 mg/day at 7-day intervals up to 200 mg/day. **ELDERLY, CHILDREN 6–12 YRS:** Initially, 25 mg/day. May increase by 25–50 mg/day at 7-day intervals. **Maximum:** 200 mg/day.

Panic Disorder, Post-Traumatic Stress Disorder (PTSD), Social Anxiety Disorder (SAD)
PO: ADULTS, ELDERLY: Initially, 25 mg/day. May increase by 50 mg/day at 7-day intervals. Range: 50–200 mg/day. **Maximum:** 200 mg/day.

Premenstrual Dysphoric Disorder (PMDD)
PO: ADULTS: Initially, 50 mg/day. May increase up to 150 mg/day per menstrual cycle in 50-mg increments.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (26%–12%): Headache, nausea, diarrhea, insomnia, drowsiness, dizziness, fatigue, rash, dry mouth. **Occasional (6%–4%):** Anxiety, nervousness, agitation, tremor, dyspepsia, diaphoresis, vomiting, constipation, sexual dysfunction, visual disturbances, altered taste. **Rare (less than 3%):** Flatulence, urinary frequency, paresthesia, hot flashes, chills.

ADVERSE EFFECTS/ TOXIC REACTIONS

Serotonin syndrome (seizures, arrhythmias, high fever), neuroleptic malignant syndrome (muscle rigidity, cognitive changes), suicidal ideation have occurred.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess appearance, behavior, speech patterns, level of interest, mood. For pts on long-term therapy, CBC, renal function, LFT should be performed periodically.

INTERVENTION/EVALUATION

Assess mental status for depression, suicidal ideation (esp. at beginning of therapy or change in dosage), anxiety, social function, panic attack. Monitor daily pattern of bowel activity, stool consistency. Assist with ambulation if dizziness occurs.

PATIENT/FAMILY TEACHING

• Dry mouth may be relieved by sugarless gum, sips of water. • Report headache, fatigue, tremor, sexual dysfunction. • Avoid tasks that require alertness, motor skills until response to drug is established (may cause dizziness, drowsiness). • Take with food if nausea occurs. • Inform physician if pregnancy occurs. • Avoid alcohol. • Do not take OTC medications without consulting physician. • Report worsening of depression, suicidal ideation.

sevelamer

TOP 100

se-**vel**-a-mer
(Renagel, Renvela)
Do not confuse Renagel with Reglan, Regonol, or Renvela, or sevelamer with Savella.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Polymeric phosphate binder. **CLINICAL:** Electrolyte modifier, antihyperphosphatemia agent.

USES

Reduction of serum phosphorus in pts with chronic renal disease on hemodialysis.

PRECAUTIONS

Contraindications: Bowel obstruction. **Cautions:** Dysphagia, severe GI tract motility disorders, major GI tract surgery.

ReVia, sildenafil with silodosin, tadalafil, or vardenafil, or Viagra with Allegra or Vaniqa.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Phosphodiesterase-5 enzyme (PDE5) inhibitor.
CLINICAL: Erectile dysfunction adjunct.

USES

Viagra: Treatment of male erectile dysfunction. **Revatio:** Treatment of pulmonary arterial hypertension (WHO Group I) to improve exercise ability. **OFF-LABEL:** Pulmonary hypertension (WHO II, III, IV); persistent pulmonary hypertension after left ventricular assist device placement.

PRECAUTIONS

Contraindications: Concurrent use of nitrates in any form. Concurrent use of protease inhibitors when used for pulmonary arterial hypertension (Revatio). **Cautions:** Cardiac, hepatic/renal impairment; resting hypotension or hypertension; cardiovascular disease including HF, unstable angina; concurrent use of bosentan, other antihypertensive agents; anatomic deformation of penis; pts who may be predisposed to priapism (sickle cell anemia, multiple myeloma, leukemia); left ventricular outflow obstruction; substantial alcohol consumption, uncontrolled hypertension, life-threatening arrhythmias, stroke, recent MI; elderly, bleeding disorders, active peptic ulcer disease. **Pregnancy Category B.**

ACTION

Inhibits type 5 cyclic guanosine monophosphate (a specific phosphodiesterase), a predominant isoenzyme of pulmonary vascular smooth muscle, corpus cavernosum of penis. **Therapeutic Effect:** Relaxes smooth muscle, increases blood flow, facilitating erection. Produces pulmonary vascular relaxation.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1 hr	—	2–4 hrs

Rapidly absorbed. Protein binding: 96%. Metabolized in liver. Primarily eliminated in feces. **Half-life:** 4 hrs.

INTERACTIONS

DRUG: **Alpha-adrenergic blocking agents** may increase symptomatic hypotension. **Protease inhibitors** may increase concentration, toxicity. **Cimetidine, CYP3A4 inhibitors (e.g., erythromycin, itraconazole, ketoconazole)** may increase concentration. Potentiates hypotensive effects of **nitrates.** **HERBAL:** **St. John's wort** may decrease concentration. **FOOD:** **High-fat meals** delay maximum effectiveness by 1 hr. **Grapefruit products** may decrease blood pressure, increase heart rate. **LAB VALUES:** None known.

AVAILABILITY (Rx)

Injection, Solution: 0.8 mg/ml (12.5 ml). **Tablets: (Revatio):** 20 mg. **(Viagra):** 25 mg, 50 mg, 100 mg.

ADMINISTRATION/HANDLING

PO

- **Viagra:** May take approximately 1 hr before sexual activity but may be taken any time from 30 min–4 hrs before sexual activity.
- **Revatio:** May be given without regard to meals.
- Give tablets at least 4–6 hrs apart.

ketoconazole, ritonavir) significantly increase concentration (concurrent use contraindicated). **HERBAL:** None significant. **FOOD:** **Grapefruit products** may increase risk of orthostatic hypotension. **LAB VALUES:** None significant.

AVAILABILITY (Rx)

Dosage in Renal Impairment
No dose adjustment.

Dosage in Hepatic Impairment
Not recommended in moderate to severe impairment.

SIDE EFFECTS

Frequent (28%–22%): Rash, pruritus, nausea. **Occasional (16%–12%):** Myalgia, dyspnea.

ADVERSE EFFECTS/ TOXIC REACTIONS

Increased risk of thromboembolic events associated with peginterferon alfa. Dermatologic events/photosensitivity including generalized rash, erythema, eczema, maculopapular rash, dermatitis, skin exfoliation, rash erythematosus, urticaria, allergic dermatitis, cutaneous vasculitis, skin eruption, photodermatosis, sunburn reported. Mild to moderate dyspnea reported in 12% of pts. Pts of East Asian ancestry may have increased risk of photosensitivity.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline vital signs, CBC, HCV-RNA level, complete metabolic panel, liver function test. Confirm hepatitis C genotype. Receive full history of home medications including herbal products. Screen for contraindications to peginterferon alfa and ribavirin. Confirm negative pregnancy test before initiating treatment. Question history of anemia, HIV, hepatitis B, liver transplantation, pulmonary disease, renal impairment. Conduct dermatologic exam, noting baseline skin characteristics, moles, lesions.

INTERVENTION/EVALUATION

Assess vital signs routinely. Monitor CBC, HCV-RNA levels, electrolytes accordingly. Obtain urine pregnancy every mo and for 6 mos after discontinuation in female pts of childbearing age. Reinforce birth control compliance. Monitor for intrauterine device failures if applicable. Monitor international normalized ratio (INR) level if on warfarin. Monitor for bruising, dyspnea, hematuria, DVT, pulmonary embolism. Encourage nutritional intake and assess for anorexia, weight loss.

PATIENT/FAMILY TEACHING

• Treatment must be used in combination with peginterferon, ribavirin. Inform pts of side effects/contraindications of triple-medication regimen. Periodic lab tests are an essential part of therapy. • Report any newly prescribed medications. • Do not take herbal products. • Women of childbearing age must use two different forms of reliable birth control during treatment and for at least 6 mos after treatment. Do not breastfeed. Notify physician if female partner becomes pregnant. • Report difficulty breathing, weakness, dizziness, weight loss. • Avoid alcohol. • Take with meals. Do not use tanning beds. Limit sun exposure; use protective UV measures. Immediately report any changes to skin including rash, skin peeling, ulcers, or new moles/lesions.

simvastatin

TOP 100

sim-va-sta-tin
(Apo-Simvastatin, Zocor)
Do not confuse simvastatin with atorvastatin, lovastatin, nystatin, pitavastatin, or pravastatin, or Zocor with Cozaar, Lipitor, Zoloft, or Zyrtec.

FIXED-COMBINATION(S)

Juvisync: simvastatin/sitagliptin (an antidiabetic agent): 10 mg/100 mg, 20 mg/100 mg, 40 mg/100 mg. **Simcor:** simvastatin/niacin (an antilipemic agent): 20 mg/500 mg, 40 mg/500 mg, 20 mg/750 mg, 20 mg/1,000 mg, 40 mg/1,000 mg. **Vytorin:** simvastatin/ezetimibe (a cholesterol absorption inhibitor): 10 mg/10 mg, 20 mg/10 mg, 40 mg/10 mg, 80 mg/10 mg.

Dosing Adjustment with Medications

Cyclosporine, gemfibrozil: Do not exceed 10 mg/day. **Amiodarone, amlodipine, ranolazine:** Do not exceed 20 mg/day. **Diltiazem, verapamil:** Do not exceed 10 mg/day.

Dosage In Renal Impairment

Creatinine clearance less than 30 ml/min: Initially, 5 mg/day.

Dosage in Hepatic Impairment

Contraindicated with active hepatic disease.

SIDE EFFECTS

Generally well tolerated. Side effects are usually mild and transient. **Occasional (3%–2%):** Headache, abdominal pain/cramps, constipation, upper respiratory tract infection. **Rare (less than 2%):** Diarrhea, flatulence, asthenia, nausea/vomiting, depression.

ADVERSE EFFECTS/ TOXIC REACTIONS

Potential for ocular lens opacities. Hypersensitivity reaction, hepatitis occur rarely. Myopathy (muscle pain, tenderness, weakness with elevated serum creatine kinase [CK], sometimes taking the form of rhabdomyolysis) has occurred.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain dietary history, esp. fat consumption. Question for possibility of pregnancy before initiating therapy (Pregnancy Category X). Question for history of hypersensitivity to simvastatin. Assess baseline lab results: serum cholesterol, triglycerides, LFT.

INTERVENTION/EVALUATION

Monitor serum cholesterol, triglyceride lab results for therapeutic response. Monitor LFT. Monitor daily pattern of bowel activity, stool consistency. Assess for headache, myopathy.

PATIENT/FAMILY TEACHING

• Use appropriate contraceptive measures (Pregnancy Category X). • Periodic lab tests are essential part of therapy. • Maintain appropriate diet. Avoid grapefruit products. • Report unexplained muscle pain, tenderness, weakness.

sirolimus

sir-**oh**-li-mus
(Rapamune)

■ **BLACK BOX ALERT** ■ Increased susceptibility to infection and potential for development of lymphoma. Not recommended for liver or lung transplant pts. Use only by physicians experienced in immunosuppressive therapy and management of transplant pts.

Do not confuse Rapamune with Rapaflo, or sirolimus with everolimus, pimecrolimus, tacrolimus, or temsirolimus.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Immunosuppressant. **CLINICAL:** Immunosuppressant.

USES

Prophylaxis of organ rejection in pts receiving renal transplant. **OFF-LABEL:** Prophylaxis of organ rejection in heart transplant recipients. Prevention of acute graft-vs-host disease in allogenic stem cell transplantation. Treatment of refractory acute or chronic graft-vs-host disease.

PRECAUTIONS

Contraindications: None known. **Cautions:** Cardiovascular disease (HF, hypertension); pulmonary disease, hepatic impairment, renal impairment, hyperlipidemia, perioperative period due to increased chance of surgical complications from impaired wound and tissue healing. Concurrent use with medications that may alter renal function.

diltiazem, ketoconazole, rifampin). Determine if pt has chickenpox, herpes zoster, malignancy, infection.

INTERVENTION/EVALUATION

Monitor serum renal function, LFT periodically. Monitor cholesterol, triglycerides, platelets, Hgb.

PATIENT/FAMILY TEACHING

• Avoid those with colds, other infections. • Avoid grapefruit products. • Avoid exposure to sunlight, artificial light sources. • Strict monitoring is essential in identifying, preventing symptoms of organ rejection. • Do not chew, crush, dissolve, or divide tablets.

sitagliptin

TOP 100 HIGH ALERT

sit-a-**glip**-tin
(Januvia)
Do not confuse Januvia with Enjuvia, Jantoven, or Janumet, or sitagliptin with saxagliptin or sumatriptan.

FIXED-COMBINATION(S)

Janumet, Janumet XR: sitagliptin/metformin (an antidiabetic): 50 mg/500 mg, 50 mg/1,000 mg. **Juvisync:** sitagliptin/simvastatin (an antilipidemic agent): 100 mg/10 mg, 100 mg/20 mg, 100 mg/40 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: DPP-4 inhibitors (gliptins). **CLINICAL:** Antidiabetic agent.

S

USES

Adjunctive treatment to diet, exercise to improve glycemic control in pts with type 2 diabetes mellitus as monotherapy or in combination with other antidiabetic agents.

PRECAUTIONS

Contraindications: None known. **Cautions:** Type I diabetes, diabetic ketoacidosis, renal impairment, end-stage renal disease, history of pancreatitis, angioedema with other DPP-4 inhibitors. Concurrent use of other glucose-lowering agents may increase risk of hypoglycemia.

ACTION

Inhibits DPP-4 enzyme, causing prolonged active incretin levels. Incretin regulates glucose homeostasis. **Therapeutic Effect:** Increases synthesis and release of insulin from pancreatic cells; lowers glucagon secretion from pancreas, decreases hepatic glucose production.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	N/A	1–4 hrs	24 hrs

Rapidly absorbed following PO administration. Protein binding: 38%. Eliminated in urine (87%), feces (13%). **Half-life:** 12 hrs.

Well absorbed following PO administration, sodium bicarbonate dissociates to sodium and bicarbonate ions. With increased hydrogen ion concentrations, bicarbonate ions combine with hydrogen ions to form carbonic acid, which then dissociates to CO_2, which is excreted by the lungs. Plasma concentration regulated by kidney (ability to form, excrete bicarbonate).

corneal edema, diagnostic aid in ophthalmoscopic exam.

PRECAUTIONS

Contraindications: Fluid retention, hypernatremia, hypertonic uterus. **Cautions:** HF, renal impairment, cirrhosis, hypertension, edema. Do not use sodium chloride preserved with benzyl alcohol in neonates.

ACTION

Sodium is a major cation of extracellular fluid. **Therapeutic Effect:** Controls water distribution, fluid and electrolyte balance, osmotic pressure of body fluids; maintains acid-base balance.

PHARMACOKINETICS

Well absorbed from GI tract. Widely distributed. Primarily excreted in urine and, to a lesser degree, in sweat, tears, saliva.

ADMINISTRATION/HANDLING

sofosbuvir

soe-**fos**-bue-veer
(Sovaldi)
Do not confuse sofosbuvir with fosamprenavir or simeprevir.

FIXED-COMBINATION(S)

Harvoni: Sofosbuvir/ledipasvir (a hepatitis C virus NSSA inhibitor): 400 mg/90 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Nucleotide polymerase inhibitor. **CLINICAL:** Antiviral.

USES

Treatment of chronic hepatitis C virus (HCV) infection, in combination with peginterferon alfa and/or ribavirin or simeprevir. Indicated for HCV genotype 1, 2, 3, or 4 infection, including pts with hepatocellular carcinoma that meet Milan criteria (awaiting liver transplantation), and pts with HCV/HIV-1 co-infection.

PRECAUTIONS

Contraindications: Pregnancy (Category X), breastfeeding, any contraindications to peginterferon alfa or ribavirin. **Cautions:** Concurrent use of potent P-glycoprotein inducers (e.g., rifampin, St. John's wort) may decrease concentration/effects.

S

ACTION

Inhibits viral replication of viral-infected cells. Suppresses cell proliferation by interrupting polymerase activity, resulting in chain termination. **Therapeutic Effect:** Inhibits viral replication of hepatitis C virus.

PHARMACOKINETICS

Well absorbed after PO administration. Metabolized in liver. Protein binding: 61%–65%. Peak plasma concentration: 2–4 hrs. Excreted in urine (80%), feces (14%), expired air (2.5%). Approximately 18% of dose removed by dialysis. **Half-life:** 27 hrs.

palpitations, weight loss. • Avoid alcohol. • Report signs of depression or suicidal ideation.

solifenacin

sol-i-**fen**-a-sin
(VESIcare)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Anticholinergic agent, muscarinic receptor antagonist. **CLINICAL:** Urinary antispasmodic.

USES

Treatment of overactive bladder with symptoms of urinary incontinence, urgency, frequency.

PRECAUTIONS

Contraindications: GI obstruction, uncontrolled narrow-angle glaucoma, urinary retention. **Cautions:** Bladder outflow obstruction, GI obstructive disorders, decreased GI motility, controlled narrow-angle glaucoma, renal/hepatic impairment, congenital or acquired QT prolongation, hypokalemia, hypomagnesemia, hot weather and/or exercise.

ACTION

Inhibits muscarinic receptors. **Therapeutic Effect:** Decreases urinary bladder contractions, increases residual urine volume, decreases detrusor muscle pressure.

PHARMACOKINETICS

Well absorbed following PO administration. Protein binding: 98%. Metabolized in liver. Excreted in urine (69%), feces (23%). **Half-life:** 40–68 hrs.

AVAILABILITY (Rx)

Injection, Powder for Reconstitution (Genotropin): 5 mg, 12 mg. **(Genotropin Miniquick):** 0.2 mg, 0.4 mg, 0.6 mg, 0.8 mg, 1 mg, 1.2 mg, 1.4 mg, 1.6 mg, 1.8 mg, 2 mg. **(Humatrope):** 6 mg, 12 mg, 24 mg. **(Nutropin):** 5 mg, 10 mg. **(Omnitrope):** 5.8 mg. **(Saizen):** 5 mg, 8.8 mg. **(Serostim):** 4 mg, 5 mg, 6 mg. **(Zorbitive):** 8.8 mg. **Injection Solution: (Norditropin):** 5 mg/1.5 ml, 10 mg/1.5 ml, 15 mg/1.5 ml. **(Nutropin AQ):** 5 mg/ml. **(Omnitrope):** 5 mg/1.5 ml, 10 mg/1.5 ml. **(Norditropin FlexPro Pen):** 5 mg/1.5 ml, 10 mg/1.5 ml, 30 mg/3 ml.

ADMINISTRATION/HANDLING

◀ALERT▶ Neonate: Benzyl alcohol as a preservative has been associated with fatal toxicity (gasping syndrome) in premature infants. Reconstitute with Sterile Water for Injection only. Use only 1 dose per vial. Discard unused portion.

Reconstitution

Genotropin, Genotropin Miniquick: Reconstitute with diluent provided.
Humatrope: Reconstitute with 1.5–5 ml diluent provided, swirl gently, do not shake.
Humatrope Cartridge: Dilute with solution provided with cartridge only.
Nutropin: Reconstitute each 5 mg with 1.5–5 ml diluent, swirl gently, do not shake.
Omnitrope: Reconstitute with diluents provided, swirl gently, do not shake.
Saigen: 5 mg: Reconstitute with 1–3 ml diluent provided, swirl gently, do not shake. 8.8 mg: Reconstitute with 2–3 ml diluent provided, swirl gently, do not shake.
Serostim: Reconstitute with Sterile Water for Injection.
Zorbitive: Reconstitute with 1–2 ml Bacteriostatic Water for Injection.

Storage

Long-term storage: Refrigerate all products except Zorbitive. Once reconstituted, Humatrope, Nutropin, Saigen, Zorbitive stable for 14 days, Genotropin for 21 days, Humatrope Cartridge for 28 days. **Genotropin Miniquick:** Refrigerate, use within 24 hrs.

INDICATIONS/ROUTES/DOSAGE

Growth Hormone Deficiency

Subcutaneous *(Genotropin, Omnitrope):* ADULTS: 0.04 mg/kg weekly divided into 6–7 equal doses/wk. May increase at 4- to 8-wk intervals to maximum of 0.08 mg/kg/wk. **CHILDREN:** 0.16–0.24 mg/kg weekly divided into daily doses.
Subcutaneous *(Humatrope):* ADULTS: 0.006 mg/kg once daily. May increase to maximum of 0.0125 mg/kg/day. **CHILDREN:** 0.18–0.3 mg/kg weekly divided into alternate-day doses or 6 doses/wk.
Subcutaneous *(Norditropin):* ADULTS: 0.004 mg/kg/day. May increase after 6 wks up to 0.016 mg/kg/day. **CHILDREN:** 0.024–0.036 mg/kg/dose 6–7 times/wk.
Subcutaneous *(Nutropin):* ADULTS: 0.006 mg/kg once daily. May increase to maximum of 0.025 mg/kg/day (younger than 35 yrs) or 0.0125/kg/day (35 yrs and older). **CHILDREN:** 0.3–0.7 mg/kg weekly divided into daily doses.
Subcutaneous *(Nutropin AQ):* ADULTS: 0.006 mg/kg once daily. May increase to maximum of 0.0125 mg/kg/day.
Subcutaneous *(Saizen):* ADULTS: 0.005 mg/kg/day. May increase up to 0.01 mg/kg/day after 4 wks. **CHILDREN:** 0.06 mg/kg 3 times/wk.

Chronic Renal Insufficiency

Subcutaneous *(Nutropin, Nutropin AQ):* CHILDREN: 0.35 mg/kg weekly divided into daily doses.

Turner's Syndrome

Subcutaneous *(Humatrope, Nutropin, Nutropin AQ):* CHILDREN: 0.375 mg/kg weekly divided into equal doses 3–7 times/wk. ***(Genotropin):*** 0.33 mg/kg weekly divided into 6–7 doses.

AIDS-Related Wasting

Subcutaneous *(Serostim):* ADULTS WEIGHING MORE THAN 55 KG: 6 mg once daily at bedtime. **ADULTS WEIGHING 45–55 KG:** 5 mg once daily at bedtime. **ADULTS**

INTERACTIONS

DRUG: **CYP3A4 inducers (e.g., carbamazepine, dexamethasone, phenobarbital, phenytoin, rifampin)** may decrease concentration. **HERBAL:** **St. John's wort** may decrease concentration. **FOOD:** **High-fat meals** decrease effectiveness. **LAB VALUES:** May increase serum lipase, amylase, bilirubin, alkaline phosphatase, transaminases. May decrease serum phosphorus, lymphocytes, WBCs, Hgb, Hct.

AVAILABILITY (Rx)

AVAILABILITY (Rx)

Solution, Oral: 5 mg/ml. **Tablets:** 80 mg (Betapace, Betapace AF, Sorine), 120 mg (Betapace, Betapace AF, Sorine), 160 mg (Betapace, Betapace AF, Sorine), 240 mg (Sorine).

ADMINISTRATION/HANDLING

PO

• Give without regard to food. • Give at same time each day.

INDICATIONS/ROUTES/DOSAGE

Ventricular Arrhythmias

PO ***(Betapace, Sorine, Sotylize):*** **ADULTS, ELDERLY:** Initially, 80 mg twice daily. May increase gradually at 2- to 3-day intervals. Range: 160–320 mg/day in 2–3 divided doses.

Atrial Fibrillation, Atrial Flutter

PO ***(Betapace AF, Sotylize):*** **ADULTS, ELDERLY:** 80 mg twice daily. May increase up to 160 mg twice daily.

Dosage in Renal Impairment

Dosage interval is modified based on creatinine clearance.

BETAPACE, SORINE

Creatinine Clearance	Dosage
31–60 ml/min	24 hrs
10–30 ml/min	36–48 hrs
Less than 10 ml/min	Individualized

BETAPACE AF

Creatinine Clearance	Dosage
Greater than 60 ml/min	12 hrs
40–60 ml/min	24 hrs
Less than 40 ml/min	Contraindicated

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Diminished sexual function, drowsiness, insomnia, asthenia. **Occasional:** Depression, cold hands/feet, diarrhea, constipation, anxiety, nasal congestion, nausea, vomiting. **Rare:** Altered taste, dry eyes, pruritus, paresthesia of fingers, toes, scalp.

ADVERSE EFFECTS/ TOXIC REACTIONS

Bradycardia, HF, hypotension, bronchospasm, hypoglycemia, prolonged QT interval, torsade de pointes, ventricular tachycardia, premature ventricular complexes may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Pt must be on continuous cardiac monitoring upon initiation of therapy. Do not administer without consulting physician if pulse is 60 beats/min or less. Assess creatinine clearance before dosing.

INTERVENTION/EVALUATION

Diligently monitor for arrhythmias. Assess B/P for hypotension, pulse for bradycardia. Assess for HF: dyspnea, peripheral edema, jugular vein distention, increased weight, rales in lungs, decreased urinary output.

PATIENT/FAMILY TEACHING

• Do not discontinue, change dose without physician approval. • Avoid tasks requiring alertness, motor skills until response to drug is established (may cause drowsiness). • Periodic lab tests, EKGs are essential part of therapy. • Report rapid heartbeat, chest pain, swelling of ankles/legs, difficulty breathing.

spironolactone

spir-**on**-oh-**lak**-tone
(Aldactone)

■ **BLACK BOX ALERT** ■ Has been shown to produce tumors in chronic toxicity studies.

Do not confuse Aldactone with Aldactazide.

FIXED-COMBINATION(S)

Aldactazide: spironolactone/hydrochlorothiazide (a thiazide diuretic): 25 mg/25 mg, 50 mg/50 mg.

HF

PO: ADULTS, ELDERLY: 12.5–25 mg/day adjusted based on pt response, evidence of hyperkalemia. **Maximum:** 50 mg.

Dosage in Renal Impairment

Dosage interval is modified based on creatinine clearance.

Creatinine Clearance	Dosage
31–50 ml/min	Decrease initial dose to 12.5 mg once daily
30 ml/min or less	Not recommended

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Hyperkalemia (in pts with renal insufficiency, those taking potassium supplements), dehydration, hyponatremia, lethargy. **Occasional:** Nausea, vomiting, anorexia, abdominal cramps, diarrhea, headache, ataxia, drowsiness, confusion, fever. **Male:** Gynecomastia, impotence, decreased libido. **Female:** Menstrual irregularities (amenorrhea, postmenopausal bleeding), breast tenderness. **Rare:** Rash, urticaria, hirsutism.

ADVERSE EFFECTS/ TOXIC REACTIONS

Severe hyperkalemia may produce arrhythmias, bradycardia, EKG changes (tented T waves, widening QRS complex, ST segment depression). May proceed to cardiac standstill, ventricular fibrillation. Cirrhosis pts at risk for hepatic decompensation if dehydration, hyponatremia occurs. Pts with primary aldosteronism may experience rapid weight loss, severe fatigue during high-dose therapy.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Weigh pt; initiate strict I&O. Evaluate hydration status by assessing mucous membranes, skin turgor. Obtain baseline serum electrolytes, renal/hepatic function, urinalysis. Assess for edema; note location, extent. Check baseline vital signs, note pulse rate/regularity.

INTERVENTION/EVALUATION

Monitor serum electrolyte values, esp. for increased potassium, BUN, creatinine. Monitor B/P. Monitor for hyponatremia: mental confusion, thirst, cold/clammy skin, drowsiness, dry mouth. Monitor for hyperkalemia: colic, diarrhea, muscle twitching followed by weakness/paralysis, arrhythmias. Obtain daily weight. Note changes in edema, skin turgor.

PATIENT/FAMILY TEACHING

• Expect increase in volume, frequency of urination. • Therapeutic effect takes several days to begin and can last for several days when drug is discontinued. This may not apply if pt is on a potassium-losing drug concomitantly (diet, use of supplements should be established by physician). • Report irregular or slow pulse, symptoms of electrolyte imbalance (see previous Intervention/Evaluation). • Avoid foods high in potassium, such as whole grains (cereals), legumes, meat, bananas, apricots, orange juice, potatoes (white, sweet), raisins. • Avoid alcohol. • Avoid tasks that require alertness, motor skills until response to drug is established (may cause drowsiness).

sucralfate

soo-**kral**-fate
(Apo-Sucralfate, Carafate, Novo-Sucralate)

Do not confuse Carafate with Cafergot, or sucralfate with salsalate.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Gastrointestinal agent. **CLINICAL:** Antiulcer.

USES

Short-term treatment (up to 8 wks) of duodenal ulcer. Maintenance therapy of duodenal ulcer after healing of acute ulcers.

sucroferric oxyhydroxide

soo-krow-**fer**-ik **ox**-ee-hye-**drox**-ide **(Velphoro)**

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Polymeric phosphate binder. **CLINICAL:** Electrolyte modifier, antihyperphosphatemia agent.

USES

Reduction of serum phosphorus levels in pts with chronic renal disease on dialysis.

PRECAUTIONS

Contraindications: None known. **Cautions:** Significant gastric/hepatic disorders, history of hemochromatosis or other diseases with iron accumulation, peritoneal dialysis with peritonitis, recent major GI surgery.

ACTION

Binds with dietary phosphorus in GI tract, allowing phosphorus to be eliminated through normal digestive process. **Therapeutic Effect:** Decreases serum phosphorus levels.

PHARMACOKINETICS

Not absorbed systemically. No physiologic process of metabolism/excretion.

S

Injection Solution: SMZ 80 mg and TMP 16 mg per ml. **Oral Suspension:** SMZ 200 mg and TMP 40 mg per 5 ml. **Tablets (Bactrim):** SMZ 400 mg and TMP 80 mg. **Tablets (Double Strength [Bactrim DS, Septra DS]):** SMZ 800 mg and TMP 160 mg.

ADMINISTRATION/HANDLING

INDICATIONS/ROUTES/DOSAGE

Ulcerative Colitis

PO: ADULTS, ELDERLY: Initially, 1 g 3–4 times/day in divided doses q4–6h. **Maximum:** 6 g/day. **Maintenance:** 2 g/day in divided doses at intervals less than or equal to q8h. **CHILDREN 6 YRS AND OLDER:** Initially, 40–60 mg/kg/day in 4–6 divided doses. **Maximum:** Initial dose: 4 g/day. **Maintenance:** 30 mg/kg/day in 4 divided doses at intervals less than or equal to q8h. **Maximum: Maintenance Dose:** 2 g/day.

Rheumatoid Arthritis (RA)

PO *(Delayed-Release Tablets):* ADULTS, ELDERLY: Initially, 0.5–1 g/day for 1 wk. Increase by 0.5 g/wk, up to 2 g/day in 2 divided doses. **Maximum:** 3 g/day.

Juvenile Rheumatoid Arthritis (JRA)

PO *(Delayed-Release Tablets):* CHILDREN: Initially, 10 mg/kg/day. May increase by 10 mg/kg/day at weekly intervals. Range: 30–50 mg/kg/day. **Maximum:** 2 g/day.

Dosage in Renal/Hepatic Impairment

Use with caution.

SIDE EFFECTS

Frequent (33%): Anorexia, nausea, vomiting, headache, oligospermia (generally reversed by withdrawal of drug). **Occasional (3%):** Hypersensitivity reaction (rash, urticaria, pruritus, fever, anemia). **Rare (Less Than 1%):** Tinnitus, hypoglycemia, diuresis, photosensitivity.

ADVERSE EFFECTS/ TOXIC REACTIONS

Anaphylaxis, Stevens-Johnson syndrome, hematologic toxicity (leukopenia, agranulocytosis), hepatotoxicity, nephrotoxicity occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for hypersensitivity to medications. Check initial urinalysis, CBC, serum renal function, LFT.

INTERVENTION/EVALUATION

Monitor I&O, urinalysis, renal function tests; ensure adequate hydration (minimum output 1,500 ml/24 hrs) to prevent nephrotoxicity. Assess skin for rash (discontinue drug, notify physician at first sign). Monitor daily pattern of bowel activity, stool consistency. (Dosage increase may be needed if diarrhea continues, recurs.) Monitor CBC closely; assess for and report immediately any hematologic effects (bleeding, ecchymoses, fever, pharyngitis, pallor, weakness, purpura). Monitor LFT; observe for jaundice.

PATIENT/FAMILY TEACHING

• May cause orange-yellow discoloration of urine, skin. • Space doses evenly around the clock. • Take after or with food with 8 oz of water; drink several glasses of water between meals. • Swallow enteric-coated tablets whole; do not chew, crush, dissolve, or divide tablets. • Continue for full length of treatment; may be necessary to take drug even after symptoms relieved. • Routinely monitor blood levels. • Inform dentist, surgeon of sulfasalazine therapy. • Avoid exposure to sun, ultraviolet light until photosensitivity determined (may last for mos after last dose).

sulindac

sul-**in**-dak
(Apo-Sulin, Novo-Sundac)

■ **BLACK BOX ALERT** ■ Increased risk of serious cardiovascular thrombotic events, including myocardial infarction, CVA. Increased risk of severe GI reactions, including ulceration, bleeding, perforation of stomach, intestines.

Do not confuse Clinoril with Cleocin or Clozaril.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: NSAID.
CLINICAL: Anti-inflammatory, antigout.

ADVERSE EFFECTS/ TOXIC REACTIONS

Rare reactions with long-term use include peptic ulcer disease, GI bleeding, gastritis, nephrotoxicity (glomerular nephritis, interstitial nephritis, nephrotic syndrome), severe hepatic reactions (cholestasis, jaundice), severe hypersensitivity reactions (fever, chills, joint pain).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline renal function, LFT. Assess onset, type, location, duration of pain, fever, inflammation. Inspect affected joints for immobility, deformities, skin condition.

INTERVENTION/EVALUATION

Assist with ambulation if dizziness occurs. Monitor daily pattern of bowel activity, stool consistency. Assess for evidence of rash. Evaluate for therapeutic response (relief of pain, stiffness, swelling; increased joint mobility; reduced joint tenderness; improved grip strength). Monitor serum hepatic/renal function, CBC, platelets.

PATIENT/FAMILY TEACHING

• Therapeutic antiarthritic effect noted 1–3 wks after therapy begins. • Avoid aspirin, alcohol during therapy (increases risk of GI bleeding). • Take with food, milk if GI upset occurs. • Avoid tasks that require alertness, motor skills until response to drug is established (may cause dizziness).

S

sumatriptan

soo-ma-**trip**-tan
(Alsuma, Apo-Sumatriptan, Imitrex, Sumavel DosePro, Zecuity)
Do not confuse sumatriptan with saxagliptin, sitagliptin, somatropin, or zolmitriptan.

FIXED-COMBINATION(S)

Treximet: sumatriptan/naproxen (an NSAID): 85 mg/500 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Serotonin 5-HT_1 receptor agonist. **CLINICAL:** Antimigraine.

USES

PO, Subcutaneous, Intranasal, Transdermal: Acute treatment of migraine headache with or without aura. **Subcutaneous:** Treatment of cluster headaches.

PRECAUTIONS

Contraindications: Management of hemiplegic or basilar migraine, peripheral vascular disease, CVA, ischemic heart disease (including angina pectoris, history of MI, silent ischemia, Prinzmetal's angina), severe hepatic impairment, transient ischemic attack, uncontrolled hypertension, MAOI use within 14 days, use within 24 hrs of ergotamine preparations or another 5-HT_1 agonist. **Cautions:** Hepatic impairment, history of seizure disorder, controlled hypertension, elderly.

ACTION

Binds selectively to serotonin receptors in cranial arteries, producing vasoconstrictive effect on cranial blood vessels. **Therapeutic Effect:** Relieves migraine headache.

PHARMACOKINETICS

Route	Onset	Peak	Duration
Nasal	15 min	N/A	24–48 hrs
PO	30 min	2 hrs	24–48 hrs
Subcutaneous	10 min	1 hr	24–48 hrs

Rapidly absorbed after subcutaneous administration. Absorption after PO administration is incomplete; significant amounts undergo hepatic metabolism, resulting in low bioavailability (about 14%). Protein binding: 10%–21%. Widely distributed. Undergoes first-pass metabolism in liver. Excreted in urine. **Half-life:** 2 hrs.

ADVERSE EFFECTS/ TOXIC REACTIONS

Excessive dosage may produce tremors, redness of extremities, reduced respirations, cyanosis, seizures, paralysis. Serious arrhythmias occur rarely, esp. in pts with hypertension, obesity, smokers, diabetes, strong family history of coronary artery disease. Serotonin syndrome may occur (agitation, confusion, hallucinations, hyperreflexia, myoclonus, shivering, tachycardia).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of peripheral vascular disease, renal/hepatic impairment, possibility of pregnancy. Question regarding onset, location, duration of migraine, possible precipitating symptoms.

INTERVENTION/EVALUATION

Evaluate for relief of migraine headache and resulting photophobia, phonophobia (sound sensitivity), nausea, vomiting.

PATIENT/FAMILY TEACHING

• Follow proper technique for loading of autoinjector, injection technique, discarding of syringe. • Do not use more than 2 injections during any 24-hr period and allow at least 1 hr between injections. • Report immediately if wheezing, palpitations, skin rash, facial swelling, pain/tightness in chest/throat occur.

S

sunitinib

HIGH ALERT

soo-**nit**-in-ib
(Sutent)

■ **BLACK BOX ALERT** ■ Hepatotoxicity may be severe and/or result in fatal liver failure.

Do not confuse sunitinib with imatinib or sorafenib.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tyrosine kinase inhibitor, vascular endothelial growth factor. **CLINICAL:** Antineoplastic.

USES

Treatment of GI stromal tumor after disease progression while on or demonstrating intolerance to imatinib. Treatment of advanced renal cell carcinoma. Treatment of pancreatic neuroendocrine tumor (PNET). **OFF-LABEL:** Non-GI stromal tumor, soft tissue sarcomas, advanced thyroid cancer.

PRECAUTIONS

Contraindications: None known. **Cautions:** Cardiac dysfunction, bradycardia, electrolyte imbalance, bleeding tendencies, hypertension, history of prolonged QT interval, medications that prolong QT interval, concurrent use of strong CYP3A4 inducers or inhibitors, HF, renal/hepatic impairment.

ACTION

Inhibitory action against multiple kinases, growth factor receptors, stem cell factor receptors, colony-stimulating factor receptors, glial cell-line neurotrophic factor receptors. **Therapeutic Effect:** Prevents tumor cell growth, produces tumor regression, inhibits metastasis.

PHARMACOKINETICS

Metabolized in liver. Protein binding: 95%. Excreted in feces (61%), urine (16%). **Half-life:** 40–60 hrs.

recently received live virus vaccine. • Do not have immunizations without physician's approval (drug lowers resistance). • Avoid pregnancy; use effective contraceptive measures. • Promptly report fever, unusual bruising/bleeding from any site.

suvorexant

soo-voe-**rex**-ant
(Belsomra)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Orexin receptor antagonist. **CLINICAL:** Sedative-hypnotic.

USES

Treatment of insomnia, characterized by difficulties with sleep onset and/or sleep maintenance.

PRECAUTIONS

Contraindications: History of narcolepsy. **Cautions:** History of COPD, depression, debilitation, drug dependency, obstructive sleep apnea, respiratory disease, pts at high risk of suicide; concomitant use of CNS depressants, CYP3A4 inhibitors. Concomitant use of other insomnia medications not recommended.

ACTION

Suppresses wake drive of the orexin neuropeptide signaling system, the central promoter of wakefulness. Blocks binding of orexin neuropeptides orexin A and orexin B to receptors of OX1R and OX2R. **Therapeutic Effect:** Induces sleep with fewer nighttime awakenings; improves sleep pattern.

PHARMACOKINETICS

Rapidly absorbed. Metabolized in liver. Protein binding: greater than 99%. Peak plasma concentration: 2 hrs. Eliminated in feces (66%), urine (23%). **Half-life:** 12 hrs.

Generic Drugs T

tacrolimus
tadalafil
tamoxifen
tamsulosin
tapentadol
tedizolid
teduglutide
telavancin
telmisartan
temazepam
temozolomide
temsirolimus
tenecteplase
tenofovir
terazosin
terbinafine
terbutaline
teriflunomide
teriparatide
testosterone
tetracycline
thalidomide
theophylline
thiamine (vitamin B_1)
thioridazine
thiotepa
thiothixene
tiagabine
ticagrelor
tigecycline
tiludronate
timolol
tiotropium
tipranavir
tizanidine
tobramycin
tocilizumab
tofacitinib
tolterodine
tolvaptan
topiramate
topotecan
toremifene
torsemide
tramadol
trametinib
tranylcypromine
trastuzumab
trazodone
treprostinil
tretinoin
triamcinolone
triamcinolone acetonide
triamcinolone hexacetonide
triamterene
trifluoperazine
trihexyphenidyl
trimethoprim
triptorelin
trospium

nephrotoxic drugs (e.g., cyclosporine). Concurrent use of strong CYP3A4 inhibitors or inducers. Pts at risk for pure red cell aplasia (e.g., concurrent use of mycophenolate); pts at risk for QT prolongation, hypokalemia, hypomagnesemia. **Topical:** Exposure to sunlight.

ACTION

Inhibits T-lymphocyte activation by binding to intracellular proteins, forming a complex, inhibiting phosphatase activity. **Therapeutic Effect:** Suppresses immunologically mediated inflammatory response; prevents organ transplant rejection.

PHARMACOKINETICS

Variably absorbed after PO administration (food reduces absorption). Protein binding: 99%. Metabolized in liver. Primarily eliminated in feces. Not removed by hemodialysis. **Half-life:** 21–61 hrs.

Atopic Dermatitis

Topical: ADULTS, ELDERLY, CHILDREN 15 YRS AND OLDER: Apply 0.03% or 0.1% ointment to affected area twice daily. **CHILDREN 2–15 YRS:** Use 0.03% ointment. Continue treatment for 1 wk after symptoms have resolved. If no improvement within 6 wks, re-examine to confirm diagnosis.

SIDE EFFECTS

Frequent (greater than 30%): Headache, tremor, insomnia, paresthesia, diarrhea, nausea, constipation, vomiting, abdominal pain, hypertension. **Occasional (29%–10%):** Rash, pruritus, anorexia, asthenia, peripheral edema, photosensitivity.

ADVERSE EFFECTS/ TOXIC REACTIONS

Nephrotoxicity (characterized by increased serum creatinine, decreased urinary output), neurotoxicity (tremor, headache, altered mental status), pleural effusion occur commonly. Thrombocytopenia, leukocytosis, anemia, atelectasis, sepsis, infection occur occasionally.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess medical history, esp. renal function; medication history, use of other immunosuppressants. Have aqueous solution of epinephrine 1:1,000, O_2 available at bedside before beginning IV infusion. Assess pt continuously for first 30 min following start of infusion and at frequent intervals thereafter.

INTERVENTION/EVALUATION

Closely monitor pts with renal impairment. Monitor lab values, esp. serum creatinine, potassium levels, CBC with differential, LFT. Monitor I&O closely. CBC should be performed weekly during first mo of therapy, twice monthly during second and third mos of treatment, then monthly throughout the first yr. Report any major change in pt assessment.

PATIENT/FAMILY TEACHING

• Take dose at same time each day. • Avoid crowds, those with infection. • Report decreased urination, chest pain, headache, dizziness, respiratory infection, rash, unusual bleeding/bruising. • Avoid exposure to sun, artificial light (may cause photosensitivity reaction). • Do not take within 2 hrs of taking antacids. Do not take with grapefruit products.

tadalafil

TOP 100

ta-**dal**-a-fil
(Adcirca, Cialis)
Do not confuse Adcirca with Advair or Advicor, or tadalafil with sildenafil or vardenafil.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Phosphodiesterase type 5 inhibitor. **CLINICAL:** Erectile dysfunction adjunct.

USES

Cialis: Treatment of erectile dysfunction (ED). Treatment of benign prostatic hyperplasia (BPH). Simultaneous treatment of ED and BPH. **Adcirca:** Treatment of pulmonary arterial hypertension (PAH).

PRECAUTIONS

Contraindications: Concurrent use of nitrates in any form. **Cautions:** Concurrent use of alpha-adrenergic blockers, renal/hepatic impairment (not recommended in pts with severe hepatic impairment or cirrhosis), anatomical deformation of penis, pts who may be predisposed to priapism (sickle cell anemia, multiple myeloma, leukemia), left ventricular outflow obstruction (e.g., aortic stenosis), bleeding disorders, peptic ulcer, elderly, concurrent use of strong CYP3A4 inducers/inhibitors.

T

PAH (Adcirca)

Creatinine clearance 31–80 ml/min: Initially, 20 mg daily. May increase to 40 mg based on tolerance. Avoid use if creatinine clearance less than 31 ml/min.

Dosage in Hepatic Impairment

Erectile dysfunction (Cialis)

Pts with Child-Pugh class A or B hepatic impairment (use with caution) should take no more than 10 mg once daily. Not recommended in severe hepatic impairment.

BPH

Mild to moderate impairment: Use caution. **Severe impairment:** Not recommended.

PAH

Mild to moderate impairment: Use caution. **Severe impairment:** Avoid use.

SIDE EFFECTS

Occasional: Headache, dyspepsia, back pain, myalgia, nasal congestion, flushing, sudden hearing loss, visual field loss, postural hypotension.

ADVERSE EFFECTS/ TOXIC REACTIONS

Prolonged erections (lasting over 4 hrs), priapism (painful erections lasting over 6 hrs) occur rarely. Angina, chest pain, MI have been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess cardiovascular status before initiating treatment for erectile dysfunction. Obtain baseline renal function, LFT. Screen for use of nitrate-based medications.

INTERVENTION/EVALUATION

Monitor B/P. Assess quality of sexual activity.

PATIENT/FAMILY TEACHING

• Has no effect in absence of sexual stimulation. • Seek treatment immediately if erection persists for over 4 hrs. • Report sudden decrease or loss of hearing or vision. • Avoid alcohol (may increase risk of postural hypotension). • Slowly go from lying to standing. • Do not ingest grapefruit products.

tamoxifen

HIGH ALERT

ta-**mox**-fen
(Apo-Tamox, Nolvadex-D, Soltamox)

■ **BLACK BOX ALERT** ■ Serious, possibly life-threatening stroke, pulmonary emboli, uterine malignancy (endometrial adenocarcinoma, uterine sarcoma) have occurred.

Do not confuse tamoxifen with pentoxifylline, tamsulosin, or temazepam.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Nonsteroidal antiestrogen. **CLINICAL:** Antineoplastic.

USES

Adjunct treatment in advanced breast cancer after primary treatment with surgery and radiation, reduce risk of breast cancer in women at high risk, reduce risk of invasive breast cancer in women with ductal carcinoma *in situ* (DCIS), metastatic breast cancer in women and men. **OFF-LABEL:** Induction of ovulation, treatment of desmoid tumors. Treatment of mastalgia, gynecomastia; ovarian, endometrial cancer; uterine sarcoma; precocious puberty in females; risk reduction in women with Paget's disease of breast.

PRECAUTIONS

Contraindications: Concomitant coumarin-type therapy when used in treatment of breast cancer in high-risk women, history of deep vein thrombosis (DVT) or pulmonary embolism (in high-risk women for breast cancer and in women with DCIS). **Cautions:** Leukopenia, thrombocytopenia, pregnancy, history of thromboembolic events, hyperlipidemia, concomitant drug therapy affecting CYP and Pgp (hepatic) metabolic pathways.

serum calcium levels should be checked before and periodically during therapy.

INTERVENTION/EVALUATION

Be alert to increased bone pain; ensure adequate pain relief. Monitor I&O, weight. Observe for edema, esp. of dependent areas, signs and symptoms of DVT. Assess for hypercalcemia (increased urinary volume, excessive thirst, nausea, vomiting, constipation, hypotonicity of muscles, deep bone/flank pain, renal stones).

PATIENT/FAMILY TEACHING

• Report vaginal bleeding/discharge/itching, leg cramps, weight gain, shortness of breath, weakness. • May initially experience increase in bone, tumor pain (appears to indicate good tumor response). • Report persistent nausea, vomiting. • Nonhormonal contraceptives are recommended during treatment.

tamsulosin

tam-**soo**-loe-sin
(Flomax, Ava-Tamsulosin)
Do not confuse Flomax with Flonase, Flovent, Foltx, Fosamax, or Volmax, or tamsulosin with tamoxifen or terazosin.

FIXED-COMBINATION(S)

Jalyn: tamsulosin/dutasteride (an androgen hormone inhibitor): 0.4 mg/0.5 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: $Alpha_1$-adrenergic blocker. **CLINICAL:** Benign prostatic hyperplasia agent.

USES

Treatment of symptoms of benign prostatic hyperplasia (BPH), alone or in combination with dutasteride (Avodart). **OFF-LABEL:** Treatment of bladder outlet obstruction or dysfunction. Facilitate expulsion of ureteral stones.

PRECAUTIONS

Contraindications: None known. **Cautions:** Concurrent use of phosphodiesterase (PDE5) inhibitors (sildenafil, tadalafil, vardenafil), pts with orthostatic hypotension.

ACTION

Antagonist of alpha receptors in prostate. **Therapeutic Effect:** Relaxes smooth muscle, in bladder neck and prostate, improves urinary flow, symptoms of prostatic hyperplasia.

PHARMACOKINETICS

Well absorbed, widely distributed. Protein binding: 94%–99%. Metabolized in liver. Primarily excreted in urine. Unknown if removed by hemodialysis. **Half-life:** 9–13 hrs.

ACTION

Binds to mu-opioid receptors in the central nervous system, causing inhibition of ascending pain pathways; increases norepinephrine by inhibiting its reabsorption into nerve cells. **Therapeutic Effect:** Produces analgesia.

PHARMACOKINETICS

Metabolized in liver. Primarily excreted in the urine. Widely distributed. Protein binding: 20%. **Half-life:** 4 hrs.

PO
- Give without regard to meal.

IV INCOMPATIBILITIES

Any solutions containing divalent cations (e.g., Ca^{2+}, Mg^{2+}), lactated Ringer's injection. Do not infuse with other medications.

INDICATIONS/ROUTES/DOSAGE

Acute Bacterial Skin and Skin Structure Infection

PO/IV: ADULTS, ELDERLY: 200 mg once daily for 6 days.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional (8%–3%): Nausea, headache, diarrhea, vomiting. **Rare (2%):** Dizziness, dermatitis, insomnia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Safety and efficacy in pts with neutropenia not established. Antibacterial activity may be reduced in the absence of granulocytes. *C. difficile*–associated diarrhea with severity ranging from mild diarrhea to fatal colitis has been reported for up to 2 mos following administration. Treatment in the absence of proven or strongly suspected bacterial infection may increase risk of drug-resistant bacteria. Infusion/hypersensitivity reactions (pruritus, urticaria, flushing, hypertension palpitation, tachycardia), optic disorders (asthenopia, blurry vision, neuropathy, visual impairment, vitreous floaters), neurologic disorders (hypoesthesia, paresthesia, peripheral neuropathy, cranial nerve VII paralysis), infections (oral candidiasis, vulvovaginal mycotic infection) occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC (note WBC, bands), wound culture/sensitivity, vital signs. Question history of recent *C. difficile* infection, hypersensitivity reaction. Assess skin wound characteristics; hydration status. Question pt's usual stool characteristics (color, frequency, consistency).

INTERVENTION/EVALUATION

Monitor skin infection/wound for improvement. Monitor daily pattern of bowel activity, stool consistency; increasing severity may indicate antibiotic-associated colitis. If frequent diarrhea occurs, obtain *C. difficile* toxin screen and initiate isolation precautions until result confirmed. Encourage PO intake. Monitor I&O. Monitor for infusion-related/hypersensitivity reaction.

PATIENT/FAMILY TEACHING

- It is essential to complete drug therapy despite symptom improvement. Early discontinuation may result in antibacterial resistance or an increased risk of recurrent infection. • Report episodes of diarrhea, esp. following weeks after treatment completion. Frequent abdominal pain, blood-streaked stool, diarrhea, fever, may indicate *C. difficile* infection, which may be contagious. • Drink plenty of fluids.

teduglutide

te-due-**gloo**-tide
(Gattex)
Do not confuse teduglutide with liraglutide or albiglutide, or Gattex with Gas-X.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Human glucagon-like peptide-II. **CLINICAL:** Short bowel syndrome (short gut syndrome, short gut) agent.

neoplastic growth. Cholecystitis, cholangitis, cholelithiasis, pancreatitis has been reported.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline serum chemistries, LFT, lipase, amylase. Colonoscopy (or alternate imaging) with removal of polyps should be completed within 5 mos prior to initiating treatment.

INTERVENTION/EVALUATION

Follow-up colonoscopy (or alternate imaging) is recommended at the end of 1 year. If no polyp is found, subsequent colonoscopies should be done no less frequently than every 5 years. If a polyp is found, adherence to current polyp follow-up guidelines is recommended. Discovery of intestinal obstruction, intestinal malignancy necessitates discontinuation of treatment. Subsequent laboratory assessments, LFT is recommended every 6 mos. If clinically meaningful elevation is seen, further diagnostic workup is recommended as clinically indicated.

PATIENT/FAMILY TEACHING

• Teach proper use and administration of medication. • Be aware of need for any new supplies. • Instruct pt in preparation of medication and observe correct administration technique. • Report yellowing of skin or eyes, dark urine, changes in stool color or consistency, severe abdominal pain, nausea, vomiting, sudden weight gain, swelling, or difficulty breathing.

telavancin

tel-a-**van**-sin
(Vibativ)

■ **BLACK BOX ALERT** ■ Pts with pre-existing renal impairment (CrCl less than 50 mL/min) who are treated for hospital-acquired pneumonia may have increased mortality risk when compared to vancomycin. May cause new or worsening renal impairment. May cause fetal harm (low birth weight, limb malformations). Women of childbearing potential should have pregnancy test before treatment; avoid use during pregnancy unless benefit to pt outweighs fetal risk.

Do not confuse telavancin with dalbavancin or oritavancin; or Vibativ with Vibra-Tabs or vigabatrin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Lipoglycopeptide antibacterial. **CLINICAL:** Antibiotic.

USES

Treatment of complicated skin, soft tissue infections caused by gram-positive microorganisms, including methicillin-susceptible or methicillin-resistant *S. aureus*, vancomycin-susceptible *Enterococcus*. Treatment of hospital-acquired and ventilator-associated bacterial pneumonia caused by susceptible isolates of *S. aureus*.

PRECAUTIONS

Contraindications: Prior hypersensitivity reactions to telavancin. **Cautions:** Renal impairment, concurrent therapy with other nephrotoxic medications (e.g., NSAIDs, ACE inhibitors, aminoglycosides). Avoid use in pts with history of congenital QT syndrome, known prolongation of QT interval, uncompensated HF, severe left ventricular hypertrophy, or receiving treatment with other drugs known to prolong QT interval, hypokalemia, hypomagnesemia, known vancomycin hypersensitivity.

ACTION

Inhibits bacterial cell wall synthesis by blocking polymerization and cross-linking of peptidoglycan. Disrupts membrane potential and changes cell wall permeability. **Therapeutic Effect:** Bactericidal. Antibiotic.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain pregnancy test prior to treatment. Obtain baseline serum BUN, creatinine, creatinine clearance prior to initiating therapy, every 48–72 hrs, and after treatment is completed. Obtain culture and sensitivity tests before giving first dose (therapy may begin before results are known).

INTERVENTION/EVALUATION

Monitor renal function tests, I&O. Assess skin for rash. Avoid rapid infusion ("red-man syndrome"). Monitor daily pattern of bowel activity, stool consistency. Obtain *C. Difficile* PCR test if diarrhea occurs.

PATIENT/FAMILY TEACHING

• Use effective contraception during treatment. • Report rash, signs/symptoms of nephrotoxicity, diarrhea. • Blood levels will be monitored routinely.

telmisartan

tel-mi-**sar**-tan
(Micardis)

■ **BLACK BOX ALERT** ■ May cause fetal injury, mortality if used during second or third trimester of pregnancy.

FIXED-COMBINATION(S)

Micardis HCT: telmisartan/hydrochlorothiazide (a diuretic): 40 mg/12.5 mg, 80 mg/12.5 mg. **Twynsta:** telmisartan/amlodipine (a calcium channel blocker): 40 mg/5 mg, 40 mg/10 mg, 80 mg/5 mg, 80 mg/10 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Angiotensin II receptor antagonist. **CLINICAL:** Antihypertensive.

USES

Treatment of hypertension alone or in combination with other antihypertensives. Reduces risk of stroke, MI, death in pts 55 yrs of age or older with cardiovascular abnormalities (e.g., coronary artery disease, high-risk diabetes mellitus).

PRECAUTIONS

Contraindications: Concurrent use with aliskiren in pts with diabetes. **Cautions:** Hypovolemia, hepatic/renal impairment, renal artery stenosis (unilateral, bilateral), biliary obstructive disease, significant aortic/mitral stenosis. Concurrent use with ramipril not recommended. Avoid potassium supplements.

ACTION

Blocks vasoconstrictor and aldosterone-secreting effects of angiotensin II, inhibiting binding of angiotensin II to AT_1 receptors. **Therapeutic Effect:** Causes vasodilation, decreases peripheral resistance, decreases B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO (reduce B/P)	1–2 hrs	—	24 hrs

Rapidly, completely absorbed after PO administration. Protein binding: greater than 99%. Metabolized in liver. Excreted in feces. Unknown if removed by hemodialysis. **Half-life:** 24 hrs.

T

ACTION

Enhances action of inhibitory neurotransmitter gamma-aminobutyric acid (GABA), resulting in CNS depression. **Therapeutic Effect:** Induces sleep.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 96%. Widely distributed. Crosses blood-brain barrier. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 9.5–12.4 hrs.

days of 28-day treatment cycle. Subsequent doses of 100–200 mg/m²/day based on platelet count, absolute neurophil count (ANC) during previous cycle. **ANC greater than 1,500 per microliter and platelets more than 100,000 mm³ Maintenance:** 200 mg/m²/day for 5 days q4wks. Continue until disease progression is observed. Minimum: 100 mg/m²/day for 5 days q4wks.

Glioblastoma Multiforme

IV Infusion, PO: ADULTS, ELDERLY: 75 mg/m² daily for 42 days. **Maintenance: (Cycle 1):** 150 mg/m² once daily for 5 days followed by 23 days without treatment. **(Cycles 2–6):** May increase to 200 mg/m² once daily for 5 days followed by 23 days without treatment if ANC greater than 1,500/mm³, platelets greater than 100,000/mm³, and nonhematologic toxicity with previous cycle.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (53%–33%): Nausea, vomiting, headache, fatigue, constipation, seizure. **Occasional (16%–10%):** Diarrhea, asthenia, fever, dizziness, peripheral edema, incoordination, insomnia. **Rare (9%–5%):** Paresthesia, drowsiness, anorexia, urinary incontinence, anxiety, pharyngitis, cough.

ADVERSE EFFECTS/ TOXIC REACTIONS

Myelosuppression is characterized by neutropenia and thrombocytopenia, with elderly and women showing higher incidence of developing severe myelosuppression. Usually occurs within first few cycles; is not cumulative. Nadir occurs in approximately 26–28 days, with recovery within 14 days of nadir. May increase occurrence of pneumocystis carinii pneumonia, myelodysplastic syndrome including myeloid leukemia, or secondary malignancies.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC. Before dosing, ANC must be greater than 1,500/mm³ and platelet count greater than 100,000/mm³. Potential for nausea, vomiting (readily controlled with antiemetic therapy).

INTERVENTION/EVALUATION

Obtain CBC on day 22 (21 days after first dose) or within 48 hrs of that day, and weekly, until ANC is greater than 1,500/mm³ and platelet count is greater than 100,000/mm³. Monitor for hematologic toxicity (fever, sore throat, signs of local infection, unusual bruising/bleeding from any site), symptoms of anemia (excessive fatigue, weakness).

PATIENT/FAMILY TEACHING

• To reduce nausea/vomiting, take on an empty stomach. • Promptly report fever, sore throat, signs of local infection, unusual bruising/bleeding from any site, or difficulty breathing. • Avoid crowds, those with infection. • Do not have immunizations without physician's approval. • Avoid pregnancy.

temsirolimus

HIGH ALERT

tem-sir-**oh**-li-mus
(Torisel)
Do not confuse temsirolimus with everolimus, sirolimus, or tacrolimus.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Kinase inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of advanced renal cell carcinoma.

PRECAUTIONS

Contraindications: Moderate-severe hepatic impairment; bilirubin greater than

Dosage with Concomitant CYP3A4 Inhibitors/Inducers

Inhibitors: Consider dosage of 12.5 mg/wk. **Inducers:** Consider dosage of 50 mg/wk.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Mild impairment: Reduce dose to 15 mg/wk. **Moderate to severe impairment:** Contraindicated.

SIDE EFFECTS

Common (51%–32%): Asthenia, rash, mucositis, nausea, edema (facial edema, peripheral edema), anorexia. **Frequent (28%–20%):** Generalized pain, dyspnea, diarrhea, cough, fever, abdominal pain, constipation, back pain, impaired taste. **Occasional (19%–8%):** Weight loss, vomiting, pruritus, chest pain, headache, nail disorder, insomnia, nosebleed, dry skin, acne, chills, myalgia.

ADVERSE EFFECTS/ TOXIC REACTIONS

UTI occurs in 15% of pts, hypersensitivity reaction in 9%, pneumonia in 8%, upper respiratory tract infection, hypertension, conjunctivitis in 7%.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question possibility of pregnancy. Obtain baseline CBC, serum chemistries, renal function, LFT routinely thereafter.

INTERVENTION/EVALUATION

Offer antiemetics to control nausea, vomiting. Monitor daily pattern of bowel frequency, stool consistency. Assess skin for evidence of rash, edema. Monitor CBC, particularly Hgb, platelets, neutrophil count; LFT, renal function tests. Monitor for shortness of breath, fatigue, hypertension. Assess oropharynx for stomatitis, mucositis.

PATIENT/FAMILY TEACHING

• Avoid crowds, those with known infection. • Avoid contact with anyone who recently received live virus vaccine. • Do not have immunizations without physician's approval (drug lowers body resistance). • Promptly report fever, unusual bruising/bleeding from any site.

tenecteplase

HIGH ALERT

ten-**eck**-te-plase

(TNKase)

Do not confuse TNKase with tPA.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tissue plasminogen activator. **CLINICAL:** Thrombolytic.

USES

Management of ST-elevation myocardial infarction (STEMI) for lysis of thrombi to restore perfusion and reduce mortality.

PRECAUTIONS

Contraindications: Active internal bleeding, cerebral aneurysm, AV malformation, bleeding diathesis, history of CVA, intracranial or intraspinal surgery or trauma within past 2 mos, intracranial neoplasm, severe uncontrolled hypertension. **Cautions:** Recent major surgery, GI or genitourinary (GU) bleeding, trauma, acute pericarditis, subacute bacterial endocarditis, pregnancy, severe hepatic impairment, hemorrhagic ophthalmic conditions, concurrent use of anticoagulants, elderly, cerebrovascular disease, hemostatic defects.

ACTION

Produced by recombinant DNA that binds to fibrin and converts plasminogen to plasmin. Initiates fibrinolysis by degrading fibrin clots, fibrinogen, other plasma

contraindications (e.g., history of CVA, bleeding of any kind, uncontrolled hypertension).

INTERVENTION/EVALUATION

Monitor continuous EKG for arrhythmias, B/P, pulse, respirations q15min until stable, then hourly or per protocol. Check peripheral pulses, heart and lung sounds. Monitor for chest pain relief; notify physician of continuation/recurrence (note location, type, intensity). Assess for overt or occult blood in any body substance. Monitor aPTT per protocol. Maintain B/P. Avoid any trauma that might increase risk of bleeding (e.g., injections, shaving). Assess neurologic status with vital signs.

tenofovir

TOP 100

ten-**oh**-foe-veer
(Viread)

■ **BLACK BOX ALERT** ■ Lactic acidosis, severe hepatomegaly with steatosis (fatty liver), including fatalities, have occurred.

FIXED-COMBINATION(S)

Atripla: tenofovir/efavirenz/emtricitabine (antiretroviral agents): 300 mg/600 mg/200 mg. **Complera:** tenofovir/emtricitabine/rilpivirine (antiretroviral agents): 300 mg/200 mg/25 mg. **Stribild:** tenofovir/elvitegravir (an integrase inhibitor)/cobicistat (a pharmacokinetic enhancer)/emtricitabine (a nucleoside reverse transcriptase inhibitor): 300 mg/150 mg/150 mg/200 mg. **Truvada:** tenofovir/emtricitabine (an antiretroviral agent): 300 mg/200 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Nucleotide analogue (reverse transcriptase inhibitor). **CLINICAL:** Antiretroviral.

USES

Treatment of HIV-1 infection in combination with at least two other antiretroviral agents. Treatment of chronic hepatitis B in pts with hepatic disease.

PRECAUTIONS

Contraindications: None known. **Cautions:** Hepatic/renal impairment, pts at risk for hepatic disease (e.g., obesity); concurrent nephrotoxic medications, concomitant strong CYP3A4 inhibitors/inducers; elderly.

ACTION

Inhibits HIV reverse transcriptase by interfering with HIV viral RNA–dependent DNA polymerase. Inhibits replication of hepatitis B virus (HBV) by inhibiting HBV polymerase. **Therapeutic Effect:** Slows HIV replication, reduces HIV RNA levels (viral load). Inhibits HBV replication.

PHARMACOKINETICS

Bioavailability in fasted pts is approximately 25%. High-fat meals increase bioavailability. Protein binding: 0.7%–7.2%. Excreted in urine. Removed by hemodialysis. **Half-life:** 17 hrs.

T

ACTION

Blocks alpha-adrenergic receptors. Produces vasodilation, decreases peripheral resistance. Relaxes smooth muscle of bladder neck. **Therapeutic Effect:** In hypertension, decreases B/P. In benign prostatic hyperplasia (BPH), reduces bladder outlet obstruction, improves urinary flow.

PHARMACOKINETICS

Rapidly, completely absorbed from GI tract. Protein binding: 90%–94%. Metabolized in liver. Eliminated in urine (40%), feces (60%). Not removed by hemodialysis. **Half-life:** 9.2–12 hrs.

Onychomycosis

PO: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 250 mg/day for 6 wks (fingernails) or 12 wks (toenails).

Tinea Versicolor

Topical Solution: ADULTS, ELDERLY: Apply to the affected area twice daily for 7 days.

Tinea Capitis

PO: CHILDREN 4 YRS AND OLDER: (Use granules). **WEIGHING GREATER THAN 35 KG:** 250 mg once daily. **WEIGHING 25–35 KG:** 187.5 mg once daily. **WEIGHING LESS THAN 25 KG:** 125 mg once daily.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Not recommended.

SIDE EFFECTS

Frequent (13%): PO: Headache. **Occasional (6%–3%): PO:** Abdominal pain, flatulence, urticaria, visual disturbance. **Rare: PO:** Diarrhea, rash, dyspepsia, pruritus, altered taste, nausea. **Topical:** Irritation, burning, pruritus, dryness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hepatobiliary dysfunction (including cholestatic hepatitis), serious skin reactions, severe neutropenia occur rarely. Ocular lens, retinal changes have been noted.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Serum LFT should be obtained in pts receiving treatment for longer than 6 wks.

INTERVENTION/EVALUATION

Check for therapeutic response. Discontinue medication, notify physician if local reaction occurs (irritation, redness, swelling, pruritus, oozing, blistering, burning). Monitor LFT in pts receiving treatment for longer than 6 wks.

PATIENT/FAMILY TEACHING

• Keep areas clean, dry; wear light clothing to promote ventilation. • Avoid topical cream contact with eyes, nose, mouth, other mucous membranes. • Rub well into affected, surrounding area. • Do not cover with occlusive dressing. • Report rash, dark urine, abdominal pain, anorexia, yellowing of skin.

terbutaline

ter-**bue**-ta-leen
(Bricanyl ✱)
Do not confuse Brethine with methergine, or terbutaline with terbinafine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Sympathomimetic (adrenergic agonist). **CLINICAL:** Bronchodilator, premature labor inhibitor.

USES

Symptomatic relief of reversible bronchospasm due to bronchial asthma, bronchitis, emphysema. **OFF-LABEL:** Delays premature labor in pregnancies between 20 and 34 wks.

PRECAUTIONS

Contraindications: Cardiac arrhythmias associated with tachycardia, tachycardia caused by digoxin toxicity. **Injection:** Prolonged prevention or management of preterm labor. **Oral:** Prevention or treatment of preterm labor. **Cautions:** Cardiac impairment, diabetes mellitus, hypertension, hyperthyroidism, history of seizures.

ACTION

Stimulates beta$_2$-adrenergic receptors, resulting in relaxation of uterine,

Excessive sympathomimetic stimulation may cause palpitations, extrasystoles, tachycardia, chest pain, slight increase in B/P followed by a substantial decrease, chills, diaphoresis, skin blanching.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Bronchospasm: Offer emotional support (high incidence of anxiety due to difficulty in breathing, sympathomimetic response to drug). **Preterm labor:** Assess baseline maternal pulse, B/P, frequency and duration of contractions, fetal heart rate.

INTERVENTION/EVALUATION

Bronchospasm: Monitor rate, depth, rhythm, type of respiration; quality, rate of pulse. Assess lung sounds for rhonchi, wheezing, rales. Monitor ABGs. Observe lips, fingernails for cyanosis (blue or dusky color in light-skinned pts; gray in dark-skinned pts). Observe for clavicular retractions, hand tremor. Evaluate for clinical improvement (quieter, slower respirations, relaxed facial expression, cessation of clavicular retractions). **Preterm labor:** Monitor for frequency, duration, strength of contractions. Diligently monitor maternal and fetal heart rate.

PATIENT/FAMILY TEACHING

- Report persistent palpitations, chest pain, muscle tremor, dizziness, headache, flushing, breathing difficulties.
- May cause nervousness, anxiety, shakiness.
- Avoid excessive use of caffeine derivatives (chocolate, coffee, tea, cola, cocoa).

teriflunomide

ter-i-**floo**-noe-myde
(Aubagio)

Do not confuse teriflunomide with leflunomide.

■ **BLACK BOX ALERT** ■ May result in major birth defects (Pregnancy Category X). Pregnancy must be excluded before initiating therapy, and must be avoided during treatment or prior to completion of an accelerated elimination procedure. Severe hepatic injury may occur. Do not initiate with acute/chronic liver disease or ALT greater than 2 times upper limit of normal.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Pyrimidine synthesis inhibitor, immunomodulatory agent. **CLINICAL:** Multiple sclerosis agent.

USES

Treatment of relapsing forms of multiple sclerosis.

PRECAUTIONS

Contraindications: Pregnant women or women of childbearing potential who are not using reliable contraception, severe hepatic impairment, concurrent use of leflunomide. **Cautions:** Concomitant neurotoxic medications, diabetes, pulmonary disease, severe immunodeficiency or bone marrow dysplasia, history of significant hematologic abnormalities, uncontrolled infection, history of new/recurrent infections, pts older than 60 yrs.

ACTION

Inhibits pyrimidine synthesis, exhibiting anti-inflammatory and antiproliferative properties. **Therapeutic Effect:** May slow progression of multiple sclerosis.

PHARMACOKINETICS

Well absorbed following PO administration. Peak concentration: 1–4 h. Protein binding: greater than 99%. Metabolized by hydrolysis. Eliminated in urine (23%), feces (38%). **Half-life:** 18–19 days.

USES

Treatment of postmenopausal women with osteoporosis who are at increased risk for fractures. Treatment of men with primary or hypogonadal osteoporosis who are at high risk for fractures. High-risk pts include those with a history of osteoporotic fractures, who have failed previous osteoporosis therapy, or were intolerant of previous osteoporosis therapy. Treatment of glucocorticoid-induced osteoporosis in men and women.

PRECAUTIONS

Contraindications: None known. **Cautions:** Conditions that increase risk of osteosarcoma (e.g., Paget's disease, unexplained elevations of alkaline phosphatase level, open epiphyses, prior skeletal radiation therapy, implant therapy), hypercalcemia, hypercalcemic disorders (e.g., hyperparathyroidism), bone metastases, history of skeletal malignancies, metabolic bone diseases other than osteoporosis, cardiac disease, renal/hepatic impairment, pts at risk for orthostasis, active or recent urolithiasis.

ACTION

Stimulates osteoblast function. Increases calcium absorption from GI tract/renal tubular reabsorption. **Therapeutic Effect:** Increases bone mineral density, bone mass/strength, reduces osteoporosis-related fractures.

PHARMACOKINETICS

Extensively absorbed following subcutaneous injection. Metabolized in liver. Excreted in urine. **Half-life:** 1 hr.

T

Nasal Gel (Natesto): 5.5 mg/actuation. **Pellet, for Subcutaneous Implantation (Testopel):** 75 mg. **Solution (Metered Dose Pump [Axiron]):** 30 mg/activation. **Transdermal System (Androderm):** 2 mg/day or 4 mg/day.

ADMINISTRATION/HANDLING

IM

• Give deep in gluteal muscle. • Do not give IV. • Warming or shaking redissolves crystals that may form in long-acting preparations. • Wet needle of syringe may cause solution to become cloudy; this does not affect potency.

Buccal

(Striant): • Apply to gum area (above incisor tooth). • Hold firmly in place for 30 sec to ensure adhesion. Instruct pt to not chew or swallow. • Not affected by food, toothbrushing, gum, chewing, alcoholic beverages. • Remove before placing new system.

Transdermal

(Androderm): • Apply to clean, dry area on skin on back, abdomen, upper arms, thighs. • Do not apply to bony prominences (e.g., shoulder) or oily, damaged, irritated skin. Do not apply to scrotum. • Rotate application site with 7-day interval to same site.

Transdermal Gel

(AndroGel, Testim, Vogelxo): • Apply (morning preferred) to clean, dry, intact skin of shoulder, upper arms (AndroGel 1% may also be applied to abdomen). • Upon opening packet(s), squeeze entire contents into palm of hand, immediately apply to application site. • Allow to dry. • Do not apply to genitals. **(Fortesta):** Apply to skin of front and inner thighs.

Topical Solution

(Axiron): • Apply using applicator to axilla at same time each morning. • Avoid washing site for 2 hrs after application.

INDICATIONS/ROUTES/DOSAGE

Male Hypogonadism

IM: ADULTS: 50–400 mg q2–4wks or 75–100 mg/wk or 150–200 mg q2wks. ***(Aveed):*** 750 mg at initiation, 4 wks and q10 wks thereafter. **ADOLESCENTS:** Initiation of pubertal growth: 25–75 mg q3–4wks, titrate q6–9mos to 100–150 mg. Duration: 3–4yrs. **Maintenance Virilizing Dose:** 100 mg/m^2/dose twice monthly.

Subcutaneous *(Pellets)*: ADULTS: 150–450 mg q3–6mos.

Topical Gel *(Fortesta)*: 40 mg once daily in morning. Range: 10–70 mg. ***(Vogelxo):*** 50 mg once daily (one tube or one packet or 4 pump actuations).

Topical Solution *(Axiron)*: ADULTS, ELDERLY: 60 mg once daily (1 pump activation of 30 mg to each axilla). Range: 30–120 mg.

Transdermal Patch *(Androderm)*: ADULTS, ELDERLY: Start therapy with 4 mg/day patch applied at night. Apply patch to abdomen, back, thighs, upper arms. Dose adjustment based on testosterone levels.

Transdermal Gel *(AndroGel)*: ADULTS, ELDERLY: (AndroGel 1%): Initial dose of 5 g delivers 50 mg testosterone and is applied once daily to abdomen, shoulders, upper arms. May increase to 7.5 g, then to 10 g, if necessary. **(AndroGel 1.62%):** Initial dose of 40.5 mg applied once daily in the morning to shoulder and upper arms. May increase to 81 mg. Further adjustments based on testosterone levels.

Transdermal Gel *(Testim)*: ADULTS, ELDERLY: Initial dose of 5 g delivers 50 mg testosterone and is applied once daily to the shoulders, upper arms. May increase to 10 g (100 mg testosterone).

Buccal *(Striant)*: ADULTS, ELDERLY: 30 mg q12h.

Nasal Gel *(Natesto)*: ADULTS ELDERLY: 11 mg (2 actuations, 1 per each nostril) 3 times/day.

Delayed Male Puberty

IM *(Cypionate or enanthate)*: ADOLESCENTS: 50–200 mg q2–4wks for limited duration.

infection in pts with gonorrhea. Part of multidrug regimen of *H. pylori* eradication to reduce risk of duodenal ulcer recurrence.

PRECAUTIONS

Contraindications: None known. **Cautions:** Sun, ultraviolet light exposure (severe photosensitivity reaction). Renal, hepatic impairment. Avoid use during tooth development (children 8 yrs or younger). Do not use during pregnancy.

ACTION

Inhibits bacterial protein synthesis by binding to ribosomes. **Therapeutic Effect:** Bacteriostatic.

PHARMACOKINETICS

Readily absorbed from GI tract. Protein binding: 30%–60%. Widely distributed. Excreted in urine; eliminated in feces through biliary system. Not removed by hemodialysis. **Half-life:** 6–11 hrs (increased in renal impairment).

Carbamazepine, phenytoin may decrease concentration. **HERBAL: Cat's claw, echinacea** possess immunostimulant properties. **FOOD:** None known. **LAB VALUES:** None significant.

AVAILABILITY (Rx)

Capsules: 50 mg, 100 mg, 150 mg, 200 mg.

ADMINISTRATION/HANDLING

◄ALERT► Thalidomide may be prescribed only by licensed prescribers who are registered in the S.T.E.P.S. program and understand the risk of teratogenicity if thalidomide is used during pregnancy.

• Administer thalidomide with water at least 1 hr after evening meal and, if possible, at bedtime due to risk of drowsiness. • For doses greater than 400 mg/day, may give in 2–3 divided doses at least 1 hr after meals.

INDICATIONS/ROUTES/DOSAGE

AIDS-Related Muscle Wasting, Aphthous Stomatitis

PO: ADULTS: 200 mg twice daily for 5 days, then 200 mg once daily for up to 8 wks.

Leprosy

PO: ADULTS, ELDERLY: Initially, 100–300 mg/day as single bedtime dose, at least 1 hr after evening meal. Continue until active reaction subsides, then reduce dose q2–4wks in 50-mg increments.

Multiple Myeloma

PO: ADULTS, ELDERLY: 200 mg once daily, preferably at bedtime, with dexamethasone 40 mg on days 1–4, 9–12, 17–20 of each 28-day cycle.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Drowsiness, dizziness, mood changes, constipation, dry mouth, peripheral neuropathy. **Occasional:** Increased appetite, weight gain, headache, loss of libido, edema of face/limbs, nausea, alopecia, dry skin, rash, hypothyroidism.

ADVERSE EFFECTS/ TOXIC REACTIONS

Neutropenia, peripheral neuropathy, thromboembolism occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess for hypersensitivity to thalidomide. Assess for pregnancy 24 hrs before beginning therapy (contraindicated). Determine use of other medications (many interactions).

INTERVENTION/EVALUATION

Monitor WBC, nerve conduction studies, HIV viral load. Observe for signs/symptoms of peripheral neuropathy. Perform pregnancy tests on women of childbearing potential weekly during the first 4 wks of use, then at 4-wk intervals in women with regular menstrual cycles or q2wks in women with irregular menstrual cycles.

PATIENT/FAMILY TEACHING

• Avoid tasks requiring alertness, motor skills until response to drug is established. • Avoid use of alcohol, other drugs causing drowsiness. • Pregnancy tests must be obtained within 24 hrs before starting thalidomide, then q2–4wks in women of childbearing age. • Discontinue and report symptoms of peripheral neuropathy. • Male pts should always use a latex condom during any sexual contact.

theophylline

thee-**off**-i-lin
(Elixophyllin, Theo-24, Uniphyl)

CLASSIFICATION

PHARMACOTHERAPEUTIC: Xanthine derivative. **CLINICAL:** Bronchodilator.

Oral Solution: ADULTS, CHILDREN 45 KG OR GREATER: Initially, 300 mg/day in divided doses q6–8h. **Maintenance:** 400–600 mg/day. **CHILDREN 1 YR AND OLDER, LESS THAN 45 KG:** Initially, 10–14 mg/kg/day (**maximum:** 300 mg) in divided doses q4–6h. **Maintenance:** Up to 20 mg/kg/day (**maximum:** 600 mg). **CHILDREN LESS THAN 1 YR:** Total daily dose = [(0.2 × age in wks) + 5] × (wgt in kg). Frequency based on age. **27–52 WKS:** Divide in 4 equal doses q6h. **LESS THAN 27 WKS:** Divide in 3 equal doses q8h.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Dose reduction, increased monitoring with impaired hepatic function.

SIDE EFFECTS

Frequent: Altered smell (IV administration), restlessness, tachycardia, tremor. **Occasional:** Heartburn, vomiting, headache, mild diuresis, insomnia, nausea.

ADVERSE EFFECTS/ TOXIC REACTIONS

Too-rapid IV administration may produce marked hypotension with accompanying syncope, light-headedness, palpitations, tachycardia, hyperventilation, nausea, vomiting, angina-like pain, seizures, ventricular fibrillation, cardiac standstill.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Offer emotional support (high incidence of anxiety due to difficulty in breathing and sympathomimetic response to drug). Peak serum concentration should be drawn 1 hr following IV dose, 1–2 hrs after immediate-release dose, 3–8 hrs after extended-release dose. Draw trough level just before next dose.

INTERVENTION/EVALUATION

Monitor rate, depth, rhythm, type of respiration; quality/rate of pulse. Assess lung sounds for rhonchi, wheezing, rales. Monitor ABGs. Observe lips, fingernails for cyanosis. Observe for clavicular retractions, hand tremor. Evaluate for clinical improvement (quieter, slower respirations, relaxed facial expression, cessation of clavicular retractions). Monitor serum theophylline levels (therapeutic serum level range: 10–20 mcg/ml).

PATIENT/FAMILY TEACHING

• Increase fluid intake (decreases lung secretion viscosity). • Avoid excessive caffeine derivatives (chocolate, coffee, tea, cola, cocoa). • Smoking, charcoal-broiled food, high-protein/low-carbohydrate diet may decrease serum theophylline level. • Report nausea, vomiting, persistent headache, palpitations.

thiamine (vitamin B_1)

thy-a-min
(Betaxin)
Do not confuse thiamine with Thorazine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Water-soluble vitamin. **CLINICAL:** Vitamin B complex.

USES

Prevention/treatment of thiamine deficiency (e.g., beriberi, Wernicke's encephalopathy syndrome, peripheral neuritis associated with pellagra, alcoholic pts with altered sensorium), metabolic disorders.

PRECAUTIONS

Contraindications: None known. **Cautions:** Wernicke's encephalopathy.

ACTION

Combines with adenosine triphosphate in liver, kidneys, leukocytes to form thiamine diphosphate, a coenzyme necessary for carbohydrate metabolism. **Therapeutic**

Canadian trade name

PATIENT/FAMILY TEACHING

• Discomfort may occur with IM injection. • Foods rich in thiamine include pork, organ meats, whole grain and enriched cereals, legumes, nuts, seeds, yeast, wheat germ, rice bran. • Urine may appear bright yellow.

thioridazine

thye-o-**rid**-a-zeen

■ **BLACK BOX ALERT** ■ Dose-related prolongation of QT interval may cause arrhythmias, sudden death.

Do not confuse thioridazine with thiothixene or Thorazine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Phenothiazine. **CLINICAL:** Antipsychotic, sedative, antidyskinetic.

USES

Treatment of refractory schizophrenic pts. **OFF-LABEL:** Treatment of behavioral problems in children, schizophrenia/psychoses in children, dementia, depressive disorders/dementia; behavioral symptoms associated with dementia in elderly, psychosis/agitation related to Alzheimer's dementia.

PRECAUTIONS

Contraindications: Severe CNS depression, coma, severe heart disease. Concurrent use of medication inhibiting metabolism of thioridazine, concurrent use of drugs that prolong QT interval, congenital long QT syndrome, history of arrhythmias, pts known to have genetic defect leading to reduced levels of activity of CYP2D6. **Cautions:** Seizures, decreased GI motility, urinary retention, benign prostatic hypertrophy, visual problems, narrow-angle glaucoma, Parkinson's disease, pts at risk for pneumonia, pts at risk for orthostatic hypotension, cerebrovascular diseases, hemodynamic instability; severe cardiac, hepatic, renal disease elderly.

ACTION

Blocks dopamine at postsynaptic receptor sites. **Therapeutic Effect:** Suppresses behavioral response in psychosis; reduces locomotor activity, aggressiveness.

PHARMACOKINETICS

Absorption may be erratic. Protein binding: Very high. Metabolized in liver. Excreted in urine. **Half-life:** 21–24 hrs.

PHARMACOKINETICS

Incompletely absorbed from GI tract. Metabolized in liver. Excreted in urine. **Half-life:** 2.3–2.4 hrs.

in liver. Primarily excreted in urine. Unknown if removed by hemodialysis. **Half-life:** 34 hrs.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Review history of seizure disorder (intensity, frequency, duration, LOC). Observe frequently for recurrence of seizure activity. Initiate seizure precautions.

INTERVENTION/EVALUATION

For pts on long-term therapy, serum hepatic/renal function tests, CBC should be performed periodically. Assist with ambulation if dizziness occurs. Assess for clinical improvement (decrease in intensity, frequency of seizures). Monitor for depression, unusual behavior, suicidal ideation or thoughts.

PATIENT/FAMILY TEACHING

• Go from lying to standing slowly. • Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid alcohol. • Report worsening seizure activity, thoughts of suicide, increased depression.

ticagrelor

tye-**ka**-grel-or
(Brilinta)

■ **BLACK BOX ALERT** ■ May cause significant, sometimes fatal bleeding. Do not use with active bleeding or history of intracranial bleeding. Do not initiate in pts planning urgent coronary artery bypass graft (CABG) surgery. Discontinue at least 5 days prior to any surgery. Suspect bleeding in any pt who is hypotensive and has had recent percutaneous coronary intervention (PCI), CABG, or other surgical procedures. If possible, manage bleeding without discontinuing therapy to decrease risk of cardiovascular events. Aspirin maintenance doses greater than 100 mg/day may reduce effectiveness and should be strictly avoided.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: $P2Y_{12}$ platelet aggregation inhibitor. **CLINICAL:** Antiplatelet.

USES

Reduction of thrombolytic cardiovascular events in conjunction with aspirin in pts with acute coronary syndrome (ACS) including unstable angina (UA), non-ST elevation myocardial infarction (STEMI), or STEMI. **OFF-LABEL:** Initial treatment of UA, non-STEMI in pts with allergy to aspirin or major GI intolerance to aspirin.

PRECAUTIONS

Contraindications: History of intracranial hemorrhage, active pathologic bleeding, severe hepatic impairment. **Cautions:** Moderate hepatic impairment, renal impairment, history of hyperuricemia or gouty arthritis. Pts at increased risk of bradycardia, concurrent use of strong CYP3A4 inhibitors or inducers, elderly. (Recommend holding dose 5 days before planned surgery if applicable.)

ACTION

Reversibly inhibits platelet $P2Y_{12}$ ADP receptor to prevent signal transduction and platelet activation. **Therapeutic Effect:** Reduces platelet aggregation.

PHARMACOKINETICS

Readily absorbed after PO administration. Protein binding: 99%. Metabolized in liver. Primarily excreted in feces (58%), urine (26%). **Half-life:** 7–9 hrs.

USES

Treatment of susceptible infections due to *E. coli, E. faecalis, S. aureus, S. agalactiae, S. anginosus* group (includes *S. anginosus, S. intermedius, S. constellatus*), *S. pyogenes, B. fragilis, Citrobacter freundii, E. cloacae, K. oxytoca, K. pneumoniae, B. thetaiotaomicron, B. uniformis, B. vulgatus, C. perfringens, Peptostreptococcus micros* including complicated skin/skin structure infections, complicated intra-abdominal infections, community-acquired bacterial pneumonia.

PRECAUTIONS

Contraindications: None known. **Cautions:** Hypersensitivity to tetracyclines, last half of pregnancy, hepatic impairment, monotherapy for pts with intestinal perforation. Do not use for diabetic foot infections, healthcare-acquired pneumonia, or ventilator-associated pneumonia.

ACTION

Inhibits protein synthesis by binding to ribosomal receptor sites of bacterial cell wall. **Therapeutic Effect:** Bacteriostatic effect.

PHARMACOKINETICS

Extensive tissue distribution, minimally metabolized. Eliminated by biliary/fecal route (59%), urine (33%). Protein binding: 71%–89%. **Half-life:** Single dose: 27 hrs; following multiple doses: 42 hrs.

T

INTERACTIONS

DRUG: **Antacids containing aluminum or magnesium, calcium, salicylates** may interfere with absorption. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** None significant.

AVAILABILITY (Rx)

Tablets: 200 mg.

ADMINISTRATION/HANDLING

PO

• Must take with 6–8 oz plain water. • Do not give within 2 hrs of food intake. • Pt must not lie down for at least 30 min following administration. • Avoid giving aspirin, calcium supplements, mineral supplements, antacids within 2 hrs of tiludronate administration.

INDICATIONS/ROUTES/DOSAGE

Paget's Disease

PO: ADULTS, ELDERLY: 400 mg once daily for 3 mos. Not recommended in pts with creatinine clearance less than 30 ml/min.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (9%–6%): Nausea, diarrhea, generalized body pain, back pain, headache. **Occasional (Less Than 6%):** Rash, dyspepsia, vomiting, rhinitis, sinusitis, dizziness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Dysphagia, esophagitis, esophageal ulcer, gastric ulcer occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess if pt is using other medications (esp. aluminum, magnesium, calcium, salicylates). Determine baseline renal function. Assess for GI disease.

INTERVENTION/EVALUATION

Monitor serum osteocalcin, alkaline phosphatase, adjusted calcium, urinary hydroxyproline to assess effectiveness of medication.

PATIENT/FAMILY TEACHING

• Take with 6–8 oz water. • Avoid other medication for 2 hrs before or after taking tiludronate. • Check with physician if calcium, vitamin D supplements are necessary.

timolol

HIGH ALERT

tim-oh-lol

(Apo-Timol, Betimol, Istalol, PMS-Timolol, Timoptic, Timoptic GFS, Timoptic Ocudose, Timoptic-XE)

Do not confuse Timoptic with Betoptic or Viroptic.

FIXED-COMBINATION(S)

Combigan: timolol/brimonidine (an alpha$_2$ agonist): 0.5%/0.2%. **Cosopt:** timolol/dorzolamide (a carbonic anhydrase inhibitor): 0.5%/2%.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Beta-adrenergic blocker. **CLINICAL:** Antiglaucoma.

USES

Ophthalmic: Reduces IOP in management of open-angle glaucoma, aphakic glaucoma, ocular hypertension, secondary glaucoma.

PRECAUTIONS

Contraindications: Bronchial asthma, cardiogenic shock, HF (unless secondary to tachyarrhythmias), COPD, second- or third-degree heart block, sinus bradycardia. **Cautions:** Diabetes mellitus, arterial obstruction, history of severe anaphylaxis to allergens.

Monitor EKG for cardiac arrhythmias, particularly PVCs. Monitor daily pattern of bowel activity, stool consistency. Monitor heart rate, B/P, serum renal function, LFT, IOP (ophthalmic preparation).

PATIENT/FAMILY TEACHING

• Instill drops correctly following guidelines. • Transient stinging, discomfort may occur upon instillation.

tiotropium

TOP 100

tye-oh-**trope**-ee-yum
(Spiriva, Spiriva Respimat)
Do not confuse Spiriva with Inspra, or tiotropium with ipratropium.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Anticholinergic. **CLINICAL:** Bronchodilator.

USES

Long-term maintenance treatment of bronchospasm associated with COPD, including chronic bronchitis, emphysema, and for reducing COPD exacerbations.

PRECAUTIONS

Contraindications: History of hypersensitivity to ipratropium. **Cautions:** Narrow-angle glaucoma, prostatic hypertrophy, bladder neck obstruction, moderate to severe renal impairment, history of hypersensitivity to atropine, myasthenia gravis.

T

ACTION

Binds to recombinant human muscarinic receptors at smooth muscle, resulting in long-acting bronchial smooth muscle relaxation. **Therapeutic Effect:** Relieves bronchospasm.

PHARMACOKINETICS

Binds extensively to tissue. Protein binding: 72%. Metabolized by oxidation. Excreted in urine. **Half-life:** 5–6 days.

Metabolized in liver. Eliminated in feces (82%), urine (4%). **Half-life:** 6 hrs.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypotension may be associated with bradycardia, orthostatic hypotension, and, rarely, syncope. Risk of hypotension increases as dosage increases; hypotension is noted within 1 hr after administration.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Record onset, type, location, duration of muscular spasm. Check for immobility, stiffness, swelling. Obtain baseline serum hepatic function tests, alkaline phosphatase, total bilirubin.

INTERVENTION/EVALUATION

Assist with ambulation at all times. For those on long-term therapy, serum hepatic/renal function tests should be performed periodically. Evaluate for therapeutic response (decreased intensity of skeletal muscle pain/tenderness, improved mobility, decrease in spasticity). Go from lying to standing slowly.

PATIENT/FAMILY TEACHING

• Avoid tasks that require alertness, motor skills until response to drug is established. • Avoid sudden changes in posture. • May cause hypotension, sedation, impaired coordination. • Avoid alcohol.

tobramycin

toe-bra-**mye**-sin
(PMS-Tobramycin, TOBI, Tobrex)

■ **BLACK BOX ALERT** ■ May cause neurotoxicity, nephrotoxicity, ototoxicity. Ototoxicity usually is irreversible. Increased risk of neuromuscular blockade, including respiratory paralysis, particularly when given after anesthesia or muscle relaxants. May cause fetal harm.

Do not confuse tobramycin with vancomycin, or Tobrex with TobraDex.

T

FIXED-COMBINATION(S)

TobraDex: tobramycin/dexamethasone (a steroid): 0.3%/0.1% per ml or per g. **Zylet:** tobramycin/loteprednol: 0.3%/0.5%.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Aminoglycoside. **CLINICAL:** Antibiotic.

USES

Treatment of susceptible infections due to *P. aeruginosa,* other gram-negative organisms including skin/skin structure, bone, joint, respiratory tract infections; postop, burn, intra-abdominal infections; complicated UTI; septicemia; meningitis. **Ophthalmic:** Superficial eye infections: blepharitis, conjunctivitis, keratitis, corneal ulcers. **Inhalation:** Bronchopulmonary infections *(Pseudomonas aeruginosa)* in pts with cystic fibrosis.

PRECAUTIONS

Contraindications: Hypersensitivity to other aminoglycosides (cross-sensitivity) and their components, pregnancy. **Cautions:** Renal impairment, preexisting auditory or vestibular impairment, conditions that depress neuromuscular transmission, Parkinson's disease, myasthenia gravis, hypocalcemia.

ACTION

Irreversibly binds to protein on bacterial ribosomes. **Therapeutic Effect:** Interferes with protein synthesis of susceptible microorganisms.

PHARMACOKINETICS

Rapid, complete absorption after IM administration. Protein binding: less than 30%. Widely distributed (does not cross blood-brain barrier; low concentrations in CSF). Excreted unchanged in urine. Removed by hemodialysis. **Half-life:** 2–4 hrs (increased in renal impairment, neonates; decreased in cystic fibrosis, febrile or burn pts).

dexmedetomidine (Precedex), diltiazem (Cardizem), furosemide (Lasix), hydromorphone (Dilaudid), insulin, linezolid (Zyvox), magnesium sulfate, midazolam (Versed), morphine, nicardipine (Cardene), tigecycline (Tygacil).

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Space parenteral doses evenly around the clock. Dosage based on ideal body weight. Peak, trough levels determined periodically to maintain desired serum concentrations (minimizes risk of toxicity). Recommended peak level: 4–10 mcg/ml; trough level: 0.5–2 mcg/ml.

Usual Parenteral Dosage

IV: ADULTS, ELDERLY: 3–7.5 mg/kg/day in 3 divided doses. Once-daily dosing: 4–7 mg/kg every 24 hrs. **CHILDREN 5 YRS AND OLDER:** 2–2.5 mg/kg/dose q8h. **CHILDREN YOUNGER THAN 5 YRS:** 2.5 mg/kg/dose q8h. **NEONATES LESS THAN 1 KG (14 DAYS OR YOUNGER):** 5 mg/kg/dose q48h; **(15–28 DAYS):** 4–5 mg/kg/dose q24–48hrs. **1–2 KG (7 DAYS OR YOUNGER):** 5 mg/kg/dose q48h; **(8–28 DAYS):** 4–5 mg/kg/dose q24–48hrs. **GREATER THAN 2 KG (7 DAYS OR YOUNGER):** 4 mg/kg q24h; **(8–28 DAYS):** 4 mg/kg q12–24hrs.

Usual Ophthalmic Dosage

Ophthalmic Ointment: ADULTS, ELDERLY, CHILDREN 2 MOS AND OLDER: Apply ½ inch to conjunctiva q8–12h (q3–4h for severe infections).

Ophthalmic Solution: ADULTS, ELDERLY, CHILDREN 2 MOS AND OLDER: 1–2 drops in affected eye q4h (2 drops/hr for severe infections).

Usual Inhalation Dosage (Cystic Fibrosis)

Inhalation High Dose: ADULTS, CHILDREN 6 YRS AND OLDER: 300 mg q12h 28 days on, 28 days off. **Podhaler:** Four 28-mg capsules twice daily for 28 days followed by 28 days off.

Dosage in Renal Impairment

Dosage and frequency modified based on degree of renal impairment, serum drug concentration. After loading dose of 1–2 mg/kg, maintenance dose and frequency are based on serum creatinine levels, creatinine clearance.

Creatinine Clearance	Dosing Interval
41–60 ml/min	q12h
21–40 ml/min	q24h
10–20 ml/min	q48h
Less than 10 ml/min	q72h
Hemodialysis	Loading dose 2–3 mg/kg then 1–2 mg/kg q48–72h
Continuous renal replacement therapy	Loading dose 2–3 mg/kg then 1–2.5 mg/kg q24–48h

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Occasional: IM: Pain, induration. **IV:** Phlebitis, thrombophlebitis. **Topical:** Hypersensitivity reaction (fever, pruritus, rash, urticaria). **Ophthalmic:** Tearing, itching, redness, eyelid swelling. **Rare:** Hypotension, nausea, vomiting.

ADVERSE EFFECTS/ TOXIC REACTIONS

Nephrotoxicity (acute kidney injury, acute tubular necrosis, renal failure) may be reversible if drug is stopped at first sign of symptoms. Irreversible ototoxicity (dizziness, ringing/roaring in ears, hearing loss), neurotoxicity (headache, dizziness, lethargy, tremor, visual disturbances) occur occasionally. Risk increases with higher dosages or prolonged therapy or if solution is applied directly to mucosa. Superinfections, particularly fungal infections, may result from bacterial imbalance with any administration route. Anaphylaxis may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Dehydration must be treated before beginning parenteral therapy. Question for

risk of infection. **Live vaccines** not recommended. May decrease effects of **lovastatin, simvastatin, oral contraceptives, phenytoin, warfarin.** **HERBAL:** **Echinacea** may alter levels/effects. **FOOD:** None known. **LAB VALUES:** May increase serum ALT, AST, lipids. May decrease platelets, neutrophils.

AVAILABILITY (Rx)

Injection Solution: 20 mg/ml (80 mg/4 ml, 200 mg/10 ml, 400 mg/20 ml). **Syringe for Subcutaneous Administration:** 162 mg/0.9 ml.

ADMINISTRATION/HANDLING

◀ALERT▶ Do not infuse IV push or bolus.

T

in renal transplant pts who are treated with tofacitinib and other immunosuppressive therapy drugs.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Janus kinase (JAK) inhibitor. **CLINICAL:** Antirheumatic agent.

USES

Treatment of adult pts with moderate to severe active rheumatoid arthritis with previous inadequate response or intolerance to methotrexate. May be used as monotherapy or in combination with methotrexate or other nonbiologic disease-modifying antirheumatic drugs (DMARDs). Do not use in combination with other biologic DMARDs or with potent immunosuppressants (e.g., azathioprine, cyclosporine).

PRECAUTIONS

Contraindications: None known. **Cautions:** Pts exposed to TB, history of serious opportunistic infections, conditions that predispose to infections (e.g., diabetes), pts at risk for GI perforation (e.g., diverticulitis), pts who resided or traveled in areas where TB is endemic, moderate to severe renal impairment, elderly, hepatic impairment, history of anemia, hyperlipidemia, hepatitis.

ACTION

Inhibits JAK enzymes which are involved in stimulating hematopoiesis and immune cell functioning. **Therapeutic Effect:** Reduces inflammation, tenderness, swelling of joints; slows or prevents progressive joint destruction in rheumatoid arthritis (RA).

PHARMACOKINETICS

Rapidly absorbed following PO administration. Protein binding: 40%. Peak concentration: 30–60 min. Metabolized in liver. Eliminated primarily in urine. **Half-life:** 3 hrs.

planning pregnancy. • Do not breast-feed. • Immediately report bleeding of any kind. • Yellowing of skin or eyes, right upper quadrant abdominal pain, bruising, clay-colored stool, dark urine may indicate liver problem. • Avoid grapefruit products.

tolterodine

tol-**ter**-oh-deen
(Detrol, Detrol LA, Unidet)
Do not confuse Detrol with Ditropan, or tolterodine with fesoterodine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Muscarinic receptor antagonist. **CLINICAL:** Antispasmodic.

USES

Treatment of overactive bladder in pts with symptoms of urinary frequency, urgency, incontinence.

PRECAUTIONS

Contraindications: Gastric retention, uncontrolled narrow-angle glaucoma, urinary retention. **Cautions:** Renal impairment, clinically significant bladder outflow obstruction (risk of urinary retention), GI obstructive disorders (e.g., pyloric stenosis [risk of gastric retention]), treated narrow-angle glaucoma, myasthenia gravis, prolonged QT interval (congenital/medications, hypokalemia, hypomagnesemia, hepatic impairment, elderly.

ACTION

Antagonist of muscarinic receptors mediating urinary bladder contraction. Increases residual urine volume, reduces detrusor muscle pressure. **Therapeutic Effect:** Decreases urinary frequency, urgency.

PHARMACOKINETICS

Immediate-release form rapidly, well absorbed after PO administration. Protein binding: 96%. Metabolized in liver. Primarily excreted in urine. Unknown if removed by hemodialysis. **Half-life:** Immediate-release: 2–10 hrs. Extended-release: 7–18 hrs.

not established. **Elderly:** No age-related precautions noted.

INTERACTIONS

DRUG: **CYP3A4 inhibitors (e.g., clarithromycin, diltiazem, erythromycin, fluconazole, itraconazole, ketoconazole, nefazodone, saquinavir, verapamil)** may increase concentration, effects. **CYP3A4 inducers (e.g., carbamazepine, phenytoin, rifabutin, rifampin)** may decrease concentration. **Cyclosporine** may increase concentration. **HERBAL:** **St. John's wort** may decrease concentration. **FOOD:** **Grapefruit products** may increase absorption, concentration. **LAB VALUES:** May increase serum potassium, magnesium. May alter serum glucose.

AVAILABILITY (Rx)

Tablets: 15 mg, 30 mg, 60 mg.

ADMINISTRATION/HANDLING

- Give without regard to meals.

INDICATIONS/ROUTES/DOSAGE

Usual Dosage

PO: ADULTS, ELDERLY: 15 mg once daily. Increase dose to 30 mg once daily, after at least 24 hrs (**maximum:** 60 mg once daily), to achieve desired level of serum sodium.

Dosage in Renal Impairment

Not recommended with creatinine clearance less than 10 ml/min.

Dosage in Hepatic Impairment

Avoid use.

SIDE EFFECTS

Frequent (16%–13%): Thirst, dry mouth. **Occasional (11%–4%):** Increase in urine output/urgency, asthenia, nausea, constipation, hyperglycemia, anorexia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Dysphagia, lethargy, slurred speech or inability to speak, affective changes, spastic quadriparesis, seizures, coma, death may occur with too-rapid correction of hyponatremia.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Initiate only in hospital setting with serum sodium monitoring. Obtain baseline serum sodium, hepatic enzyme levels, BUN, creatinine, CBC. Assess for increased pulse rate, poor skin turgor, nausea, diarrhea (signs of hyponatremia).

INTERVENTION/EVALUATION

During initiation and titration, frequently monitor for changes in serum electrolytes and volume. Avoid fluid restriction during first 24 hrs of therapy. Monitor for improvement in signs/symptoms of hyponatremia, hypernatremia (flushing, edema, restlessness, dry mucous membranes, fever).

PATIENT/FAMILY TEACHING

• Continue ingesting fluids in response to thirst. • Report urinary changes, loss of strength, unusual fatigue. • Report immediately symptoms of osmotic demyelination (e.g., trouble speaking/swallowing, confusion, mood changes, trouble controlling body movements, seizures).

topiramate

toe-**peer**-a-mate
(Apo-Topiramate, Novo-Topiramate, Qudexy XR, Topamax, Topamax Sprinkle, Topiragen, Trokendi XR)
Do not confuse Topamax or topiramate with Tegretol, Tegretol XR, or Toprol XL.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Carbonic anhydrase inhibitor. **CLINICAL:** Anticonvulsant.

intervals. Usual maintenance dose: 100–200 mg twice daily. **Maximum:** 1,600 mg/day. **CHILDREN 2–16 YRS:** Initially, 1–3 mg/kg/day to maximum of 25 mg at night for 1 wk. May increase by 1–3 mg/kg/day at weekly intervals given in 2 divided doses. **Maintenance:** 5–9 mg/kg/day in 2 divided doses. **ADULTS, ELDERLY: (Qudexy XR, Trokendi XR) (Partial-Onset, LGS):** Initially, 25–50 mg once daily. Increase by 25–50 mg at weekly intervals, up to 200–400 mg/day. **(Generalized Tonic-Clonic):** Initially, 25–50 mg/day. Increase by 25–50 mg/day at weekly intervals, up to 400 mg/day. **CHILDREN 6 YRS AND OLDER: (Trokendi XR):** initially, 1–3 mg/kg once daily. May increase by 1–3 mg/kg at 2-wk intervals up to 5–9 mg/kg once daily. **CHILDREN 2 YRS AND OLDER:** Initially, 25 mg (based on range of 1–3 mg/kg) once daily at bedtime for 1 wk. Increase dose by 1–3 mg/kg at 1–2 wk intervals up to 5–9 mg/kg once daily.

Monotherapy with Partial-Onset, Tonic-Clonic Seizures

PO: ADULTS, ELDERLY, CHILDREN 10 YRS AND OLDER: Initially, 25 mg twice daily. Increase at weekly intervals up to 400 mg/day according to the following schedule: Wk 1, 25 mg twice daily. Wk 2, 50 mg twice daily. Wk 3, 75 mg twice daily. Wk 4, 100 mg twice daily. Wk 5, 150 mg twice daily. Wk 6, 200 mg twice daily. **CHILDREN 2–9 YRS:** Initially, 25 mg/day. Then 25 mg 2 times/day week 2; then increase by 25–50 mg/day at weekly intervals up to minimum dose. **ADULTS, ELDERLY, CHILDREN 10 YRS OR OLDER: (Qudexy XR, Trokendi XR):** Initially, 50 mg once daily. Increase by 50 mg/day at weekly intervals for first 4 wks, then by 100 mg/day for wks 5 and 6, up to 400 mg/day.

Wgt.	Minimum	Maximum
11 kg or less	150 mg/day in 2 divided doses	250 mg/day in 2 divided doses
12–22 kg	200 mg/day in 2 divided doses	300 mg/day in 2 divided doses
23–31 kg	200 mg/day in 2 divided doses	350 mg/day in 2 divided doses
32–38 kg	250 mg/day in 2 divided doses	350 mg/day in 2 divided doses
39 or more kg	250 mg/day in 2 divided doses	400 mg/day in 2 divided doses

Migraine Prevention

PO: ADULTS, ELDERLY, CHILDREN 12 YRS and OLDER: Initially, 25 mg/day. May increase by 25 mg/day at 7-day intervals up to a total daily dose of 100 mg/day in 2 divided doses.

Dosage in Renal Impairment

Reduce drug dosage by 50% and titrate more slowly in pts who have creatinine clearance less than 70 ml/min.

Dosage in Hepatic Impairment

Use with caution.

SIDE EFFECTS

Frequent (30%–10%): Drowsiness, dizziness, ataxia, nervousness, nystagmus, diplopia, paresthesia, nausea, tremor. **Occasional (9%–3%):** Confusion, breast pain, dysmenorrhea, dyspepsia, depression, asthenia, pharyngitis, weight loss, anorexia, rash, musculoskeletal pain, abdominal pain, difficulty with coordination, sinusitis, agitation, flu-like symptoms. **Rare (3%–2%):** Mood disturbances (e.g., irritability, depression), dry mouth, aggressive behavior, impaired heat regulation.

ADVERSE EFFECTS/ TOXIC REACTIONS

Psychomotor slowing, impaired concentration, language problems (esp. word-finding difficulties), memory disturbances occur occasionally. Metabolic acidosis, suicidal ideation occur rarely.

ACTION

Binds to estrogen receptors on tumors, producing complex that decreases DNA synthesis, inhibits estrogen effects. **Therapeutic Effect:** Blocks growth-stimulating effects of estrogen in breast cancer.

PHARMACOKINETICS

Well absorbed after PO administration. Protein binding: greater than 99%. Metabolized in liver. Eliminated primarily in feces. **Half-life:** Approximately 5 days.

T

Hepatic Cirrhosis

PO: ADULTS, ELDERLY: Initially, 5–10 mg/day given with aldosterone antagonist or potassium-sparing diuretic. May increase by approximately doubling dose until desired therapeutic effect is attained. **Maximum single dose:** 40 mg.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (10%–4%): Headache, dizziness, rhinitis. **Occasional (3%–1%):** Asthenia insomnia, nervousness, diarrhea, constipation, nausea, dyspepsia, edema, EKG changes, pharyngitis, cough, arthralgia, myalgia. **Rare (Less Than 1%):** Syncope, hypotension, arrhythmias.

ADVERSE EFFECTS/ TOXIC REACTIONS

Ototoxicity may occur with too-rapid IV administration or with high doses; must be given slowly. Overdose produces acute, profound water loss, volume/electrolyte depletion, dehydration, decreased blood volume, circulatory collapse.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check serum electrolyte levels, esp. potassium. Obtain baseline weight; check for edema. Assess for rales in lungs, signs of HF.

INTERVENTION/EVALUATION

Monitor B/P, serum electrolytes (esp. potassium), I&O, weight. Notify physician of any hearing abnormality. Note extent of diuresis. Assess lungs for rales. Check for signs of edema, particularly of dependent areas. Although less potassium is lost with torsemide than with furosemide, assess for signs of hypokalemia (change of muscle strength, tremor, muscle cramps, altered mental status, cardiac arrhythmias).

PATIENT/FAMILY TEACHING

• Take medication in morning to prevent nocturia. • Expect increased urinary volume, frequency. • Report palpitations, muscle weakness, cramps, nausea, dizziness. • Do not take other medications (including OTC drugs) without consulting physician. • Eat foods high in potassium such as whole grains (cereals), legumes, meat, bananas, apricots, orange juice, potatoes (white, sweet), raisins.

tramadol

tram-a-dol

(ConZip, Ralivia, Tridural, Ultram, Ultram ER)

Do not confuse tramadol with tapentadol, Toradol, Trandate or Ultram with Ultracet.

FIXED-COMBINATION(S)

Ultracet: tramadol/acetaminophen (a non-narcotic analgesic): 37.5 mg/325 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Centrally acting synthetic opioid analgesic.
CLINICAL: Analgesic.

USES

Management of moderate to moderately severe pain. **Extended-Release:** Around-the-clock management of moderate to moderately severe pain for extended period.

PRECAUTIONS

Contraindications: Ultram, Ultram ER: Acute alcohol intoxication, concurrent use of centrally acting analgesics, hypnotics, opioids, psychotropic drugs, hypersensitivity to opioids. **ConZip,** Severe/acute bronchial asthma, hypercapnia, significant respiratory depression. **Caution:** CNS depression, anoxia, advanced hepatic cirrhosis, respiratory depression, elevated ICP, history of seizures or risk for seizures, hepatic/renal impairment, treatment of acute abdominal conditions,

blurred vision, urinary retention/frequency, menopausal symptoms.

ADVERSE EFFECTS/ TOXIC REACTIONS

Seizures reported in pts receiving tramadol within recommended dosage range. May have prolonged duration of action, cumulative effect in pts with hepatic/renal impairment, serotonin syndrome (agitation, hallucinations, tachycardia, hyperreflexia).

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess onset, type, location, duration of pain. Assess drug history, esp. carbamazepine, analgesics, CNS depressants, MAOIs. Review past medical history, esp. epilepsy, seizures. Assess renal function, LFT.

INTERVENTION/EVALUATION

Monitor pulse, B/P, renal/hepatic function. Assist with ambulation if dizziness, vertigo occurs. Dry crackers, cola may relieve nausea. Palpate bladder for urinary retention. Monitor daily pattern of bowel activity, stool consistency. Sips of water may relieve dry mouth. Assess for clinical improvement, record onset of relief of pain.

PATIENT/FAMILY TEACHING

• May cause dependence. • Avoid alcohol, OTC medications (analgesics, sedatives). • May cause drowsiness, dizziness, blurred vision. • Avoid tasks requiring alertness, motor skills until response to drug is established. • Report severe constipation, difficulty breathing, excessive sedation, seizures, muscle weakness, tremors, chest pain, palpitations.

T

trametinib

tra-**me**-ti-nib
(Mekinest)
Do not confuse trametinib with imatinib or tipifarnib.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Kinase inhibitor. **CLINICAL:** Antineoplastic.

USES

Used as a single agent or in combination with dabrafenib for treatment of unresectable or metastatic melanoma with BRAF V600E or V600L mutations, as detected by FDA-approved test. Single-agent regimen is not indicated in pts who have received prior BRAF-inhibitor therapy.

PRECAUTIONS

Contraindications: None known. **Cautions:** Cardiac/pulmonary impairment, diabetes.

ACTION

Inhibits mitogen-activated extracellular kinase (MEK), **Therapeutic Effect:** Inhibits tumor cell growth, causing apoptosis.

PHARMACOKINETICS

Rapidly absorbed after PO administration. Protein binding: 97.4%. Peak plasma concentration: 1.5 hrs. Metabolized in liver. Excreted in feces (80%), urine (20%). **Half-life:** 3.9–4.8 days.

Pulmonary: INTERSTITIAL LUNG DISEASE: Discontinue trametinib. Do not modify dabrafenib.
Venous Thromboembolism: UNCOMPLICATED (DVT) OR (PE): Withhold trametinib for up to 3 wks. If improved to grade 0–1, then resume at lower dose level. Discontinue if not improved. Do not modify dabrafenib. **LIFE-THREATENING PE:** Discontinue both regimens.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Single Regimen:
Frequent (57%–32%): Rash, diarrhea, lymphedema, peripheral edema. **Occasional (19%–10%):** Dermatitis acneiform, hypertension, stomatitis, mouth ulceration, mucosal ulceration, abdominal pain, dry skin, pruritus, paronychia, folliculitis, cellulitis, dizziness, dysgeusia, blurred vision, dry eye.
Combination Regimen:
Frequent (71%–40%): Pyrexia, chills, fatigue, rash, nausea, vomiting. **Occasional (36%–11%):** Diarrhea, abdominal pain, peripheral edema, headache, cough, arthralgia, night sweats, myalgia, constipation, decreased appetite, back pain, dry skin, insomnia, dermatitis acneiform, dizziness, muscle spasm, extremity pain, actinic keratosis, erythema, oral/throat pain, urinary tract infection, pruritus, dry mouth, dehydration.

ADVERSE EFFECTS/ TOXIC REACTIONS

Primary malignancies including basal or squamous cell carcinoma, keratoacanthoma, pancreatic adenocarcinoma, glioblastoma (brain cancer) reported. DVT, PE reported in 9% of pts. May increase cell proliferation of wild-type BRAF melanoma or new malignant melanomas. Serious, sometimes fatal intracranial or gastric bleeding occurred in 5% of pts. Other hemorrhagic events may include conjunctival/gingival/rectal/hemorrhoidal/vaginal bleeding; epistaxis (nosebleed), melena (bloody stools). Cardiomyopathy, HF, decreased LVEF reported in 7%–9% of pts. Ocular (eye) toxicities such as retinal vein occlusion, retinal detachment, vision loss, glaucoma, uveitis, iritis reported. Cough, dyspnea, hypoxia, pleural effusion, infiltrates may indicate interstitial lung disease (ILD). Serious febrile reactions may lead to renal failure, severe dehydration, hypotension, rigors. Skin toxicities including palmar-plantar erythrodysesthesia syndrome (PPES), papilloma have occurred. Hyperglycemia reported in 2%–5% of pts. Other effects may include hypertension, rhabdomyolysis. May prolong QT interval of cardiac cycle.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, serum metabolic panel (with LFT), magnesium, phosphate, ionized calcium, capillary glucose level, vital signs. Obtain BRAF V600E mutation history, negative pregnancy status, ophthalmologic exam with visual acuity, echocardiogram, EKG before initiating treatment. Assess skin for moles, lesions, papillomas. Question current breastfeeding status. Receive full medication history including herbal products. Question any history as listed in PRECAUTIONS.

INTERVENTION/EVALUATION

Offer emotional support. Monitor CBC, serum electrolytes, capillary blood glucose, stool characteristics routinely. Monitor for signs of hyperglycemia (thirst, polyuria, confusion, dehydration). Assess skin for new lesions, toxicities every 2 mos during treatment and at least 6 mos after discontinuation. Obtain LVEF by echocardiogram 1 mo after initiation, then every 2–3 mos; ophthalmologic exam with any vision changes. Immediately report any altered mental status, bleeding events, vision changes, eye pain/swelling/infection, fever, urinary changes. Screen for bleeding of any kind.

produce serotonin syndrome. **HERBAL: Valerian, St. John's wort, SAMe, kava kava** may increase risk of serotonin syndrome or excessive sedation. **FOOD: Foods containing pressor amines (aged cheese, caffeine, red wine), tyramine** may cause sudden, severe hypertension. **LAB VALUES:** None significant.

AVAILABILITY (Rx)

Tablets: 10 mg.

ADMINISTRATION/HANDLING

◀ALERT▶ At least 14 days must elapse between tranylcypromine and selective serotonin reuptake inhibitors (SSRIs). Avoid foods containing tryptophan and caffeine; tyramine-containing foods/beverages (e.g., aged cheese, air-dried or cured meats, fava, soy sauce, soybean condiments, tap/draft beer).

INDICATIONS/ROUTES/DOSAGE

Depression

PO: ADULTS, ELDERLY: Initially, 10 mg twice daily. May increase by 10 mg/day at 1- to 3-wk intervals up to 60 mg/day in divided doses. **Usual effective dose:** 30 mg/day.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Orthostatic hypotension, restlessness, GI upset, insomnia, dizziness, lethargy, weakness, dry mouth, peripheral edema. **Occasional:** Flushing, diaphoresis, rash, urinary frequency, increased appetite, transient impotence. **Rare:** Visual disturbances.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypertensive crisis occurs rarely, marked by severe hypertension, occipital headache radiating frontally, neck stiffness/soreness, nausea, vomiting, diaphoresis, fever/chills, clammy skin, dilated pupils, palpitations, tachycardia, bradycardia, constricting chest pain. Intracranial bleeding may be associated with severe hypertension.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Perform baseline serum renal function, LFT. Assess sensitivity to tranylcypromine. Assess for other medical conditions, esp. alcoholism, HF, pheochromocytoma, arrhythmias, cardiovascular disease, hypertension, suicidal tendencies. Question for other medications, including CNS depressants, meperidine, other antidepressants.

INTERVENTION/EVALUATION

Assess appearance, behavior, speech pattern, level of interest, mood. Supervise suicidal-risk pt closely during early therapy (as depression lessens, energy level improves, increasing suicide potential). Monitor for occipital headache radiating frontally, neck stiffness/soreness (may be first signal of impending hypertensive crisis). Monitor B/P diligently for hypertension. Assess skin, temperature for fever. Discontinue medication immediately if palpitations, frequent headaches occur. Monitor weight.

PATIENT/FAMILY TEACHING

• Take second daily dose no later than 4 PM to avoid insomnia. • Antidepressant relief may be noted during first wk of therapy; maximum benefit noted within 3 wks. • Report worsening depression, unusual behavior, suicidal thoughts or ideation. • Report headache, neck stiffness/soreness immediately. • Go from lying to standing slowly. • Avoid foods that require bacteria/molds for their preparation/preservation, those that contain tyramine (e.g., cheese, sour cream, beer, wine, pickled herring, liver, figs, raisins, bananas, avocados, soy sauce, yeast extracts, yogurt, papaya, broad beans, meat tenderizers), excessive amounts of caffeine (coffee, tea, chocolate), OTC

T

INDICATIONS/ROUTES/DOSAGE

Breast Cancer (Adjuvant)

IV: ADULTS, ELDERLY: (with concurrent paclitaxel or docetaxel): Initially, 4 mg/kg as 90-min infusion, then 2 mg/kg weekly as 30-min infusion for 12 wks followed 1 wk later (when concurrent chemotherapy completed) by 6 mg/kg infusion over 30–90 min q3wks for total therapy duration of 52 wks. **(with docetaxel/carboplatin):** Initially, 4 mg/kg as 90-min infusion, then 2 mg/kg weekly as 30-min infusion for a total of 18 wks, followed 1 wk later (when concurrent chemotherapy completed) by 6 mg/kg infused over 30–90 min q3wks for total therapy duration of 52 wks.

Breast Cancer (Metastatic)

IV: ADULTS, ELDERLY: Initially, 4 mg/kg as 90-min infusion, then 2 mg/kg as 30-min infusion weekly until disease progression.

Stomach Cancer

IV: ADULTS, ELDERLY: Initially, 8 mg/kg over 90 min, then 6 mg/kg over 30–90 min q3wks until disease progression.

Dosage Adjustment in Cardiotoxicity

Left ventricular ejection fraction (LVEF) 16% or greater decrease from baseline WNL (within normal limits) or LVEF below normal limits and 10% or greater decrease from baseline: Hold treatment for 4 wks. Repeat LVEF q4wks. Resume therapy if LVEF returns to normal limits in 4–8 wks and remains at 15% or less decrease from baseline.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent (Greater Than 20%): Pain, asthenia, fever, chills, headache, abdominal pain, back pain, infection, nausea, diarrhea, vomiting, cough, dyspnea. **Occasional (15%–5%):** Tachycardia, HF, flulike symptoms, anorexia, edema, bone pain, arthralgia, insomnia, dizziness, paresthesia, depression, rhinitis, pharyngitis, sinusitis. **Rare (Less Than 5%):** Allergic reaction, anemia, leukopenia, neuropathy, herpes simplex.

ADVERSE EFFECTS/ TOXIC REACTIONS

Cardiomyopathy, ventricular dysfunction, HF occur rarely. Pancytopenia may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Evaluate left ventricular function. Obtain baseline echocardiogram, EKG, multigated acquisition (MUGA) scan. Obtain CBC at baseline and at regular intervals during therapy.

INTERVENTION/EVALUATION

Frequently monitor for deteriorating cardiac function. Assess for asthenia (loss of strength, energy). Assist with ambulation if asthenia occurs. Monitor for fever, chills, abdominal pain, back pain. Offer antiemetics if nausea, vomiting occur. Monitor daily pattern of bowel activity, stool consistency.

PATIENT/FAMILY TEACHING

- Do not have immunizations without physician's approval (lowers resistance).
- Avoid contact with those who have recently taken oral polio vaccine.
- Avoid crowds, those with infection.

T

trazodone

traz-o-done
(Apo-Trazodone, Novo-Trazodone)

■ **BLACK BOX ALERT** ■ Increased risk of suicidal ideation and behavior in children, adolescents, young adults 18–24 yrs with major depressive disorder, other psychiatric disorders.

Do not confuse trazodone with tramadol or ziprasidone.

ADVERSE EFFECTS/ TOXIC REACTIONS

Priapism, altered libido, retrograde ejaculation, impotence occur rarely. Appears to be less cardiotoxic than other antidepressants, although arrhythmias may occur in pts with preexisting cardiac disease.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess mental status, mood, behavior. For those on long-term therapy, serum hepatic/renal function tests, blood counts should be performed periodically. Elderly are more likely to experience sedative, hypotensive effects.

INTERVENTION/EVALUATION

Monitor for suicidal ideation (esp. at beginning of therapy or dosage change). Assess appearance, behavior, speech pattern, level of interest, mood. Monitor WBC, neutrophil count, hepatic enzymes. Assist with ambulation if dizziness, lightheadedness occurs.

PATIENT/FAMILY TEACHING

• Immediately discontinue medication, consult physician if priapism occurs. • May take after meal, snack. • May take at bedtime if drowsiness occurs. • Change positions slowly to avoid hypotensive effect. • Avoid tasks that require alertness, motor skills until response to drug is established. • Tolerance to sedative, anticholinergic effects usually develops during early therapy. • Photosensitivity to sun may occur. • Dry mouth may be relieved by sugarless gum, sips of water. • Report visual disturbances, worsening depression, suicidal ideation, unusual changes in behavior. • Do not abruptly discontinue medication. • Avoid alcohol.

treprostinil

tre-**prost**-i-nil
(Remodulin, Tyvaso)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Platelet aggregation inhibitor, vasodilator.
CLINICAL: Antiplatelet.

USES

Injection: Treatment of pulmonary arterial hypertension (PAH) in pts with NYHA class II–IV symptoms to decrease exercise associated symptoms; diminish clinical deterioration when transitioning from epoprostenol (Flolan). **Inhalation:** Treatment of PAH in pts with NYHA class III symptoms to increase walk distance.

PRECAUTIONS

Contraindications: None known. **Cautions:** Hepatic/renal impairment, pts older than 65 yrs, pts with significant underlying lung disease (e.g., COPD), low systemic arterial pressure; concomitant use of anticoagulants or antiplatelets, CYP2C8 inducers (e.g., rifampin), CYP2C8 inhibitors (e.g., gemfibrozil).

ACTION

Directly dilates pulmonary, systemic arterial vascular beds, also inhibits platelet aggregation. **Therapeutic Effect:** Reduces symptoms of pulmonary arterial hypertension associated with exercise.

PHARMACOKINETICS

Rapidly, completely absorbed after subcutaneous infusion. Protein binding: 91%. Metabolized by liver. Excreted in urine (79%), feces (13%). **Half-life:** 2–4 hrs.

T

(e.g., headache, nausea, vomiting). Monitor for changes in B/P.

PATIENT/FAMILY TEACHING

• Delivery occurs via self-inserted subcutaneous catheter using ambulatory subcutaneous pump; carefully follow instructions for drug administration. • Follow guidelines for care of subcutaneous catheter, troubleshooting infusion pump problems. • Avoid skin or eye contact with Tyvaso (rinse immediately with water).

tretinoin

HIGH ALERT

tret-i-noyn
(Atralin, Avita, Refissa, Rejuva-A, Renova, Retin-A, Retin-A Micro, Tretin X, Vesanoid)

■ **BLACK BOX ALERT** ■ High risk for teratogenicity; major fetal abnormalities, spontaneous abortions. Pts with acute promyelocytic leukemia (APL) are at severe risk for reactions (fever, dyspnea, acute respiratory distress syndrome [pulmonary infiltrates, pleural effusions, pericardial effusions]), edema, hepatic, renal, and/or multiorgan failure; 40% develop leukocytosis.

Do not confuse tretinoin with isotretinoin, phenytoin, or triamcinolone.

FIXED-COMBINATION(S)

With octyl methoxycinnamate and oxybenzone, moisturizers, and SPF-12, a sunscreen **(Retin-A Regimen Kit).**

T

CLASSIFICATION

PHARMACOTHERAPEUTIC: Retinoid.
CLINICAL: Antiacne, transdermal, antineoplastic.

USES

Topical: Treatment of acne vulgaris, photodamaged skin. **PO:** Induction of remission in pts with acute promyelocytic leukemia (APL). **OFF-LABEL (PO):** Maintenance therapy in APL, combination therapy (arsenic trioxide) for remission induction in APL. **Topical:** Some skin cancers.

PRECAUTIONS

Contraindications: Sensitivity to parabens (used as preservative in gelatin capsule). **Extreme Caution: Topical:** Eczema, sun exposure. **Cautions: Topical:** Those with considerable sun exposure in their occupation, hypersensitivity to sun. **PO:** Elevated serum cholesterol/triglycerides, concurrent use of antifibrinolytic agents.

ACTION

Antiacne: Decreases cohesiveness of follicular epithelial cells. Increases turnover of follicular epithelial cells. **Therapeutic Effect:** Causes expulsion of blackheads. Bacterial skin counts are not altered. **Transdermal:** Exerts effects on growth/differentiation of epithelial cells. **Therapeutic Effect:** Alleviates fine wrinkles, hyperpigmentation. **Antineoplastic:** Induces maturation, decreases proliferation of acute promyelocytic leukemia (APL) cells. **Therapeutic Effect:** Repopulation of bone marrow, and peripheral blood with normal hematopoietic cells.

PHARMACOKINETICS

Topical: Minimally absorbed. **PO:** Well absorbed following PO administration. Protein binding: greater than 95%. Metabolized in liver. Primarily excreted in urine. **Half-life:** 0.5–2 hrs.

tumorigenic potential when combined with ultraviolet radiation.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

PO: Inform women of childbearing potential of risk to fetus if pregnancy occurs. Instruct on need for use of 2 reliable forms of contraceptives concurrently during therapy and for 1 mo after discontinuation of therapy, even in infertile women. Pregnancy test should be obtained within 1 wk before institution of therapy. Obtain initial serum LFT, cholesterol, triglyceride levels.

INTERVENTION/EVALUATION

PO: Monitor serum LFT, hematologic, coagulation profiles, cholesterol, triglycerides. Monitor for signs/symptoms of pseudotumor cerebri in children.

PATIENT/FAMILY TEACHING

• **Topical:** Avoid exposure to sunlight, tanning beds; use sunscreens, protective clothing. • Protect affected areas from wind, cold. • If skin is already sunburned, do not use drug until fully healed. • Keep tretinoin away from eyes, mouth, angles of nose, mucous membranes. • Do not use medicated, drying, abrasive soaps; wash face no more than 2–3 times/day with gentle soap. • Avoid use of preparations containing alcohol, menthol, spice, lime (e.g., shaving lotions, astringents, perfume). • Mild redness, peeling are expected; decrease frequency or discontinue medication if excessive reaction occurs. • Nonmedicated cosmetics may be used; however, cosmetics must be removed before tretinoin application. • Improvement noted during first 24 wks of therapy. • **Antiacne:** Therapeutic results noted in 2–3 wks; optimal results in 6 wks. **Oral:** • Avoid tasks requiring motor skills, alertness until response to drug is established. • Avoid alcohol. • Avoid exposure to sunlight, tanning beds. • Report persistent vomiting, diarrhea, unusual bleeding/bruising, acute abdominal pain, vision changes, or if pregnancy is suspected.

triamcinolone

trye-am-**sin**-oh-lone

triamcinolone acetonide

(Kenalog, Kenalog-10, Kenalog-40, Nasacort AQ, Triderm)

triamcinolone hexacetonide

(Aristospan)

Do not confuse Nasacort with Nasalcrom.

FIXED-COMBINATION(S)

Myco-II, Mycolog II, Myco-Triacet: triamcinolone/nystatin (an antifungal): 0.1%/100,000 units/g.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Adrenocortical steroid. **CLINICAL:** Anti-inflammatory.

USES

Nasal inhalation: Seasonal, perennial rhinitis. **Intra-articular:** Acute gouty arthritis, bursitis, tenosynovitis, epicondylitis, rheumatoid arthritis, synovitis of osteoarthritis. **Intralesional:** Alopecia areata, discoid lupus erythematosus, keloids, lichen plaques, psoriatic plaques. **Topical:** Relief of inflammation, pruritus associated with corticoid-responsive dermatoses.

PRECAUTIONS

Contraindications: Systemic fungal infections, cerebral malaria, serious infections. **IM:** Idiopathic thrombocytopenic

Canadian trade name

following long-term therapy: Anorexia, nausea, fever, headache, arthralgia, rebound inflammation, fatigue, weakness, lethargy, dizziness, orthostatic hypotension. Anaphylaxis occurs rarely with parenteral administration. Sudden discontinuation may be fatal. Blindness has occurred rarely after intralesional injection around face, head.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for hypersensitivity to any corticosteroids. Obtain baselines for height, weight, B/P, serum glucose, electrolytes.

INTERVENTION/EVALUATION

Oral inhalation, intranasal: Check mucous membranes for signs of fungal infection. Monitor growth in children. Monitor B/P.

PATIENT/FAMILY TEACHING

• Report if condition being treated persists or worsens. • Avoid exposure to chickenpox or measles. • Avoid alcohol. • **Inhalation:** Do not take for acute asthma attack. • Rinse mouth to decrease risk of mouth soreness. • Report oropharyngeal lesions or soreness (stomatitis). • **Nasal:** Report unusual cough/spasm, persistent nasal bleeding, burning, infection.

triamterene

trye-**am**-ter-een
(Dyrenium)

■ **BLACK BOX ALERT** ■ Hyperkalemia risk, potentially fatal if uncorrected; increased incidence in renal impairment, diabetes (even without evidence of diabetic nephropathy), elderly, severely ill pts.

Do not confuse Dyrenium with Pyridium, or triamterene with trimipramine.

FIXED-COMBINATION(S)

Dyazide, Maxzide: triamterene/hydrochlorothiazide (a diuretic): 37.5 mg/25 mg, 50 mg/25 mg, 75 mg/50 mg.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Potassium-sparing diuretic. **CLINICAL:** Diuretic, antihypertensive.

USES

Treatment of edema in HF, cirrhosis, nephrotic syndrome; steroid-induced edema; edema due to secondary hyperaldosteronism. **OFF-LABEL:** Treatment of hypertension.

PRECAUTIONS

Contraindications: Drug-induced or preexisting hyperkalemia, progressive or severe renal disease, severe hepatic disease. **Cautions:** Hepatic/renal impairment, history of renal calculi, diabetes mellitus, gouty arthritis.

ACTION

Inhibits sodium, potassium, ATPase. Interferes with sodium/potassium exchange in distal tubule, cortical collecting tubule, collecting duct. Increases sodium, decreases potassium excretion. Increases magnesium, decreases calcium loss. **Therapeutic Effect:** Produces diuresis, lowers B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	2–4 hrs	N/A	7–9 hrs

Incompletely absorbed from GI tract. Widely distributed. Metabolized in liver. Primarily eliminated in feces via biliary route. **Half-life:** 1.5–2.5 hrs (increased in renal impairment).

Do not confuse trifluoperazine with triflupromazine or trihexyphenidyl.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Phenothiazine derivative. **CLINICAL:** Antipsychotic, antianxiety.

USES

Treatment of schizophrenia, generalized nonpsychotic anxiety. **OFF-LABEL:** Psychotic disorders, behavioral symptoms associated with dementia behavior, psychosis/agitation related to Alzheimer's dementia.

PRECAUTIONS

Contraindications: Severe CNS depression, bone marrow suppression, blood dyscrasias, severe hepatic disease, coma. **Cautions:** Seizure disorder, severe cardiac/renal disease, pts at risk for pneumonia, hypotensive episodes, decreased GI motility, urinary retention, BPH, visual problems, narrow-angle glaucoma, myasthenia gravis, Parkinsons disease, elderly.

ACTION

Blocks dopamine at postsynaptic receptor sites. Possesses alpha-adrenergic blocking effects. **Therapeutic Effect:** Suppresses behavioral response in psychosis; reduces locomotor activity, aggressiveness.

PHARMACOKINETICS

Readily absorbed following PO administration. Protein binding: 90%–99%. Metabolized in liver. Excreted in urine. **Half-life:** 24 hrs.

anticholinergics, MAOIs may increase anticholinergic effects. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** None significant.

AVAILABILITY (Rx)

Elixir: 2 mg/5 ml. **Tablets:** 2 mg, 5 mg.

ADMINISTRATION/HANDLING

PO

• Administer with food, water to decrease GI irritation.

INDICATIONS/ROUTES/DOSAGE

Parkinsonism

PO: ADULTS, ELDERLY: Initially, 1 mg on first day. May increase by 2 mg/day at 3- to 5-day intervals up to 6–10 mg/day (12–15 mg/day in pts with postencephalitic parkinsonism).

Drug-Induced Extrapyramidal Symptoms

PO: ADULTS, ELDERLY: Initially, 1 mg/day. Range: 5–15 mg/day in 3–4 divided doses.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

◀ALERT▶ Those older than 60 yrs tend to develop mental confusion, disorientation, agitation, psychotic-like symptoms. **Frequent:** Drowsiness, dry mouth. **Occasional:** Blurred vision, urinary retention, constipation, dizziness, headache, muscle cramps. **Rare:** Skin rash, seizures, depression.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hypersensitivity reaction (eczema, pruritus, rash, cardiac arrhythmias, photosensitivity) may occur. Overdosage may vary from CNS depression (sedation, apnea, cardiovascular collapse, death) to severe paradoxical reaction (hallucinations, tremor, seizures).

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Be alert to neurologic effects (headache, lethargy, mental confusion, agitation). Monitor elderly closely for paradoxical reaction. Assess for clinical reversal of symptoms (improvement of tremor of head/hands at rest, mask-like facial expression, shuffling gait, muscular rigidity).

PATIENT/FAMILY TEACHING

• Take after meals or with food. • Do not stop medication abruptly. • Report GI effects, palpitations, eye pain, rash, fever, heat intolerance. • Avoid alcohol, other CNS depressants. • May cause dry mouth, drowsiness. • Avoid tasks that require alertness, motor skills until response to drug is established. • Report persistant constipation, difficulty urinating.

trimethoprim

trye-**meth**-oh-prim
(Apo-Trimethoprim, Primsol)

FIXED-COMBINATION(S)

Bactrim, Septra: trimethoprim/sulfamethoxazole (a sulfonamide): 16 mg/80 mg/ml (injection), 40 mg/200 mg/5 ml (suspension), 80 mg/400 mg, 160 mg/800 mg (tablets).

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Folate antagonist. **CLINICAL:** Antibacterial.

USES

Treatment of UTI caused by susceptible strains of *E. coli, P. mirabilis, K. pneumoniae*. Treatment of acute otitis media due to *H. influenzae, S. pneumoniae*. **OFF-LABEL:** Treatment of pneumonia caused by *Pneumocystis jiroveci* (in combination with dapsone).

T

alcoholics, those with renal impairment or receiving prolonged high dosage.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess hematology baseline reports, serum renal function tests.

INTERVENTION/EVALUATION

Assess skin for rash. Evaluate food tolerance. Monitor serum hematology reports, renal function, LFT. Check for developing signs of hematologic toxicity (pallor, fever, sore throat, malaise, bleeding/bruising).

PATIENT/FAMILY TEACHING

• Space doses evenly. • Complete full length of therapy (10–14 days). • May take on empty stomach or with food if stomach upset occurs. • Avoid sun, ultraviolet light; use sunscreen, wear protective clothing. • Immediately report pallor, fatigue, sore throat, bruising/bleeding, discoloration of skin, fever, rash.

triptorelin

trip-toe-**rel**-in
(Trelstar, Trelstar Depot, Trelstar LA)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Gonadotropin-releasing hormone analogue.
CLINICAL: Antineoplastic.

T

USES

Treatment of advanced prostate cancer (alternate to orchiectomy or estrogen administration). **OFF-LABEL:** Treatment of endometriosis, precocious puberty, uterine sarcoma.

PRECAUTIONS

Contraindications: Hypersensitivity to luteinizing hormone-releasing hormone (LHRH), LHRH agonists, pregnancy. **Cautions:** None known.

ACTION

Through a negative feedback mechanism, inhibits gonadotropin hormone secretion. Circulating levels of luteinizing hormone (LH), follicle-stimulating hormone (FSH), testosterone, estradiol rise initially, then subside with continued therapy. **Therapeutic Effect:** Suppresses growth of abnormal prostate tissue.

AVAILABILITY (Rx)

Generic Drugs U

umeclidinium

ustekinumab

umeclidinium

ue-**mek**-li-**din**-ee-um
(Incruse Ellipta)
Do not confuse umeclidinium with aclidinium or clidinium.

FIXED COMBINATION(S)

Anoro Ellipta: umeclidinium/vilanterol (long acting beta2-adrenergic agonist): 62.5 mcg/25 mcg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Anticholinergic. **CLINICAL:** Bronchodilator.

USES

Long-term, once daily, maintenance treatment of airflow obstruction in pts with COPD.

PRECAUTIONS

Contraindications: Severe hypersensitivity to milk proteins or any drug components. **Cautions:** Bladder neck obstruction, myasthenia gravis, narrow-angle glaucoma, prostatic hypertrophy, urinary retention. Not recommended in pts with acutely deteriorating COPD requiring emergent relief of acute symptoms.

ACTION

Inhibits muscarinic M3 receptor in lungs, resulting in relaxation of bronchial smooth muscle. **Therapeutic Effect:** Relieves bronchospasm, reduces airway resistance, improves bronchodilation.

PHARMACOKINETICS

Rapidly absorbed following inhalation. Primarily metabolized by enzyme cytochrome P4502D6. Protein binding: 89%. Peak concentration: 5–15 min. Steady state reached within 14 days. **Half-life:** 11 hrs.

Pregnancy Category C. Children: Not indicated in this pt population. **Elderly:** No age-related precautions noted.

INTERACTIONS

DRUG: Anticholinergics, medications with anticholingeric properties may increase effects/risk of toxicity. **HERBAL:** None significant. **FOOD:** None known. **LAB VALUES:** None known.

AVAILABILITY (Rx)

Inhalation Powder: 62.5 mcg/capsule (in blister packs containing 30 doses).

ADMINISTRATION/HANDLING

Inhalation

Newly Opened Package Guidelines
• Peel back lid to open foil tray. Tray contains dessiccant for moisture reduction. Do not eat or inhale dessiccant; discard in trash. • Write "tray opened" and "discard" dates on inhaler label. • Clicking sound will be heard each time inhaler cover is fully opened, signaling dose is ready for inhalation (shown by decrease on number counter). • Do not open cover until ready for use. If cover is opened and closed without inhalation, dose will be lost. The prior dose will be left in inhaler but will no longer be available for administration. It is not possible to accidentally take double dose or extra dose. To avoid dose wasting after inhaler is ready, do not close cover until after dose is inhaled. • Before inhaler is used for first time, counter should show the number 30 (or 7 if sample or instructional pack being used), showing number of doses remaining. • Each time cover is closed, 1 dose is prepared. Counter counts down by 1 each time cover is opened. • If fewer than 10 doses remain, counter will show red in counter window.

Preparation • Open inhaler cover. • Slide cover down to expose mouthpiece. A "click" will be heard and counter will count down by 1 number. • Shaking not required for preparation. • If counter does not count down

as "click" is heard, inhaler will not deliver dose and device may be permanently malfunctioning.

Administration • Fully exhale with inhaler away from mouth and place mouthpiece between lips. • Do not block air vent with fingers. • Take one long, steady, deep breath and continue inhalation for as long as possible. • Remove mouthpiece and hold breath for 3–4 sec. Do not inhale another dose if medication not tasted or felt (dose was delivered). • Close lid cover.

Storage • Store at room temperature up to 6 wks after opening tray. • Do not refrigerate or freeze. • Protect from sunlight and moisture. • Discard after counter reaches 0. • Do not reuse inhaler.

INDICATIONS/ROUTES/DOSAGE

COPD

Inhalation: ADULTS, ELDERLY: One inhalation (62.5 mcg) once daily, at same time each day. **Maximum:** 1 inhalation/24 hrs.

Dose Modification

Deterioration of COPD: Discontinue treatment. Institute short-acting bronchodilators and supportive pulmonary therapy.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Mild to moderate: No dose adjustment. **Severe:** Use caution.

SIDE EFFECTS

Occasional (8%–5%): Nasopharyngitis, upper respiratory tract infection. **Rare (3%–1%):** Cough, arthralgia, viral respiratory tract infection, pharyngitis, myalgia, abdominal pain, toothache, tachycardia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Life-threatening asthma-related events, bronchospasm, worsening of COPD-related symptoms have been reported. Hypersensitivity reactions may occur (esp. in pts with undiagnosed, severe milk protein allergy or allergy to products containing lactose). Worsening of narrow-angle glaucoma (eye pain, blurry vision, visual halos, colored images in association with red eyes from conjunctival congestion and corneal edema) may occur. May cause worsening of urinary retention, esp. in pts with prostatic hypertrophy or bladder neck obstruction.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline ABG, O_2 saturation, vital signs; pulmonary function test, if applicable. Assess respiratory rate, depth, rhythm. Assess lung sounds for wheezing, rales. Screen for concomitant use of anticholinergic medications. Question history of asthma, BPH, bladder neck obstruction. Teach proper inhaler priming and administration techniques. Conduct ophthalmologic exam in pts with narrow-angle glaucoma.

INTERVENTION/EVALUATION

Routinely monitor O_2 saturation, vital signs. Auscultate lung sounds and monitor for symptom improvement. Recommend discontinuation of short-acting $beta_2$-agonists while on long-term therapy. Monitor for COPD deterioration, narrow-angle glaucoma, urinary retention/obstruction.

PATIENT/FAMILY TEACHING

• Report fever, productive cough, body aches, paradoxical bronchospasm, difficulty breathing; may indicate lung infection, worsening of COPD. • Therapy not intended for acute COPD symptom relief, and extra doses are not advised. • Report symptoms of acute narrow-angle glaucoma, urinary retention, bladder distention. • Refill prescription when counter on left of inhaler reaches red area of scale. • Follow manufacturer guidelines for proper use of inhaler. • Drink plenty

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45 mg q12wks. **PTS WITH COEXISTENT MODERATE TO SEVERE PLAQUE PSORIASIS WEIGHING MORE THAN 100 KG:** Initially, 90 mg repeated in 4 wks, then 90 mg q12wks.

Dosage in Renal/Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Occasional (8%–4%): Nasopharyngitis, upper respiratory tract infection, headache. **Rare (3%–1%):** Fatigue, diarrhea, back pain, dizziness, pruritus, injection site erythema, myalgia, depression.

ADVERSE EFFECTS/ TOXIC REACTIONS

Worsening of psoriasis, thrombocytopenia, malignancies, serious infections (cellulitis, diverticulitis, gastroenteritis, pneumonia, osteomyelitis, UTI, postoperative wound infection) have been noted. Reversible posterior leukoencephalopathy syndrome (headache, seizures, confusion, visual disturbances) occurs rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Pts should not receive live vaccines during treatment, 1 yr prior to initiating treatment, or 1 yr following discontinuation of treatment. Inform pt of duration of treatment and required monitoring procedures. Assess skin prior to therapy; document extent and location of psoriasis lesions. Test pt for tuberculosis infection prior to initiating treatment.

INTERVENTION/EVALUATION

Closely monitor for signs/symptoms of active tuberculosis during and after treatment. Assess skin throughout therapy for evidence of improvement of psoriasis lesions. Monitor for worsening of lesions.

PATIENT/FAMILY TEACHING

- If appropriate, pt may self-inject after proper training in preparation and injection technique.
- Report any signs of infection.
- If new diagnosis of malignancy occurs, inform physician of current treatment with ustekinumab.

Generic Drugs V

valacyclovir
valganciclovir
valproic acid
valsartan
vancomycin
vandetanib
vardenafil
varenicline
vasopressin
vedolizumab
vemurafenib
venlafaxine
verapamil
vilazodone
vinBLAStine
vinCRIStine
vinorelbine
vismodegib
vitamin A
vitamin D (vitamin D analogues)
calcitriol
doxercalciferol
ergocalciferol
paricalcitol
vitamin E
vitamin K
phytonadione ($vitamin\ K_1$)
vorapaxar
voriconazole
vorinostat
vortioxetene

Genital Herpes

Creatinine Clearance	Initial Episode	Recurrent Episode	Suppressive Therapy
10–29 ml/min	1 g q24h	500 mg q24h	500 mg q24–48h
Less than 10 ml/min	500 mg q24h	500 mg q24h	500 mg q24–48h

Chickenpox

PO: CHILDREN 2–17 YRS: 20 mg/kg/dose 3 times/day for 5 days. **Maximum:** 1 g/dose.

Dosage in Renal Impairment

Dosage and frequency are modified based on creatinine clearance. **HD:** Give dose postdialysis.

Cold Sores/Herpes Zoster

Creatinine Clearance	Herpes Zoster	Cold Sores
30–49 ml/min	1 g q12h	1 g q12h × 2 doses
10–29 ml/min	1 g q24h	500 mg q12h × 2 doses
Less than 10 ml/min	500 mg q24h	500 mg as single dose

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: Herpes zoster (17%–10%): Nausea, headache. **Genital herpes (17%):** Headache. **Occasional: Herpes zoster (7%–3%):** Vomiting, diarrhea, constipation (50 yrs and older), asthenia, dizziness (50 yrs and older). **Genital herpes (8%–3%):** Nausea, diarrhea, dizziness. **Rare: Herpes zoster (3%–1%):** Abdominal pain, anorexia. **Genital herpes (3%–1%):** Asthenia, abdominal pain.

ADVERSE EFFECTS/ TOXIC REACTIONS

Neutropenia, thrombocytopenia, renal failure occur rarely.

V

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of allergies, particularly to valacyclovir, acyclovir. Tissue cultures for herpes zoster, herpes simplex should be obtained before giving first dose (therapy may proceed before results are known). Assess medical history, esp. HIV infection, bone marrow or renal transplantation, renal/hepatic impairment.

INTERVENTION/EVALUATION

Evaluate cutaneous lesions. Monitor renal function, LFT, CBC, urinalysis. Provide analgesics, comfort measures for herpes zoster (esp. exhausting to elderly). Encourage fluids. Keep pt's fingernails short, hands clean.

PATIENT/FAMILY TEACHING

• Drink adequate fluids. • Do not touch lesions with fingers to avoid spreading infection to new site. • **Genital herpes:** Continue therapy for full length of treatment. • Space doses evenly. • Avoid sexual intercourse during duration of lesions to prevent infecting partner. • Valacyclovir does not cure herpes. • Report if lesions recur or do not improve. • Pap smears should be done at least annually due to increased risk of cervical cancer in women with genital herpes. • Initiate treatment at first sign of recurrent episode of genital herpes or herpes zoster (early treatment within first 24–48 hrs is imperative for therapeutic results).

valganciclovir

val-gan-**sye**-kloe-veer
(Apo-Valganciclovir, Valcyte)

■ **BLACK BOX ALERT** ■ May adversely affect spermatogenesis, fertility. Risk for granulocytopenia, anemia, thrombocytopenia.

Do not confuse Valcyte with Valium or Valtrex, or valganciclovir with valacyclovir.

Creatinine Clearance	Induction Dosage	Maintenance Dosage
60 ml/min or higher	900 mg twice daily	900 mg once daily
40–59 ml/min	450 mg twice daily	450 mg once daily
25–39 ml/min	450 mg once daily	450 mg every 2 days
10–24 ml/min	450 mg every 2 days	450 mg twice weekly

Dosage in Hepatic Impairment
No dose adjustment.

SIDE EFFECTS

Frequent (16%–9%): Diarrhea, neutropenia, headache. **Occasional (8%–3%):** Nausea. **Rare (Less Than 3%):** Insomnia, paresthesia, vomiting, abdominal pain, fever.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hematologic toxicity, including severe neutropenia (most common), anemia, thrombocytopenia, leukopenia, aplastic anemia, pancytopenia, bone marrow suppression may occur. Retinal detachment occurs rarely. Overdose may result in renal toxicity. May decrease sperm production, fertility.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, serum chemistries, renal function, urinalysis. Receive full medication history.

INTERVENTION/EVALUATION

Monitor I&O, ensure adequate hydration (minimum 1,500 ml/24 hrs). Diligently evaluate CBC for decreased WBCs, Hgb, Hct, platelets, changes in urinary characteristics, consistency. Question pt regarding vision, therapeutic improvement, complications.

PATIENT/FAMILY TEACHING

• Valganciclovir provides suppression, not cure, of CMV retinitis. • Frequent blood tests are necessary during therapy because of toxic nature of drug. • Ophthalmologic exam q4–6wks during treatment is advised. • Report any new symptom promptly. • May temporarily or permanently inhibit sperm production in men, suppress fertility in women. • Barrier contraception should be used during and for 90 days after therapy (mutagenic potential). • Swallow whole; do not chew, crush, dissolve, or divide. • Avoid handling broken/crushed tablets, oral solution. • Report fever, chills, unusual bleeding/bruising, urinary changes.

valproic acid

val-**pro**-ick **as**-id
(Apo-Divalproex, Depacon, Depakene, Depakote, Depakote ER, Depakote Sprinkle, Novo-Divalproex, Stavzor)

■ **BLACK BOX ALERT** ■ Embryo, fetal neural tube defects (spina bifida) have occurred. Life-threatening pancreatitis, complete hepatic failure have occurred.
Do not confuse Depakene with Depakote.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Carboxylic acid derivative. **CLINICAL:** Anticonvulsant, antimanic, antimigraine.

USES

Monotherapy/adjunctive therapy of simple and complex partial seizures, simple and complex absence seizures. Adjunctive therapy of multiple seizures **Additional uses for Depakote, Depakote ER, Stavzor:** Treatment of manic episodes with bipolar disorder, prophylaxis of migraine headaches. **OFF-LABEL:** Refractory status epilepticus, diabetic neuropathy.

PRECAUTIONS

Contraindications: Active hepatic disease, urea cycle disorders, known mitochondrial disorders; migraine prevention

30–60 mg/kg/day. **Usual adult dosage:** 1,000–2,500 mg/day. ***(Stavzor)*:** Initially, 10–15 mg/kg/day, may increase by 5–10 mg/kg/day at 1-wk intervals to achieve desired response. **Maximum:** 60 mg/kg/day.

IV: ADULTS, ELDERLY, CHILDREN: Same frequency as oral dose.

Manic Episodes

PO *(Depakote)*: ADULTS, ELDERLY: Initially, 750 mg/day in divided doses. **Maximum:** 60 mg/kg/day.

PO *(Extended-Release [Depakote ER])*: Initially, 25 mg/kg/day once daily. **Maximum:** 60 mg/kg/day. ***(Delayed-Release [Stavzor])*:** Initially, 750 mg/day in divided dose. Titrate to lowest therapeutic dose. **Maximum:** 60 mg/kg/day.

Prevention of Migraine Headaches

PO *(Extended-Release [Depakote ER])*: ADULTS, ELDERLY: Initially, 500 mg/day for 7 days. May increase up to 1,000 mg/day.

PO *(Delayed-Release [Depakote])*: ADULTS, ELDERLY, CHILDREN 16 YRS AND OLDER: Initially, 250 mg twice daily. May increase up to 1,000 mg/day. **ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: *(Stavzor)*:** 250 mg twice daily. May increase to 1,000 mg/day.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Not recommended.

SIDE EFFECTS

Frequent: Epilepsy: Abdominal pain, irregular menses, diarrhea, transient alopecia, indigestion, nausea, vomiting, tremors, fluctuations in body weight. **Mania (22%–19%):** Nausea, drowsiness. **Occasional: Epilepsy:** Constipation, dizziness, drowsiness, headache, skin rash, unusual excitement, restlessness. **Mania (12%–6%):** Asthenia, abdominal pain, dyspepsia, rash. **Rare: Epilepsy:** Mood changes, diplopia, nystagmus, spots before eyes, unusual bleeding/bruising.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hepatotoxicity may occur, particularly in first 6 mos of therapy. May be preceded by loss of seizure control, malaise, weakness, lethargy, anorexia, vomiting rather than abnormal serum hepatic function test results. Blood dyscrasias may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Anticonvulsant: Review history of seizure disorder (intensity, frequency, duration, level of consciousness). Initiate safety measures, quiet dark environment. CBC should be performed before and 2 wks after therapy begins, then 2 wks following maintenance dose. Obtain baseline hepatic function tests. **Antimanic:** Assess behavior, appearance, emotional status, response to environment, speech pattern, thought content. **Antimigraine:** Question pt regarding onset, location, duration of migraine, possible precipitating symptoms.

INTERVENTION/EVALUATION

Monitor serum LFT, ammonia, CBC. **Anticonvulsant:** Observe frequently for recurrence of seizure activity. Monitor serum hepatic function tests, CBC. Assess skin for ecchymoses, petechiae. Monitor for clinical improvement (decrease in intensity/frequency of seizures). **Antimanic:** Question for suicidal ideation. Assess for therapeutic response (interest in surroundings, increased ability to concentrate, relaxed facial expression). **Antimigraine:** Evaluate for relief of migraine headache and resulting photophobia, phonophobia, nausea, vomiting. **Therapeutic serum level:** 50–100 mcg/ml; **toxic serum level:** greater than 100 mcg/ml.

PATIENT/ FAMILY TEACHING

- Do not abruptly discontinue medication after long-term use (may precipitate

V

may worsen hypertension. **Black cohosh, periwinkle** may increase antihypertensive effects. **FOOD:** None known. **LAB VALUES:** May increase serum bilirubin, ALT, AST, BUN, creatinine, potassium. May decrease Hgb, Hct, WBC.

AVAILABILITY (Rx)

Tablets: 40 mg, 80 mg, 160 mg, 320 mg.

ADMINISTRATION/HANDLING

PO

- Give without regard to meals.

INDICATIONS/ROUTES/DOSAGE

Hypertension

PO: ADULTS, ELDERLY: Initially, 80–160 mg/day in pts who are not volume depleted. **Maximum:** 320 mg/day. **CHILDREN 6–16 YRS:** Initially, 1.3 mg/kg once daily (**maximum:** 40 mg). May increase up to 2.7 mg/kg once daily (**maximum:** 160 mg/day).

HF

PO: ADULTS, ELDERLY: Initially, 40 mg twice daily. May increase up to 160 mg twice daily. **Maximum:** 320 mg/day.

Post-MI, Left Ventricular Dysfunction

PO: ADULTS, ELDERLY: May initiate 12 hrs or longer following MI. Initially, 20 mg twice daily. May increase within 7 days to 40 mg twice daily. May further increase up to target dose of 160 mg twice daily.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Rare (2%–1%): Insomnia, fatigue, heartburn, abdominal pain, dizziness, headache, diarrhea, nausea, vomiting, arthralgia, edema.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdosage may manifest as hypotension, tachycardia. Bradycardia occurs less often. Viral infection, upper respiratory tract infection (cough, pharyngitis, sinusitis, rhinitis) occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain B/P, apical pulse immediately before each dose, in addition to regular monitoring (be alert to fluctuations). If excessive reduction in B/P occurs, place pt in supine position, feet slightly elevated. Question for possibility of pregnancy. Assess medication history (esp. diuretic). Question for history of hepatic/renal impairment, renal artery stenosis, history of severe HF. Obtain baseline chemistries, blood counts.

INTERVENTION/EVALUATION

Maintain hydration (offer fluids frequently). Assess for evidence of upper respiratory infection. Monitor serum electrolytes, renal function, LFT, Hgb, Hct, urinalysis, B/P, pulse. Observe for symptoms of hypotension.

PATIENT/ FAMILY TEACHING

• Take measures to avoid pregnancy • Inform physician as soon as possible if pregnancy occurs. • Report any sign of infection (sore throat, fever). • Do not stop taking medication. • Report swelling of extremities, chest pain, palpitations.

vancomycin

van-koe-**mye**-sin
(Vancocin)
Do not confuse vancomycin with clindamycin, gentamicin, tobramycin, or Vibramycin.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Tricyclic glycopeptide antibiotic. **CLINICAL:** Antibiotic.

USES

Systemic: Treatment of infections caused by staphylococcal, streptococcal spp. bacteria. **PO:** Treatment of antibiotic colitis, pseudomembranous colitis, antibiotic-associated diarrhea produced by *C. difficile*

IV COMPATIBILITIES

Amiodarone (Cordarone), calcium gluconate, dexmedetomidine (Precedex), diltiazem (Cardizem), hydromorphone (Dilaudid), insulin, lorazepam (Ativan), magnesium sulfate, midazolam (Versed), morphine, nicardipine (Cardene), potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

Usual Parenteral Dosage

IV: ADULTS, ELDERLY: 10–20 mg/kg/dose q8–12h. Dosage requires adjustment in renal impairment. **CHILDREN OLDER THAN 1 MO:** 10–15 mg/kg/dose q6h. **NEONATES:** 15 mg/kg q24h up to 10–15 mg/kg/dose q6–8h.

Staphylococcal Enterocolitis, Antibiotic-Associated Pseudomembranous Colitis Caused by *Clostridium difficile*

PO: ADULTS, ELDERLY: 125–500 mg 4 times/day for 7–10 days. **CHILDREN:** 40 mg/kg/day in 3–4 divided doses for 7–10 days. **Maximum:** 2 g/day.

Dosage in Renal Impairment

After loading dose, subsequent dosages and frequency are modified based on creatinine clearance, severity of infection, and serum concentration of drug.

Dosage in Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

Frequent: PO: Bitter/unpleasant taste, nausea, vomiting, mouth irritation (with oral solution). **Rare: Parenteral:** Phlebitis, thrombophlebitis, pain at peripheral IV site, dizziness, vertigo, tinnitus, chills, fever, rash, necrosis with extravasation. **PO:** Rash.

ADVERSE EFFECTS/ TOXIC REACTIONS

Nephrotoxicity (acute kidney injury, acute tubular necrosis, renal failure), ototoxicity (temporary or permanent hearing loss) may occur. "Red man syndrome" or "red neck syndrome" is common adverse reaction characterized by pruritus, urticaria, erythema, angioedema, tachycardia, hypotension, myalgia, maculopapular rash (usually appears on face, neck, upper torso). Cardiovascular toxicity (cardiac depression, arrest) occurs rarely. Onset usually occurs within 30 min of start of infusion, resolves within hrs following infusion. May result from too-rapid rate of infusion.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Avoid other ototoxic, nephrotoxic medications if possible. Obtain culture, sensitivity test before giving first dose (therapy may begin before results are known).

INTERVENTION/EVALUATION

Monitor serum renal function tests, I&O. Assess skin for rash. Check hearing acuity, balance. Monitor B/P carefully during infusion. Evaluate IV site for phlebitis (heat, pain, red streaking over vein). Obtain vancomycin peak/trough level as ordered by physician or pharmacist. **Therapeutic serum level: peak:** 20–40 mcg/ml; **trough:** 10–20 mcg/ml. **Toxic serum level: peak:** greater than 40 mcg/ml; **trough:** greater than 20 mcg/ml.

PATIENT/ FAMILY TEACHING

• Continue therapy for full length of treatment. • Doses should be evenly spaced. • Report ringing in ears, hearing loss, changes in urinary frequency or consistency. • Lab tests are important part of total therapy.

vandetanib

van-**det**-a-nib
(Caprelsa)

■ **BLACK BOX ALERT** ■ Can prolong QT interval (torsades de pointes and sudden cardiac death reported). Do not use in pts with hypokalemia, hypocalcemia, hypomagnesemia, congenital long QT

V

INDICATIONS/ROUTES/DOSAGE

Thyroid Cancer

PO: ADULTS, ELDERLY: 300 mg once daily.

Dosage Adjustment for QT Prolongation or Toxicity

Interrupt therapy until resolved or improved, then restart at 100–200 mg once daily.

Dosage in Renal Impairment

Creatinine clearance less than 50 ml/min: 200 mg once daily.

Dosage in Hepatic Impairment

Mild: No dose adjustment.
Moderate to severe: Not recommended.

SIDE EFFECTS

Frequent (57%–21%): Diarrhea/colitis, rash, dermatitis acneiform/acne, nausea, headache, fatigue, anorexia, abdominal pain. **Occasional (15%–10%):** Dry skin, vomiting, asthenia, photosensitivity, insomnia, nasopharyngitis, dyspepsia, cough, pruritus, weight decrease, depression.

ADVERSE EFFECTS/ TOXIC REACTIONS

Prolonged QT interval resulting in torsades de pointes, ventricular arrhythmias, sudden cardiac death have been reported. Frequent diarrhea may result in electrolyte imbalances. Severe skin reactions, including Stevens-Johnson syndrome, have been reported. Interstitial lung disease (ILD) or pneumonitis reported (may result in respiratory-related death). Consider ILD in pts with hypoxia, pleural effusion, cough, dyspnea. Ischemic cerebrovascular events have been reported. Life-threatening events including hypertensive crisis, reversible posterior leukoencephalopathy syndrome (RPLS) have been noted. Adverse reactions resulting in death included respiratory failure/arrest, aspiration pneumonia, cardiac failure, sepsis, GI bleeding.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain CBC with differential, serum chemistries, magnesium, ionized calcium, TSH, UA, EKG, vital signs. Obtain negative urine pregnancy before therapy. Question for history of congenital long QT syndrome, HF, arrhythmias, hepatic/renal impairment, seizures, CVA, hemorrhagic events, HTN. Obtain full medication history including contraception. Perform full head-to-toe exam including visual acuity, thorough skin assessment.

INTERVENTION/EVALUATION

Monitor blood levels including electrolytes esp. during episodes of diarrhea. Obtain EKG during wks 2–4, wks 8–12, then every 3 mos thereafter. Obtain EKG for palpitations, chest pain, hypokalemia, hyperkalemia, hypocalcemia, bradycardia, ventricular arrhythmias, syncope. Report any respiratory changes including dyspnea, cough (may indicate ILD). Reversible posterior leukoencephalopathy syndrome should be considered in pts with seizures, headache, visual disturbances, confusion, altered mental status. Ophthalmologic exams including slit lamp recommended in pts with visual disturbances.

PATIENT/FAMILY TEACHING

• Blood levels, EKGs will be routinely monitored. • Strictly avoid pregnancy. Contraception should be taken during treatment and 4 mos after discontinuation. • Changes in mental status, seizures, headache, blurry vision, trouble speaking, one-sided weakness may indicate stroke, high blood pressure crisis, or life-threatening brain swelling. Immediately report any newly prescribed medications. • Do not take herbal products. • Limit exposure to sunlight. • Report any yellowing of skin or eyes, abdominal pain, bruising, black/tarry stools, dark urine, decreased urine output, skin changes. • Report palpitations, chest pain, shortness of breath, dizziness, fainting (may indicate arrhythmia).

V

Dosage with Concurrent Ritonavir, Fosamprenavir/Ritonavir, Lopinavir/Ritonavir, Tipranavir
PO: ADULTS: 2.5 mg in 72-hr period.

Dosage with Concurrent Atazanavir, Clarithromycin, Ketoconazole (at 400 mg/day), Itraconazole (at 400 mg/day), Indinavir, Saquinavir, Fosamprenavir/Nelfinavir
PO: ADULTS: 2.5 mg in 24-hr period.

Dosage with Concurrent Ketoconazole (at 200 mg/day), Itraconazole (at 200 mg/day), Erythromycin
PO: ADULTS: 5 mg in 24-hr period.

Dosage in Renal Impairment
No dose adjustment.

Dosage in Moderate Hepatic Impairment
PO: For pts with Child-Pugh class B hepatic impairment, dosage is 5 mg 1 hr before sexual activity. ODT (Staxyn) not recommended.

SIDE EFFECTS

Occasional: Headache, flushing, rhinitis, indigestion, sudden hearing loss. **Rare (Less Than 2%):** Dizziness, changes in color vision, blurred vision, postural hypotension.

ADVERSE EFFECTS/ TOXIC REACTIONS

Prolonged erections (lasting over 4 hrs), priapism (painful erections lasting over 6 hrs) occur rarely.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess cardiovascular status, medication history (esp. alpha-adrenergic blockers, nitrates) before initiating treatment for erectile dysfunction.

INTERVENTION/EVALUATION

Monitor B/P. Assess quality of sexual activity.

PATIENT/FAMILY TEACHING

• Has no effect in absence of sexual stimulation. • Seek treatment immediately if erection persists for over 4 hrs. • Avoid grapefruit products. • Report sudden decrease or loss of hearing or vision. • Do not take nitrates for chest pain.

varenicline

var-**en**-i-kleen
(Champix, Chantix)

■ **BLACK BOX ALERT** ■ Risk of psychiatric symptoms and suicidal behavior. Agitation, hostility, depressed mood have been reported.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Selective partial nicotine agonist. **CLINICAL:** Smoking deterrent.

USES

Aid to smoking cessation treatment.

PRECAUTIONS

Contraindications: None known. **Cautions:** Renal impairment, history of suicidal ideation, bipolar disorder, depression, schizophrenia.

ACTION

Prevents nicotine stimulation of mesolimbic system associated with nicotine addiction. **Therapeutic Effect:** Decreases desire to smoke.

PHARMACOKINETICS

Completely absorbed following PO administration. Absorption unaffected by food, time of day dosing. Maximum plasma concentration: 3–4 hrs; steady-state condition: within 4 days. Protein binding: 20%. Minimal metabolism. Removed by hemodialysis. Primarily excreted unchanged in urine. **Half-life:** 24 hrs.

V

of pulseless electrical activity, ventricular fibrillation or tachycardia, and vasodilatory shock with hypotension unresponsive to fluids or exogenous catecholamines. Adjunct in treatment of acute massive GI hemorrhage or esophageal varices.

PRECAUTIONS

Contraindications: None known. **Cautions:** Seizures, migraine, asthma, vascular disease, renal/cardiac disease, goiter (with cardiac complications), arteriosclerosis, nephritis.

ACTION

Increases reabsorption of water by renal tubules. Directly stimulates smooth muscle in GI tract. **Therapeutic Effect:** Causes peristalsis, vasoconstriction.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	N/A	N/A	0.5–1 hr
IM, subcutaneous	1–2 hrs	N/A	2–8 hrs

Distributed throughout extracellular fluid. Metabolized in liver, kidney. Primarily excreted in urine. **Half-life:** 10–20 min.

recent-onset CNS demyelinating disorders including multiple sclerosis. Not recommended during active infection.

ACTION

Binds to T-lymphocyte integrin receptors and blocks the interaction with mucosal addressin cell adhesion molecule-1 (MAdCAM-1). Inhibits migration and homing of memory T-lymphocytes into inflamed GI tissue. **Therapeutic Effect:** Reduces chronic inflammation of colon.

PHARMACOKINETICS

Metabolism not specified. Elimination not specified. **Half-life:** 25 days.

ACTION

Inhibits kinase activity of certain mutated forms of BRAF. **Therapeutic Effect:** Blocks tumor cell proliferation in melanoma with the mutation.

PHARMACOKINETICS

Readily absorbed after PO administration. Protein binding: 99%. Minimally metabolized in liver. Primarily excreted in feces (94%). **Half-life:** 57 hrs. Range: 30–120 hrs.

Category C. Children: Children, adolescents are at increased risk for suicidal ideation and behavior, worsening depression, esp. during first few mos of therapy. **Elderly:** No age-related precautions noted.

INTERACTIONS

DRUG: **CYP3A4 inhibitors (e.g., ketoconazole)** may increase concentration/effects. **MAOIs** may cause neuroleptic malignant syndrome, autonomic instability (including rapid fluctuations of vital signs), extreme agitation, hyperthermia, altered mental status, myoclonus, rigidity, coma. **Triptans, selegiline, SSRIs, trazodone, tricyclic antidepressants** may increase risk of serotonin syndrome. May increase risk of bleeding with **NSAIDs, aspirin, warfarin.** **HERBAL:** **Gotu kola, kava kava, St. John's wort, valerian** may increase CNS depression. **St. John's wort** may increase risk of serotonin syndrome. **FOOD:** None known. **LAB VALUES:** May increase serum cholesterol CPK, LDH, prolactin, GGT.

AVAILABILITY (Rx)

Tablets: 25 mg, 37.5 mg, 50 mg, 75 mg, 100 mg.

V

renal impairment may require dosage adjustment.

INTERACTIONS

DRUG: **Beta-adrenergic blockers** may have additive negative effects on heart rate, AV conduction, or contractility. **Statins** may increase risk of myopathy, rhabdomyolysis. May increase concentration of **cyclosporine, carbamazepine.** May increase **digoxin** concentration. **CYP3A4 inducers (e.g., rifampin)** may decrease concentration/effects. **HERBAL:** **St. John's wort** may decrease concentration/effects. **Ephedra, ginseng, ginger, licorice, yohimbe, black cohosh, periwinkle** may worsen hypertension. **FOOD:** **Grapefruit products** may increase concentration. **LAB VALUES:** EKG may show prolonged PR interval. **Therapeutic serum level:** 0.08–0.3 mcg/ml; **toxic serum level:** N/A.

AVAILABILITY (Rx)

Injection Solution: 2.5 mg/ml. **Tablets (Calan):** 40 mg, 80 mg, 120 mg.

V

PRECAUTIONS

Contraindications: Use of MAOIs intended to treat psychiatric disorders (with or within 14 days of stopping vilazodone or MAOI), starting vilazodone in pts receiving linezolid. **Cautions:** History of seizures; pts at risk for suicide, hepatic impairment, elderly.

ACTION

Enhances serotonergic activity in CNS by selectively inhibiting reuptake of serotonin. **Therapeutic Effect:** Relieves depression.

PHARMACOKINETICS

Readily absorbed from GI tract. Peak concentration: 4–5 hrs. Widely distributed. Protein binding: 96%–99%. Metabolized in liver. **Half-life:** 25 hrs.

established (may cause dizziness). • Slowly go from lying to standing. • Take with food. • Do not suddenly stop taking medication; withdraw gradually. • Report suicidal ideation, signs of mania/hypomania. Avoid alcohol.

*vinBLAStine

HIGH ALERT

vin-**blas**-teen

■ **BLACK BOX ALERT** ■ Must be administered by personnel trained in administration/handling of chemotherapeutic agents. Fatal if given intrathecally (ascending paralysis, death). Vesicant; avoid extravasation.

Do not confuse vinblastine with vincristine or vinorelbine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Vinca alkaloid. **CLINICAL:** Antineoplastic.

USES

Treatment of Hodgkin's and non-Hodgkin's lymphoma, advanced stage of mycosis fungoides, advanced testicular carcinoma, Kaposi's sarcoma, Letterer-Siwe disease, breast carcinoma, choriocarcinoma. **OFF-LABEL:** Treatment of bladder, ovarian cancer; non–small-cell lung cancer; soft tissue sarcoma, melanoma.

PRECAUTIONS

Contraindications: Bacterial infection, significant granulocytopenia. **Cautions:** Hepatic impairment, severe leukopenia, neurotoxicity, recent exposure to radiation therapy, chemotherapy, ischemic heart disease, preexisting pulmonary disease.

ACTION

Binds to tubulin, inhibiting microtubule formation; may interfere with nucleic acid, protein synthesis. **Therapeutic Effect:** Inhibits cell division by disrupting mitotic spindle.

PHARMACOKINETICS

Does not cross blood-brain barrier. Protein binding: 99%. Metabolized in liver. Primarily eliminated in feces by biliary system. **Half-life:** 24.8 hrs.

V

Rate of Administration • Inject into tubing of running IV infusion or directly into vein over 1 min (IV infusion over 5–15 min). • Do not inject into extremity with impaired, potentially impaired circulation caused by compression or invading neoplasm, phlebitis, varicosity. • Rinse syringe, needle with venous blood before withdrawing needle (minimizes possibility of extravasation). • Extravasation may result in cellulitis, phlebitis. Large amount of extravasation may result in tissue sloughing. If extravasation occurs, give local injection of hyaluronidase, apply warm compresses.
Storage • Refrigerate unopened vials. • Solution appears clear, colorless. • Following reconstitution, solution is stable for 30 days if refrigerated. • Discard if solution is discolored or precipitate forms.

IV INCOMPATIBILITY

Furosemide (Lasix).

IV COMPATIBILITIES

Allopurinol (Aloprim), cisplatin (Platinol AQ), cyclophosphamide (Cytoxan), doxorubicin (Adriamycin), etoposide (VePesid), 5-fluorouracil, gemcitabine (Gemzar), granisetron (Kytril), heparin, leucovorin, methotrexate, ondansetron (Zofran), paclitaxel (Taxol), vinorelbine (Navelbine).

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ Dosage individualized based on clinical response, tolerance to adverse effects. When used in combination therapy, consult specific protocols for optimum dosage, sequence of drug administration.

Usual Dosage

IV: ADULTS, ELDERLY: 3.7–7.4 mg/m² q7days. **Maximum:** 18.5 mg/m². **CHILDREN:** 2.5–6 mg/m² q7–14days. **Maximum:** 12.5 mg/m²/wk.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Direct serum bilirubin concentration greater than 3 mg/dL: Reduce dose by 50%.

SIDE EFFECTS

Frequent: Nausea, vomiting, alopecia. **Occasional:** Constipation, diarrhea, rectal bleeding, headache, paresthesia (occur 4–6 hrs after administration, persist for 2–10 hrs), malaise, asthenia, dizziness, pain at tumor site, jaw/face pain, depression, dry mouth. **Rare:** Dermatitis, stomatitis, phototoxicity, hyperuricemia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hematologic toxicity manifested most commonly as leukopenia, less frequently as anemia. WBC reaches its nadir 4–10 days after initial therapy, recovers within 7–14 days (high dosage may require 21-day recovery period). Thrombocytopenia is usually mild and transient, with recovery occurring in few days. Hepatic insufficiency may increase risk of toxicity. Acute shortness of breath, bronchospasm may occur, particularly when administered concurrently with mitomycin.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Nausea, vomiting easily controlled by antiemetics. Discontinue therapy if WBC, platelet counts fall abruptly (unless drug is clearly destroying tumor cells in bone marrow). Obtain CBC weekly or before each dosing.

INTERVENTION/EVALUATION

If neutrophils fall below 2,000/mm³, assess diligently for signs of infection. Assess for stomatitis; maintain strict oral hygiene. Monitor for hematologic toxicity: infection (fever, sore throat, signs of local infection), unusual bruising/bleeding from any site, symptoms of anemia (excessive fatigue, weakness). Monitor daily pattern of bowel activity, stool consistency. Avoid constipation.

V

PATIENT/FAMILY TEACHING

• Immediately report any pain/burning at injection site during administration. • Pain at tumor site may occur during or shortly after injection. • Do not have immunizations without physician approval (drug lowers resistance). • Avoid crowds, those with infection. • Promptly report fever, sore throat, signs of local infection, unusual bruising/bleeding from any site. • Hair loss is reversible, but new hair growth may have different color, texture. • Report persistent nausea/vomiting. • Avoid constipation by increasing fluids, bulk in diet, exercise as tolerated.

*vinCRIStine

HIGH ALERT

vin-**cris**-teen
(Marqibo, Vincasar PFS)

■ **BLACK BOX ALERT** ■ Must be administered by personnel trained in administration/handling of chemotherapeutic agents. Fatal if given intrathecally (ascending paralysis, death). Vesicant; avoid extravasation. Marqibo and Vincasar are not interchangeable.

Do not confuse vincristine with vinblastine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Vinca alkaloid. **CLINICAL:** Antineoplastic.

USES

Vincasar: Treatment of acute lymphocytic leukemia (ALL), Hodgkin's lymphoma, advanced non-Hodgkin's lymphomas, neuroblastoma, rhabdomyosarcoma, Wilms tumor. **Marqibo:** Relapsed Philadelphia chromosome negative (Ph^-) ALL. **OFF-LABEL:** **Vincasar:** Treatment of multiple myeloma, chronic lymphocytic leukemia (CLL), brain tumors, small cell lung cancer, ovarian germ cell tumors, Ewing's sarcoma, gestational trophoblastic tumors, retinoblastoma.

PRECAUTIONS

Contraindications: Demyelinating form of Charcot-Marie-Tooth syndrome. Intrathecal administration. **Caution:** Hepatic impairment, pts receiving radiation therapy through ports (including liver), neurotoxicity, preexisting neuromuscular disease, hepatobiliary dysfunction, elderly.

ACTION

Binds to tubulin, inhibiting microtubule formation; may interfere with nucleic acid/protein synthesis. **Therapeutic Effect:** Inhibits cell division by disrupting mitotic spindle.

PHARMACOKINETICS

Does not cross blood-brain barrier. Protein binding: 75%. Metabolized in liver. Primarily eliminated in feces by biliary system. **Half-life:** 24 hrs. Marqibo: 45 hrs.

ADMINISTRATION/HANDLING

or high-dose therapy may produce foot/wrist drop, difficulty walking, slapping gait, ataxia, muscle wasting. Acute uric acid nephropathy may occur.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline CBC, LFT. Offer pt/family emotional support.

INTERVENTION/EVALUATION

Monitor serum uric acid levels, renal/hepatic function studies, CBC. Assess Achilles tendon reflex. Monitor daily pattern of bowel activity, stool consistency. Monitor for ptosis, diplopia, blurred vision. Question pt regarding urinary changes.

PATIENT/FAMILY TEACHING

• Immediately report any pain/burning at injection site during administration. • Hair loss is reversible, but new hair growth may have different color/texture. • Report persistent nausea/vomiting. • Report signs of peripheral neuropathy (burning/numbness of bottom of feet, palms of hands). • Report fever, sore throat, unusual bleeding/bruising, shortness of breath.

vinorelbine HIGH ALERT

vin-oh-**rel**-been
(Navelbine)

■ **BLACK BOX ALERT** ■ Must be administered by personnel trained in administration/handling of chemotherapeutic agents. Fatal if given intrathecally (ascending paralysis, death). Extravasation produces thrombophlebitis, local tissue necrosis. May produce severe granulocytopenia.

Do not confuse vinorelbine with vinblastine or vincristine.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Vinca alkaloid. **CLINICAL:** Antineoplastic.

USES

Single agent or in combination with cisplatin for treatment of unresectable, advanced, non–small-cell lung cancer (NSCLC). **OFF-LABEL:** Treatment of metastatic breast cancer, cervical carcinoma, ovarian carcinoma, malignant pleural mesothelioma, soft tissue sarcoma, small-cell lung cancer.

PRECAUTIONS

Contraindications: Granulocyte count before treatment of less than 1,000 cells/mm^3. **Cautions:** Compromised marrow reserve due to prior chemotherapy/radiation therapy; hepatic impairment, neurotoxicity; neuropathy, pulmonary impairment.

ACTION

Binds to tubulin, inhibiting microtubule formation; may interfere with nucleic acid protein synthesis. **Therapeutic Effect:** Prevents cellular division by disrupting formation of mitotic spindle.

PHARMACOKINETICS

Widely distributed after IV administration. Protein binding: 80%–90%. Metabolized in liver. Primarily eliminated in feces by biliary system. **Half-life:** 28–43 hrs.

may produce an acute pulmonary reaction. **Paclitaxel** may increase neuropathy. **CYP3A4 inhibitors (e.g., ketoconazole)** may increase concentration/effects. **HERBAL: St. John's wort** may decrease concentration. **FOOD:** None known. **LAB VALUES:** May increase serum bilirubin, alkaline phosphatase, ALT, AST.

AVAILABILITY (Rx)

Injection Solution: 10 mg/ml (1-ml, 5-ml vials).

ADMINISTRATION/HANDLING

after surgery, or pts who are not candidates for surgery or radiation.

PRECAUTIONS

◀ALERT▶ Do not donate blood products for at least 7 mos after discontinuation.

Contraindications: None known. **Cautions:** Hepatic/renal impairment.

ACTION

An inhibitor of Hedgehog pathway, binding to and inhibiting smoothened, a transmembrane protein involved in hedgehog signal transduction. **Therapeutic Effect:** Inhibits tumor cell growth and metastasis of basal cell carcinoma.

PHARMACOKINETICS

Metabolized in liver. Protein binding: 99%. Excreted in feces (82%), urine (4%). **Half-life:** 4 days (daily dosing), 12 days (single dose).

3 days, then 50,000 units/day for 14 days followed by oral supplementation: 10,000–20,000 units once daily for 2 mos. **CHILDREN 1–7 YRS:** 17,500–35,000 units/day for 10 days followed by oral supplementation: 5,000–10,000 units once daily for 2 mos. **INFANTS YOUNGER THAN 1 YR:** 7,500–15,000 units/day for 10 days followed by oral supplementation: 5,000–10,000 units once daily for 2 mos.

Malabsorption Syndrome

PO: ADULTS, ELDERLY, CHILDREN 8 YRS AND OLDER: 10,000–50,000 units/day.

Dosage in Renal/Hepatic Impairment

No dose adjustment.

SIDE EFFECTS

None known.

ADVERSE EFFECTS/ TOXIC REACTIONS

Chronic overdose produces malaise, nausea, vomiting, drying/cracking of skin/lips, inflammation of tongue/gums, irritability, alopecia, night sweats. Bulging fontanelles have occurred in infants.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Closely supervise for overdosage symptoms during prolonged daily administration over 25,000 international units. Monitor for therapeutic serum vitamin A levels (80–300 international units/ml).

PATIENT/FAMILY TEACHING

- Foods rich in vitamin A include cod, halibut, tuna, shark (naturally occurring vitamin A found only in animal sources). • Avoid taking mineral oil, cholestyramine (Questran) while taking vitamin A.

vitamin D (vitamin D analogues)

calcitriol

kal-si-**trye**-ole
(Calcijex, Rocaltrol, Vectical)

doxercalciferol

dox-er-kal-**sif**-e-role
(Hectorol)

ergocalciferol

er-goe-kal-**sif**-e-role
(Drisdol)

paricalcitol

par-i-**kal**-si-tol
(Zemplar)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Fat-soluble vitamin. **CLINICAL:** Vitamin D analogue.

USES

Calcitriol: Manage hypocalcemia in pts on chronic renal dialysis, secondary hypoparathyroidism in chronic kidney disease (CKD), manage hypocalcemia in hypoparathyroidism. **(Topical):** Treatment of mild to moderate plaque psoriasis. **Doxercalciferol:** Treatment of secondary hyperparathyroidism in CKD. **Ergocalciferol:** Treatment of refractory rickets, hypophosphatemia, hypoparathyroidism, dietary supplement. **Paricalcitol: (Intravenous):** Treatment/prevention of secondary hyperparathyroidism associated

Canadian trade name

ADMINISTRATION/HANDLING

Calcitriol

PO

- May take without regard to food.

Canadian trade name

need to be restricted (foods high in phosphorus include beans, dairy products, nuts, peas, whole-grain products). • Oral formulations may cause hypersensitivity reactions. Avoid excessive doses. • Report signs/symptoms of hypercalcemia (headache, weakness, drowsiness, nausea, vomiting, dry mouth, constipation, metallic taste, muscle or bone pain). • Maintain adequate hydration. • Avoid changes in diet or supplemental calcium intake (unless directed by health care professional). • Avoid magnesium-containing antacids in pts with renal failure.

vitamin E

vite-a-min E
(Aquasol E, E-Gems, Key-E, Key-E Kaps)
Do not confuse Aquasol E with Anusol or Aquasol A.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Fat-soluble vitamin. **CLINICAL:** Nutritional supplement.

USES

Prevention/treatment of vitamin E deficiency.

PRECAUTIONS

Contraindications: None known. **Cautions:** None known.

ACTION

Prevents oxidation of vitamins A and C, protects fatty acids from attack by free radicals, protects RBCs from hemolysis by oxidizing agents. **Therapeutic Effect:** Prevents/treats vitamin E deficiency.

PHARMACOKINETICS

Variably absorbed from GI tract (requires bile salts, dietary fat, normal pancreatic function). Primarily concentrated in adipose tissue. Metabolized in liver. Primarily eliminated by biliary system.

Canadian trade name

IV INCOMPATIBILITIES

None known.

IV COMPATIBILITIES

Heparin, potassium chloride, sodium bicarbonate.

INDICATIONS/ROUTES/DOSAGE

◀ALERT▶ PO/subcutaneous route preferred; IV/IM use restricted to emergent situations.

Oral Anticoagulant Overdose

PO, IV, Subcutaneous: ADULTS, ELDERLY: 2.5–10 mg/dose. May repeat in 12–48 hrs if given orally, in 6–8 hrs if given by IV or subcutaneous route. **CHILDREN:** 0.5–5 mg depending on need for further anticoagulation, severity of bleeding.

Hemorrhagic Disease of Newborn

IM, Subcutaneous: NEONATE: Treatment: 1 mg/dose/day. May increase to 2 mg. **Prophylaxis (IM):** 0.5–1 mg within 1 hr of birth.

SIDE EFFECTS

◀ALERT▶ PO/subcutaneous administration less likely to produce side effects than IV/IM routes.

Occasional: Pain, soreness, swelling at IM injection site, pruritic erythema (with repeated injections), facial flushing, altered taste.

ADVERSE EFFECTS/ TOXIC REACTIONS

Newborns (esp. premature infants) may develop hyperbilirubinemia. Severe reaction (cramp-like pain, chest pain, dyspnea, facial flushing, dizziness, rapid/weak pulse, rash, diaphoresis, hypotension progressing to shock, cardiac arrest) occurs rarely, immediately after IV administration.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Monitor PT, international normalized ratio (INR) routinely in pts taking anticoagulants. Assess skin for ecchymoses, petechiae. Assess gums for gingival bleeding, erythema. Assess urine for hematuria. Assess Hct, platelet count, urine/stool culture for occult blood. Assess for decrease in B/P, increase in pulse rate, complaint of abdominal/back pain, severe headache (may be evidence of hemorrhage). Question for increase in amount of discharge during menses. Assess peripheral pulses. Check for excessive bleeding from minor cuts, scratches.

PATIENT/FAMILY TEACHING

• Discomfort may occur with parenteral administration. • **Adults:** Use electric razor, soft toothbrush to prevent bleeding. • Report any sign of red or dark urine, black or red stool, coffee-ground vomitus, red-speckled mucus from cough. • Do not use any OTC medication without physician approval (may interfere with platelet aggregation). • Consume foods rich in vitamin K_1, including leafy green vegetables, meat, cow's milk, vegetable oil, egg yolks, tomatoes.

vorapaxar

vor-a-**pax**-ar
(Zontivity)

■ **BLACK BOX ALERT** ■ Avoid use in **pts with history of CVA, intracranial** hemorrhage (ICH), TIA or with active pathologic bleeding. Antiplatelet agents increase risk of bleeding, including ICH and fatal bleeding.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Protease-activated receptor-1 antagonist. **CLINICAL:** Antiplatelet.

USES

Reduction of thrombotic cardiovascular events in pts with history of MI or peripheral artery disease (PAD). Reduces rate of a combined endpoint of cardiovascular death, CVA, MI, and urgent coronary revascularization. Use with

V

vision change (may indicate ICH); hematuria, GI bleeding. Assess peripheral pulses; skin for ecchymosis, petechiae. Check for excessive bleeding from minor cuts, scratches, skin tears. Consider transfusion of platelets or RBCs if severe bleeding occurs.

PATIENT/FAMILY TEACHING

• It may take longer to stop bleeding. • Bruising may occur more easily. • Report unexpected, prolonged, excessive bleeding of any kind, or blood in sputum, stool, urine, or vomitus. • Avoid alcohol, over-the-counter anti-inflammatories such as aspirin, ibuprofen, or naproxen. • Consult doctor before any planned surgery, dental work. • Use electric razor, soft toothbrush to prevent bleeding. • Report confusion, headache, one-sided weakness, trouble speaking, or vision problems; may indicate life-threatening bleeding of brain.

voriconazole

vor-i-**kon**-a-zole
(Vfend)
Do not confuse voriconazole with fluconazole.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Triazole derivative. **CLINICAL:** Antifungal.

USES

Treatment of invasive aspergillosis, esophageal candidiasis. Treatment of serious fungal infections caused by *Scedosporium apiospermum, Fusarium* spp. Treatment of candidemia in non-neutropenic pts. Treatment of disseminated *Candida* infections of skin and viscera. **OFF-LABEL:** Fungal infection prophylaxis in moderate- to high-risk neutropenic cancer pts with myelodysplastic syndrome or acute myeloid leukemia (AML), empiric therapy for persistent neutropenic fever. Empiric treatment of fungal meningitis or osteoarticular, infections, neutropenic allogenic hematopoietic stem cell recipients/pts with significant graft-vs-host disease.

PRECAUTIONS

Contraindications: Concurrent administration of carbamazepine, ergot alkaloids, pimozide, quinidine (may cause prolonged QT interval, torsades de pointes), rifabutin, rifampin, ritonavir, sirolimus, St. John's wort. **Cautions:** Severe renal/hepatic impairment, hypersensitivity to other azole antifungal agents. Pts at risk for acute pancreatitis, pts with fructose intolerance, glucose-galactose malabsorption; concomitant nephrotoxic medications; hypokalemia, hypomagnesemia, hypocalcemia.

ACTION

Interferes with fungal cytochrome activity, decreasing ergosterol synthesis, inhibiting fungal cell membrane formation. **Therapeutic Effect:** Damages fungal cell wall membrane.

PHARMACOKINETICS

Rapidly, completely absorbed after PO administration. Widely distributed. Protein binding: 58%. Metabolized in liver. Primarily excreted as metabolite in urine. **Half-life:** Variable, dose dependent.

V

Severe: Use only if benefits outweigh risks. Monitor closely for toxicity.

SIDE EFFECTS

Frequent (20%–6%): Abnormal vision, fever, nausea, rash, vomiting. **Occasional (5%–2%):** Headache, chills, hallucinations, photophobia, tachycardia, hypertension.

ADVERSE EFFECTS/ TOXIC REACTIONS

Hepatotoxicity (jaundice, hepatitis, hepatic failure), acute renal failure have occurred in severely ill pts.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline serum hepatic/renal function tests. Receive full medication history and screen for interactions.

INTERVENTION/EVALUATION

Monitor serum renal function, LFT. Monitor visual function (visual acuity, visual field, color perception) for drug therapy lasting longer than 28 days.

PATIENT/FAMILY TEACHING

• Take at least 1 hr before or 1 hr after a meal. • Avoid grapefruit products. • Avoid driving at night. • Report visual changes (blurred vision, photophobia, yellowing of skin/eyes). • Avoid performing hazardous tasks if changes in vision occur. • Avoid direct sunlight. • Women of childbearing potential should use effective contraception.

vorinostat

vor-**in**-o-stat
(Zolinza)
Do not confuse vorinostat with Votrient.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Histone deacetylase inhibitor. **CLINICAL:** Antineoplastic.

USES

Treatment of cutaneous manifestations in pts with cutaneous T-cell lymphoma (CTCL) with progressive, persistent, or recurrent disease, on or following two systemic therapies.

PRECAUTIONS

Contraindications: None known. **Cautions:** History of deep vein thrombosis (DVT), diabetes mellitus, hepatic impairment, preexisting hypokalemia, hypomagnesemia, pts with history of QT prolongation or medications that prolong QT interval.

ACTION

Inhibits activity of histone deacetylase enzymes that catalyze removal of acetyl groups of proteins, causing accumulation of acetylated histones. **Therapeutic Effect:** Terminates cell growth, causes apoptosis.

PHARMACOKINETICS

Protein binding: 71%. Metabolized to inactive metabolites. Excreted in urine. **Half-life:** 2 hrs.

of suicide; family history of bipolar disorder, mania, hypomania; hepatic impairment.

ACTION

Blocks reuptake of neurotransmitter serotonin at CNS presynaptic membranes, increasing availability at postsynaptic receptor sites. **Therapeutic Effect:** Relieves depression.

PHARMACOKINETICS

Readily absorbed following PO administration. Metabolized in liver, primarily through oxidation. Protein binding: 98%. Peak plasma concentration: 7–11 hrs. Steady state reached within 2 wks. Excreted in urine (59%), feces (26%). **Half-life:** 66 hrs.

Generic Drugs W

warfarin

tuberculosis, acute infection, diabetes, heparin-induced thrombocytopenia, pts at risk for hemorrhage, moderate to severe renal impairment, moderate to severe hypertension, thyroid disease, polycythemia vera, vasculitis, open wound, menstruating and postpartum women, indwelling catheters.

ACTION

Interferes with hepatic synthesis of vitamin K–dependent clotting factors, resulting in depletion of coagulation factors II, VII, IX, X. **Therapeutic Effect:** Prevents further extension of formed existing clot; prevents new clot formation, secondary thromboembolic complications.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	1.5–3 days	5–7 days	2–5 days

Well absorbed from GI tract. Protein binding: 99%. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. **Half-life:** 20–60 hrs.

Generic Drugs Z

zafirlukast	zidovudine	zolmitriptan
zaleplon	ziprasidone	zolpidem
zanamivir	zoledronic acid	zonisamide

zafirlukast

za-**fir**-loo-kast
(Accolate)
Do not confuse Accolate with Accupril, Accutane, or Aclovate.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Leukotriene receptor antagonist. **CLINICAL:** Antiasthma.

USES

Prophylaxis, chronic treatment of bronchial asthma in adults and children 5 yrs and older.

PRECAUTIONS

Contraindications: Hepatic impairment. **Cautions:** Elderly.

ACTION

Competitive antagonist of leukotriene receptor. Leukotriene production and receptor occupation are associated with pathophysiology of asthma. **Therapeutic Effect:** Reduces airway edema, smooth muscle constriction; alters cellular activity associated with inflammatory process. Reduces signs/symptoms of asthma.

PHARMACOKINETICS

Rapidly absorbed after PO administration (food reduces absorption). Protein binding: 99%. Metabolized in liver. Primarily excreted in feces. Unknown if removed by hemodialysis. **Half-life:** 10 hrs.

INTERACTIONS

DRUG: **Erythromycin, theophylline** may decrease concentration/effect. **Aspirin** may increase concentration/effects. May increase effects of **warfarin** (increases INR). **HERBAL:** None significant. **FOOD:** **Food** decreases bioavailability by 40%. **LAB VALUES:** None significant.

AVAILABILITY (Rx)

Tablets: 10 mg, 20 mg.

ADMINISTRATION/HANDLING

PO

- Give 1 hr before or 2 hrs after meals.

INDICATIONS/ROUTES/DOSAGE

Bronchial Asthma

PO: ADULTS, ELDERLY, CHILDREN 12 YRS AND OLDER: 20 mg twice daily. **CHILDREN 5–11 YRS:** 10 mg twice daily.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Contraindicated.

SIDE EFFECTS

Frequent (13%): Headache. **Occasional (3%):** Nausea, diarrhea. **Rare (Less Than 3%):** Generalized pain, asthenia, myalgia, fever, dyspepsia, vomiting, dizziness.

ADVERSE EFFECTS/ TOXIC REACTIONS

Concurrent administration of inhaled corticosteroids increases risk of upper respiratory tract infection.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain medication history. Assess serum hepatic function lab values.

INTERVENTION/EVALUATION

Monitor rate, depth, rhythm, type of respiration; quality, rate of pulse. Assess lung sounds for rhonchi, wheezing, rales. Monitor serum LFT.

drug is discontinued). **Frequent (28%–7%):** Nausea, headache, myalgia, dizziness. **Occasional (5%–3%):** Abdominal pain, asthenia, dyspepsia, eye pain, paresthesia. **Rare (2%):** Tremor, amnesia, hyperacusis (acute sense of hearing), fever, dysmenorrhea.

ADVERSE EFFECTS/ TOXIC REACTIONS

May produce altered concentration/ behavior changes, impaired memory. Taking medication while ambulating may result in hallucinations, impaired coordination, dizziness, light-headedness. Overdose results in drowsiness, confusion, diminished reflexes, coma.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Provide for safety; raise bed rails. Provide environment conducive to sleep (back rub, quiet environment, low lighting).

INTERVENTION/EVALUATION

Assess sleep pattern.

PATIENT/FAMILY TEACHING

• Take right before bedtime or when in bed and not falling asleep. • Avoid tasks requiring alertness, motor skills until response to drug is established. • Do not exceed prescribed dosage. • Do not take with or immediately after a high-fat or heavy meal. • Rebound insomnia may occur when drug is discontinued after short-term therapy. • Avoid alcohol, other CNS depressants.

zanamivir

zan-**am**-i-veer
(Relenza)

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Antiviral.
CLINICAL: Antiviral, anti-influenza.

USES

Treatment of uncomplicated acute illness due to influenza virus A and B in adults, children 7 yrs and older who have been symptomatic for less than 2 days. Prevention of influenza A and B in adults and children 5 yrs and older.

PRECAUTIONS

Contraindications: None known. **Cautions:** COPD, asthma, severe renal/hepatic impairment.

ACTION

Inhibits influenza virus enzyme neuraminidase, essential for viral replication. **Therapeutic Effect:** Prevents viral release from infected cells.

PHARMACOKINETICS

Systemically absorbed, approximately 4%–17%. Protein binding: less than 10%. Not metabolized. Excreted unchanged in urine. **Half-life:** 2.5–5.1 hrs.

viral HIV replication. **Therapeutic Effect:** Slows HIV replication, reducing progression of HIV infection.

PHARMACOKINETICS

Rapidly, completely absorbed from GI tract. Protein binding: 25%–38%. Metabolized in liver. Crosses blood-brain barrier and is widely distributed, including to CSF. Primarily excreted in urine. Minimal removal by hemodialysis. **Half-life:** 0.5–3 hrs (increased in renal impairment).

treatment of bipolar disorder as adjunct to lithium or valproic acid. **OFF-LABEL:** Psychosis/agitation related to Alzheimer's dementia.

PRECAUTIONS

Contraindications: Conditions associated with risk of prolonged QT interval, congenital long QT syndrome, concurrent use of other QT prolongation medications (e.g., class IA and III antiarrhythmics, moxifloxacin, tacrolimus, thioridazine). Uncompensated HF. Recent MI. **Cautions:** Pts with bradycardia, hypokalemia, hypomagnesemia may be at greater risk for torsades de pointes (atypical ventricular tachycardia). History of MI or unstable heart disease, seizures; pts at risk for aspiration pneumonia, hepatic impairment. Pts at high risk for suicide, hypotensive episodes, breast cancer, or other prolactin-dependent tumors, Parkinson's disease, diabetes.

ACTION

Exact mechanism unknown. Antagonizes alpha-adrenergic, dopamine, histamine, serotonin receptors; inhibits reuptake of serotonin, norepinephrine. **Therapeutic Effect:** Diminishes symptoms of schizophrenia, depression.

PHARMACOKINETICS

Well absorbed after PO administration. Food increases bioavailability. Protein binding: 99%. Metabolized in liver. Eliminated in feces. Not removed by hemodialysis. **Half-life:** **PO:** 7 hrs; **IM:** 2–5 hrs.

calcium, phosphorus levels. **(Osteoporosis):** Reduces bone turnover.

Orally Disintegrating Tablet

- Give whole; do not break, crush, cut.
- Place on pts tongue, allow to dissolve.
- Not necessary to administer with liquid.

Nasal

• Instruct pt to clear nasal passages as much as possible before use. • With head upright, pt should close one nostril with index finger, breathe out gently through mouth. • Instruct pt to insert nozzle into open nostril about ½ inch, close mouth, and while taking a breath through nose, release spray dosage by firmly pressing plunger. • Have pt remove nozzle from nose, gently breathe in through nose and out through mouth for 15–20 sec. Tell pt to avoid breathing in deeply.

INDICATIONS/ROUTES/DOSAGE

Acute Migraine Attack

PO: ADULTS, ELDERLY, CHILDREN OLDER THAN 18 YRS: Initially, 1.25–2.5 mg (**Maximum:** 5 mg). If headache returns, may repeat dose after 2 hrs. **Maximum:** 10 mg/24 hrs.

Orally Disintegrating Tablet: ADULTS, ELDERLY: Initially, 2.5 mg (**Maximum:** 5 mg) at onset of migraine headache. If headache returns, may repeat dose after 2 hrs. **Maximum:** 10 mg/24 hrs.

Intranasal: ADULTS, ELDERLY: Initially, 2.5 mg (**Maximum:** 5 mg). If headache returns, may repeat dose after 2 hrs. **Maximum:** 10 mg/24 hrs.

Dosage in Renal Impairment

No dose adjustment.

Dosage in Hepatic Impairment

Tablet: Initially, 1.25 mg (**Maximum:** 5 mg). Oral disintegrating tablet, nasal solution: Not recommended.

SIDE EFFECTS

Frequent (8%–6%): PO: Dizziness, paresthesia, neck/throat/jaw pressure, drowsiness. **Nasal:** Altered taste, paresthesia. **Occasional (5%–3%): PO:** Warm/hot sensation, asthenia, chest pressure. **Nasal:** Nausea, drowsiness, nasal discomfort, dizziness, asthenia, dry mouth. **Rare (2%–1%):** Diaphoresis, myalgia.

ADVERSE EFFECTS/ TOXIC REACTIONS

Cardiac events (ischemia, coronary artery vasospasm, MI), noncardiac vasospasm-related reactions (hemorrhage, stroke) occur rarely, particularly in pts with hypertension, diabetes, strong family history of coronary artery disease; pts who are obese; smokers; males older than 40 yrs; postmenopausal women.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for history of peripheral vascular disease, coronary artery disease, renal/hepatic impairment, MAOI use. Question pt regarding onset, location, duration of migraine, possible precipitating factors.

INTERVENTION/EVALUATION

Monitor for evidence of dizziness. Monitor B/P, esp. in pts with hepatic impairment. Assess for relief of migraine headache, migraine potential for photophobia, phonophobia (sound sensitivity, light sensitivity, nausea, vomiting).

PATIENT/FAMILY TEACHING

• Take single dose as soon as symptoms of actual migraine attack appear. • Medication is intended to relieve migraine, not to prevent or reduce number of attacks. • Lie down in quiet dark room for additional benefit after taking medication. • Avoid tasks that require alertness, motor skills until response to drug is established. • Report chest pain; palpitations; tightness in throat; edema of face, lips, eyes; rash; easy bruising; blood in urine or stool; pain or numbness in arms or legs.

zolpidem

zole-pi-dem
(Ambien, Ambien CR, Edluar, Intermezzo, Sublinox, Zolpimist)

Dosage in Renal Impairment
No dose adjustment; use caution.

Dosage in Hepatic Impairment
PO: ***(Immediate-Release Tablet, Spray, Sublingual Tablet)***: 5 mg. ***(Extended-Release Tablet)***: 6.25 mg. ***(Intermezzo)***: 1.75 mg.

SIDE EFFECTS

Occasional (7%): Headache. **Rare (less than 2%):** Dizziness, nausea, diarrhea, muscle pain, sleepwalking.

ADVERSE EFFECTS/ TOXIC REACTIONS

Overdose may produce severe ataxia (clumsiness, unsteadiness), bradycardia, diplopia, severe drowsiness, nausea, vomiting, difficulty breathing, unconsciousness. Abrupt withdrawal following long-term use may produce weakness, facial flushing, diaphoresis, vomiting, tremor. Drug tolerance/dependence may occur with prolonged use of high dosages.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Assess B/P, pulse, respirations, mental status, sleep patterns. Raise bed rails, provide call light. Provide environment conducive to sleep (back rub, quiet environment, low lighting).

INTERVENTION/EVALUATION

Monitor sleep pattern of pt. Evaluate for therapeutic response to insomnia: decrease in number of nocturnal awakenings, increase in length of sleep. Monitor daytime alertness, respiratory rate, behavior profile.

PATIENT/FAMILY TEACHING

• Do not abruptly discontinue medication after long-term use. • Avoid alcohol and tasks that require alertness, motor skills until response to drug is established. • Tolerance, dependence may occur with prolonged use of high dosages. • Do not break, chew, crush, dissolve, or divide Ambien CR tablets; swallow whole.

zonisamide

zoe-**nis**-a-mide
(Zonegran)
Do not confuse Zonegran with Sinequan, or zonisamide with lacosamide.

◆CLASSIFICATION

PHARMACOTHERAPEUTIC: Succinimide. **CLINICAL:** Anticonvulsant.

USES

Adjunctive therapy in treatment of partial seizures in adults, children older than 16 yrs with epilepsy. **OFF-LABEL:** Bipolar disorder.

PRECAUTIONS

Contraindications: Allergy to sulfonamides. **Cautions:** Renal/hepatic impairment, pts at high risk for suicide or metabolic acidosis (e.g., severe respiratory disease).

ACTION

Exact mechanism unknown. May stabilize neuronal membranes, suppress neuronal hypersynchronization by blocking sodium, calcium channels. **Therapeutic Effect:** Reduces seizure activity.

PHARMACOKINETICS

Well absorbed after PO administration. Metabolized in liver. Extensively bound to RBCs. Protein binding: 40%. Primarily excreted in urine. **Half-life:** 63 hrs (plasma), 105 hrs (RBCs).

Appendix A

CALCULATION OF DOSES

Frequently, dosages ordered do not correspond exactly to what is available and must be calculated.

RATIO/PROPORTION:

A pt is to receive 65 mg of a medication. It is available as 80 mg/2 ml. What volume (ml) needs to be administered to the patient?

STEP 1: Set up ratio.

$$\frac{80 \text{ mg}}{2 \text{ ml}} = \frac{65 \text{ mg}}{x \text{ (ml)}}$$

STEP 2: Cross multiply and divide each side by the number with x to determine volume to be administered.

$$80 \text{ mg} \quad (x) \text{ ml} = 65 \text{ mg} \quad 2 \text{ ml}$$
$$80x = 130$$
$$x = \frac{130}{80} = 1.625 \text{ ml}$$

CALCULATIONS IN MICROGRAMS PER KILOGRAM PER MINUTE (mcg/kg/min):

A 63-year-old pt (weight 165 lb) is to receive medication A at a rate of 8 mcg/kg/min. Given a solution containing medication A in a concentration of 500 mg/250 ml, at what rate (ml/hr) would you infuse this medication?

STEP 1: Convert to same units. In this problem, the dose is expressed in mcg/kg; therefore, convert weight to kg (2.2 lb = 1 kg) and drug concentration to mcg/ml (1 mg = 1,000 mcg).

$$165 \text{ lb divided by } 2.2 = 75 \text{ kg}$$
$$\frac{500 \text{ mg}}{250 \text{ ml}} = \frac{2 \text{ mg}}{\text{ml}} = \frac{2{,}000 \text{ mcg}}{\text{ml}}$$

STEP 2: Number of mcg/hr.

$$(75 \text{ kg}) \times 8 \text{ mcg/kg/min} = 600 \text{ mcg/min or } 36{,}000 \text{ mcg/hr}$$

STEP 3: Number of ml/hr.

$$36{,}000 \text{ mcg/hr divided by } 2{,}000 \text{ mcg/ml} = 18 \text{ ml/hr}$$

Appendix B

CONTROLLED DRUGS (UNITED STATES)

Schedule I: Medications having no legal medical use. These substances may be used for research purposes with proper registration (e.g., heroin, LSD).

Schedule II: Medications having a legitimate medical use but are characterized by a very high abuse potential and/or potential for severe physical and psychic dependency. Emergency telephone orders for limited quantities of these drugs are authorized, but the prescriber must provide a written, signed prescription order (e.g., morphine, amphetamines).

Schedule III: Medications having significant abuse potential (less than Schedule II). Telephone orders are permitted (e.g., opiates in combination with other substances such as acetaminophen).

Schedule IV: Medications having a low abuse potential. Telephone orders are permitted (e.g., benzodiazepines, propoxyphene).

Schedule V: Medications having the lowest abuse potential of the controlled substances. Some Schedule V products may be available without a prescription (e.g., certain cough preparations containing limited amounts of an opiate).

Appendix C

FDA PREGNANCY CATEGORIES

Note: FDA is revising current regulations on pregnancy, labor and delivery, and nursing mothers. Pregnancy letter categories will be eliminated and be replaced by sections that will contain fetal risk summaries, clinical considerations, and data subsections.
◀ALERT▶ Medications should be used during pregnancy only if clearly needed.

A: Adequate and well-controlled studies have failed to show a risk to the fetus in the first trimester of pregnancy (also, no evidence of risk has been seen in later trimesters). Possibility of fetal harm appears remote.

B: Animal reproduction studies have failed to show a risk to the fetus, and there are no adequate/well-controlled studies in pregnant women.

C: Animal reproduction studies have shown an adverse effect on the fetus, and there are no adequate/well-controlled studies in humans. However, the benefits may warrant use of the drug in pregnant women despite potential risks.

D: There is positive evidence of human fetal risk based on data from investigational or marketing experience or from studies in humans, but the potential benefits may warrant use of the drug despite potential risks (e.g., use in life-threatening situations in which other medications cannot be used or are ineffective).

X: Animal or human studies have shown fetal abnormalities and/or there is evidence of human fetal risk based on adverse reaction data from investigational or marketing experience where the risks of using the medication clearly outweigh potential benefits.

Appendix D

WOUND CARE

A wound is any process that disrupts the normal structure and function of tissues. Wounds can be closed (e.g., bruise, sprain) or open (e.g., abrasion, surgical wound).

TYPES OF OPEN WOUNDS

Superficial	Damage only to the epithelium; heals rapidly via regeneration of epithelial cells.
Partial thickness	Involves the dermal layer and is associated with blood vessel damage.
Full thickness	Involves subcutaneous fat and deeper layers. Requires the longest time to heal. Connective tissue needs to regenerate; contraction occurs during the healing process.

WOUND HEALING

Wound healing is a complex process resulting in restored cell structure and tissue layers after an injury. Wound healing involves cellular, physiologic, biochemical, and molecular processes. They are interdependent and overlapping. An acute wound usually heals within several wks, whereas chronic wounds take 6 wks or longer to heal. Additionally, other factors can delay the healing process. These include trauma/edema, infection, necrosis, lack of oxygen delivery to the tissues, advanced age, obesity, chronic diseases (e.g., diabetes, anemia), vascular insufficiency, and immunodeficiency.

Wound healing can be divided into three phases: inflammation, proliferation, and maturation.

Inflammation	Occurs within seconds of the injury and can last up to 3 days. Associated with redness, heat, swelling, and pain. Immediate vasoconstriction of damaged blood vessels and coagulation limiting blood loss occurs. Following vasoconstriction, histamine and other chemical mediators are released from damaged cells, causing vasodilation and release of growth factors essential for wound healing (e.g., increased capillary permeability and release of exudate).
Proliferation	Granulation tissue composed of macrophages, fibroblasts, immature collagen, blood vessels, and ground substance is formed. Fibroblasts stimulate production of collagen and elastin, increasing the strength of the wound and stimulating growth of new blood vessels. As granulation fills the wound site, edges of the wound pull together, decreasing surface of the wound. Epithelialization then occurs: Epithelial cells migrate from wound edge, covering the wound and resulting in scar formation. This phase usually lasts 2 to 3 wks.
Maturation	Collagen fibers cross link and reorganize, increasing the strength of scar. This process can take anywhere from 3 wks to 2 yrs.

WOUND DRESSINGS

Dressings play a major role in wound management. They protect the wound, keeping it moist and thus promote healing (only diabetic, dry, gangrenous toes require a moisture-free environment for effective healing).

Hydrocolloid, hydrogel, film, and foam dressing can handle large amounts of exudate and promote auto-debridement. Alginate and collagen-based dressings promote granulation of tissue. Silver and iodine dressings are used to avoid infections, which may delay wound healing.

WOUND CARE PRODUCTS

Description	General Uses	Comments
Alginate dressings: Spun fibers of brown seaweed that act as ion exchange mechanisms to absorb serous fluid or exudate, forming a gel-like covering that conforms to the shape of the wound. Facilitate autolytic debridement and maintain a moist wound environment. **Products:** Algicell, Carra Sorb. Available as ropes, pads.	Abrasions/ lacerations/skin tears Arterial/venous ulcers Deep and tunneling wounds Diabetic ulcers Pressure ulcers Second-degree burns Odorous wounds Contaminated and infected wounds	Good for moderately to heavily exudative wounds and hemorrhagic wounds Can be left in place until soaked with exudate Requires a secondary dressing (e.g., transparent film, foam, hydrocolloids) Do not moisten prior to use Nonadhesive, nonocclusive Contraindicated in third-degree burns; not recommended for dry or minimally exudative wounds
Collagenase ointment: Sterile enzymatic debriding ointment that possesses the ability to digest collagen in necrotic tissue. **Products:** Santyl.	Debriding chronic dermal ulcers and severely burned areas	Can be used for infected wounds Gauze is used as a secondary dressing Discontinue when granulation tissue is present Optimal pH for enzymatic action is 6–8 Avoid acidic agents for cleansing; avoid detergents and agents containing heavy metal (e.g., mercury or silver), which may adversely affect enzymatic activity
Trypsin, castor oil, Peru balsam: Trypsin is a mild debriding agent that helps shed damaged skin cells. **Castor oil** acts as a lubricant to protect tissue. **Peru balsam** increases blood flow to a wound area, reduces wound odor. **Products:** Granulex, Xenaderm. Available as gel, ointment, spray.	Promotes healing/ treatment of decubitus ulcers, varicose ulcer, and dehiscent wounds	Can be used for infected wounds Avoid concurrent use of silver-containing products (may reduce efficacy) Promotes healing and relieves pain caused by bed sores and other skin ulcers

Continued

Description	General Uses	Comments
Hydrophilic polyurethane foam: Also called open cell foam dressings. Sheets of foamed solutions of polymers containing variably sized open cells that can hold wound exudate away from wound bed. Maintains moist wound environment. **Products:** Curafoam, Lyofoam. Available as sheets in a wide variety of formulations.	Moderate to heavy exudative wounds with or without a clean granular wound bed Diabetic ulcers, pressure ulcers, venous stasis ulcers Draining surgical incisions Superficial burns Tube and drain sites	Contraindicated for use in third-degree burns Not recommended for wounds with little to no exudate or when tunneling is present Good for cavitating wounds Highly absorbent, semi-occlusive dressing Usual dressing change is up to 3 times/wk Can be worn during bathing
Hydrocolloids: Formulations of elastomeric, adhesive, and gelling agents; the most common absorbent ingredient is carboxymethylcellulose. Most hydrocolloids are backed with a semi-occlusive film layer. The wound side of the dressing is adhesive, adhering to a moist surface as well as to dry skin but not to the moist wound bed. As wound fluid is absorbed, the hydrocolloid forms a viscous gel in the wound bed, enhancing a moist wound environment. **Products:** Hydrocol, Tegasorb. Available as dressings, granules, patches, paste.	Minimal to moderate exudate in partial and full thickness wounds Cuts and abrasions First- and second-degree burns Pressure ulcers Stasis ulcers	Not for wounds producing heavy exudate, infected wounds, dry eschar-covered wounds May provide pain relief Good for chronic wounds that are epithelializing Can be left in place for up to 7 days Contraindicated for third-degree burns Can shower while wearing
Hydrogels: Glycerin- or water-based dressings designed to hydrate the wound. May absorb small amounts of exudate. **Products:** Curacel, Duo Derm, Intra Site. Available as gel, sheets, gauze.	Partial and full thickness wounds Dry to minimal exudate Cuts and abrasions First- and second-degree burns Pressure ulcers Stasis ulcers	Not for wounds producing moderate to heavy exudate Not for infected wounds May provide pain relief Good for wounds that are debriding Good for keeping a dry wound moist Can be left in place for 1–3 days

Description	General Uses	Comments
Iodine compounds: **Cadexomer iodine:** Iodine is complexed with a polymeric cadexomer starch vehicle, forming a topical gel or paste. The cadexomer moiety absorbs exudate and debris and releases iodine for antimicrobial activity. **Products:** Iodosorb, Iodoflex. Available as gel, dressing, ointment, powder.	Chronic nonhealing, exuding wounds including pressure or leg ulcers and exuding, infected wounds	Requires use of a secondary dressing Contraindicated in pts with iodine sensitivity, Hashimoto's thyroiditis, nontoxic nodular goiter, children Dressing to be changed when it turns white, indicating that the iodine has been depleted Do not use on dry necrotic tissue
Silver compounds **Silver sulfadiazine cream:** Silver possesses bactericidal properties. Has been shown to reduce bacterial density, vascular margination, migration of inflammatory cells. Enhances rate of re-epithelialization. **Products:** Silvadene, SSD, Thermazene.	Prevent infection in second- and third-degree burns Prevent or treat infection in chronic wounds	May have cytotoxic effects that could delay wound healing Allergic reactions may occur Use should be limited to a 2- to 4-wk period Bacteria may become resistant with prolonged use Avoid use with collagenase- or trypsin-containing debriding agents
Transparent film dressings: Polyurethane sheets coated on one side with an adhesive that is inactivated by moisture and will not adhere to a moist surface such as the wound bed. Have no absorbent capacity and are impermeable to fluids and bacteria but are semipermeable to oxygen and water vapor. **Products:** Bioclusive, CarraFilm, Tegaderm HP. Available in a variety of sizes and features.	Prophylaxis on high-risk intact skin Superficial wounds with minimal or no exudate Wounds on elbows, heels, or flat surfaces; covering of blisters; and retention of primary dressing	Prevents wound desiccation and contamination by bacteria Contraindicated in third-degree burns Promotes autolysis of necrotic tissue in the wound; maintains moist environment Avoid in arterial ulcers and infected wounds requiring frequent monitoring Do not use as primary dressing on wounds with depth or tunneling May provide pain relief Usually changed up to 3 times/wk
Becaplermin gel: Recombinant formulation of platelet-derived growth factor that promotes cell mitogenesis and proliferation of cells involved in wound repair. Enhances formation of granulation tissue. **Products:** Regranex.	Diabetic foot ulcers that extend into subcutaneous tissue or beyond and have an adequate blood supply	Usually applied daily Adequate blood supply and absence of necrotic tissue are needed for efficacy Repeated use (3 or more tubes) may increase risk of cancer-related death Use cautiously in pts with known malignancy

Appendix E

DRUGS OF ABUSE

Substance	*Brand/* Street Names	Administered	Effects of Intoxication	Potential Health Consequences
Amphetamine	*Adderall, Dexedrine;* bennies, black beauties, hearts, speed, truck drivers, uppers	Injection, smoked, snorted	Increased heart rate, blood pressure, body temperature, metabolism; increased energy, mental alertness; tremors; reduced appetite; irritability; anxiety; panic; violent behavior; psychosis	Weight loss, insomnia, cardiac or cardiovascular complications, stroke, seizures, addiction, tremor, irritability
Barbiturates	*Nembutal, Seconal, Phenobarbital;* barbs, reds, phennies, yellows, yellow jackets	Injection, oral	Reduction of pain and anxiety; feeling of well-being; lowered inhibitions; slowed pulse/breathing; lowered blood pressure; poor concentration; sedation, drowsiness	Confusion, fatigue; impaired coordination, memory, judgment; respiratory depression or arrest; addiction; depression; unusual excitement; fever; irritability; slurred speech; dizziness
Benzodiazepines	*Ativan, Librium, Valium, Xanax;* candy, downers, tranks	Oral	Reduction of pain and anxiety; feeling of well-being; lowered inhibitions; slowed pulse/breathing; lowered blood pressure; poor concentration; sedation, drowsiness	Confusion, fatigue; impaired coordination, memory, judgment; respiratory depression or arrest; addiction; dizziness

Substance	*Brand/* Street Names	Administered	Effects of Intoxication	Potential Health Consequences
Cocaine	Blow, bump, candy, coke, crack, rock, snow, toot	Injection, smoked, snorted	Increased heart rate, blood pressure, body temperature, metabolism; increased energy, mental alertness; tremors; reduced appetite; irritability; anxiety; panic; violent behavior; psychosis	Weight loss, insomnia, cardiac or cardiovascular complications, stroke, seizures, addiction, nasal damage from snorting, rapid or irregular heartbeat, headaches, malnutrition
Codeine	*Fiorinal with codeine, Tylenol with codeine;* Captain Cody, schoolboy, loads, pancakes and syrup	Injection, oral	Pain relief, euphoria, drowsiness	Respiratory depression and arrest, nausea, confusion, constipation, sedation, unconsciousness, coma, tolerance, addiction
Dextromethorphan	Found in some cough and cold medications; poor man's PCP, velvet, Robo, Triple C	Oral	Impaired motor function, feeling of being separated from one's body and environment; euphoria; slurred speech; confusion; dizziness; distorted visual perceptions	
Flunitrazepam	*Rohypnol;* forget-me pill, Mexican Valium, roofies, roofinol, rope, rophies	Oral, snorted	Sedation, muscle relaxation, confusion, memory loss, dizziness, impaired coordination, reduced pain/anxiety, feeling of well-being	Addiction; confusion, fatigue, memory loss, respiratory depression

Continued

Substance	*Brand*/ Street Names	Administered	Effects of Intoxication	Potential Health Consequences
GHB	Georgia home boy, grievous bodily harm, liquid ecstasy, goop, liquid X	Oral	Drowsiness, nausea, headache, disorientation, loss of coordination, memory loss	Unconsciousness, seizures, coma, confusion, nausea, vomiting, headache
Heroin	Smack, brown sugar, dope, junk, white horse, China white	Injection, smoked, snorted	Euphoria, drowsiness, impaired coordination, dizziness, confusion, nausea, sedation, feeling of heaviness in the body, slowed breathing	Constipation, confusion, sedation, respiratory depression, coma, addiction
Hydrocodone	*Vicodan, Lortab; vike watson-387*	Oral	Pain relief, euphoria, drowsiness	Respiratory depression and arrest, nausea, confusion, constipation, sedation, unconsciousness, coma, tolerance, addiction
Inhalants	Solvents (paint thinner, glues), nitrites (laughing gas, snappers, poppers)	Inhaled through nose or mouth	Stimulation, loss of inhibition, headache, nausea or vomiting, slurred speech, loss of motor coordination, wheezing	Cramps, muscle weakness, depression, memory impairment, damage to cardiovascular and nervous systems, unconsciousness, sudden death

Substance	*Brand*/ Street Names	Administered	Effects of Intoxication	Potential Health Consequences
Ketamine	*Ketalar;* cat Valium, Special K, kit kat, vitamin K	Injection, snorted, smoked	Increased heart rate and blood pressure, impaired motor function, feelings of being separated from one's body and environment; at high doses: delirium, depression, respiratory depression or arrest; death	Memory loss, numbness, nausea/vomiting, anxiety, tremors, respiratory depression
LSD	Acid, cubes, microdot, yellow sunshine, blotter, bloomers	Oral, absorbed through mouth tissues	Altered states of perception and feeling; hallucinations; nausea; increased body temperature, heart rate, blood pressure; loss of appetite; sweating; sleeplessness; numbness; dizziness; weakness; tremors; impulsive behavior; rapid shifts in emotion	Flashbacks, hallucinogen persisting perception disorder
Marijuana	Blunt, ganja, grass, joint, Mary Jane, pot, reefer, sinsemilla, skunk, weed	Oral, smoked	Euphoria, relaxation, slowed reaction time, impaired balance and coordination, increased heart rate and appetite, impaired learning and memory, anxiety, panic attacks, psychosis	Cough, impaired memory and learning, anxiety, panic attacks, frequent respiratory infections, possible mental health decline, addiction

Continued

Substance	*Brand*/ Street Names	Administered	Effects of Intoxication	Potential Health Consequences
MDMA	Ecstasy, Adam, clarity, Eve, lover's speed, peace, Molly	Injection, oral, snorted	Mild hallucinogenic effects, increased tactile sensitivity, empathic feelings, lowered inhibition, anxiety, chills, sweating, teeth clenching, muscle cramping	Reduced appetite, irregular heartbeat, heart failure, impaired memory, hyperthermia, addiction
Mescaline	Buttons, cactus, peyote	Oral, smoked	Altered states of perception and feeling; hallucinations; nausea; increased body temperature, heart rate, blood pressure; loss of appetite; sweating; sleeplessness; numbness; dizziness; weakness; tremors; impulsive behavior; rapid shifts in emotion	Loss of appetite, nausea, weakness, chronic mental disorders
Methamphetamine	*Desoxyn;* meth, ice, crank, crystal, go fast, speed	Oral, injection, smoked, snorted	Increased heart rate, blood pressure, body temperature, metabolism; increased energy, mental alertness; tremors; reduced appetite; irritability; anxiety; panic; violent behavior; psychosis	Weight loss, insomnia, cardiac or cardiovascular complications, stroke, seizures, addiction, severe dental problems, behavior/memory loss, impaired memory and learning, tolerance, addiction

Substance	*Brand/* Street Names	Administered	Effects of Intoxication	Potential Health Consequences
Methylphenidate	*Ritalin;* JIF, MPH, Skippy, smart drug, vitamin R	Injection, oral, snorted	Increase or decrease in blood pressure; psychotic episodes	Digestive problems, loss of appetite, weight loss, reduced appetite, rapid irregular heartbeat, heart failure, seizures, stroke
Morphine	*Roxanol, Duramorph;* M, Miss Emma, monkey, white stuff	Injection, oral, smoked	Pain relief, euphoria, drowsiness	Respiratory depression and arrest, nausea, confusion, constipation, sedation, unconsciousness, coma, tolerance, addiction
Oxycodone	*OxyContin, Percodan;* oxycotton, oxycet, hillbilly heroin, killers, OCs	Injection, oral	Pain relief, euphoria, drowsiness	Respiratory depression and arrest, nausea, confusion, constipation, sedation, unconsciousness, coma, tolerance, addiction
PCP	*Phencyclidine;* angel dust, boat, hog, love boat, peace pill	Injection, oral, smoked	Impaired motor function, feelings of being separated from one's body and environment, analgesia, psychosis, aggression, violence, slurred speech, loss of coordination, hallucinations	Memory loss, loss of appetite, panic, aggression, violence
Psilocybin	Magic mushrooms, purple passion, shrooms	Oral	Altered states of perception and feeling, hallucinations, nausea, nervousness, paranoia, panic	Chronic mental disorders

Appendix F

EQUIANALGESIC DOSING

Guidelines for equianalgesic dosing of commonly used analgesics are presented in the following table. The dosages are approximate to 10 mg of morphine intramuscularly. These guidelines are for the management of acute pain in the opioid-naïve pt. Dosages may vary for the opioid-tolerant pt and for the management of chronic pain. Dosing adjustments for renal or hepatic insufficiency may also be necessary. Clinical response is the criterion that must be applied for each pt with titration to desired response.

Name	Equianalgesic Oral Dose	Equianalgesic Parenteral Dose (IV, IM, Subcutaneous)
Codeine	200 mg	100–130 mg
Fentanyl	Not available	0.1 mg (100 mcg)
Hydrocodone	30–45 mg	Not available
Hydromorphone (Dilaudid)	7.5–8 mg	1.5–2 mg
Hydromorphone (Dilaudid) (Controlled-Release)	7.5 mg	N/A
Meperidine (Demerol)	300 mg	75 mg
Methadone (Dolophine)	10–20 mg	10 mg
Morphine	30 mg	10 mg
Oxycodone (OxyContin)	20–30 mg	Not available
Oxymorphone	10 mg	1 mg
Oxymorphone (Extended-Release)	10 mg	N/A

Appendix G

HERBALS: COMMON NATURAL MEDICINES

The use of herbal therapies is increasing in the United States. Because of the rise in the use of herbal therapy, the following is presented to provide some basic information on some of the more popular herbs. Please note this is not an all-inclusive list, which is beyond the scope of this handbook.

Name	Uses	Comments
Aloe vera	Orally: osteoarthritis, inflammatory bowel diseases (e.g., ulcerative colitis), fever, itching, inflammation. Topically: burns, wound healing, psoriasis, sunburn, frostbite, cold sores.	Well tolerated. Orally can cause abdominal pain, cramps; topically can cause burning, itching, contact dermatitis. May lower blood glucose levels and have additive effects with antidiabetic medications.
Bilberry	Orally: improve visual acuity (e.g., night vision, cataracts), atherosclerosis, chronic fatigue syndrome. Topically: mild inflammation of mouth and throat mucous membranes.	Can inhibit platelet aggregation, increase risk of bleeding when combined with antiplatelet or anticoagulant medications (e.g., aspirin, clopidogrel, enoxaparin, warfarin). May lower blood glucose.
Bitter orange	Orally: appetite stimulant, dyspepsia. Topically: inflammation of the eyelid, conjunctiva, retina.	May cause hypertension, cardiovascular toxicity. May increase concentration/effects of midazolam; concurrent use with MAOIs may increase blood pressure (avoid use); combination with caffeine can increase blood pressure, heart rate.
Black cohosh	Orally: symptoms of menopause, premenstrual syndrome (PMS), dysmenorrhea, dyspepsia. Topically: acne, mole, and wart removal; improve skin appearance.	Can cause GI upset, rash, headache, dizziness, increased weight, cramping, breast tenderness, vaginal spotting/bleeding. May decrease effects of cisplatin; may increase risk of hepatic damage with hepatotoxic medications.
Capsicum (cayenne pepper)	Orally: dyspepsia, flatulence, diarrhea, cramps, toothache, hyperlipidemia. Topically: pain of shingles, osteoarthritis, rheumatoid arthritis, postherpetic neuralgia, diabetic neuralgia, trigeminal neuralgia.	Orally can cause upper abdominal discomfort (e.g., gas, bloating, nausea, diarrhea, belching); topically can cause burning, stinging, erythema. May increase effects/adverse effects of antiplatelet medications.

Continued

Name	Uses	Comments
Chamomile	Prepared as a tea and used as a mild sedative, relaxant, and sleeping aid; used for indigestion, itching, and inflammation.	Large amounts may cause vomiting.
Chastberry	Orally: menstrual irregularities (e.g., dysmenorrhea, amenorrhea, metrorrhagia).	Can cause GI upset, headache, diarrhea, nausea, itching, urticaria, rash, insomnia, increased weight, irregular menstrual bleeding. Can interfere with efficacy of oral contraceptives, hormone replacement therapy.
Clove (clove oil)	Orally: dyspepsia, expectorant, diarrhea, halitosis, flatulence, nausea, vomiting. Topically: toothache, mouth and throat inflammation.	Topically can cause tissue irritation, allergic dermatitis.
Co-enzyme Q-10	Heart failure, angina, diabetes, hypertension.	Can cause GI side effects (e.g., nausea, vomiting, diarrhea, appetite suppression, heartburn, epigastric discomfort). Can decrease blood pressure and have an additive effect with antihypertensive medications; may reduce anticoagulant effects of warfarin.
Cranberry	Prevention/treatment of urinary tract infections, neurogenic bladder, urinary deodorizer in incontinence.	Large amounts can cause GI upset, diarrhea. Greater than 1,000 ml daily can increase risk of uric acid, kidney stone formation.
DHEA	Slow or reverse aging, weight loss, metabolic syndrome, increase immune and cognitive function.	At high dose can cause acne, hirsutism, hair loss, voice deepening, insulin resistance, altered menstrual pattern. May interfere with antiestrogen effects of anastrozole, letrozole, or other aromatase inhibitors; may overcome estrogen receptor antagonist activity of tamoxifen in estrogen receptor positive cancer cells.
Dong quai	Dysmenorrhea, premenstrual syndrome, menopausal symptoms.	May cause photosensitivity and photodermatitis. May increase effect/risk of bleeding with antiplatelet and anticoagulant medications (e.g., aspirin, warfarin).

Name	Uses	Comments
Echinacea	Treat/prevent common cold, other upper respiratory tract infections.	Can cause GI effects (e.g., nausea, abdominal pain, diarrhea, vomiting). Stimulates immune function—may exacerbate autoimmune diseases (e.g., multiple sclerosis, rheumatoid arthritis, systemic lupus erythematosis).
Eucalyptus	Orally: infections, fever, dyspepsia, expectorant for coughs. Topically: inflammation of respiratory tract mucous membranes, rheumatoid arthritis, nasal stuffiness.	Orally: GI effects (e.g., nausea, vomiting, diarrhea). Topically (prolonged exposure/large amounts): agitation, drowsiness, muscle weakness, ataxia.
Evening primrose oil	Premenstrual syndrome (PMS), endometriosis, symptoms of menopause (e.g., hot flashes).	May increase risk of bruising/bleeding with antiplatelet/anticoagulant medications (e.g., aspirin, clopidogrel, enoxaparin, warfarin).
Feverfew	Orally: fever, headaches, prevention of migraines, menstrual irregularities. Topically: toothaches, antiseptic.	Orally: GI effects (e.g., heartburn, nausea, diarrhea, constipation, abdominal pain, bloating, flatulence). Topically: contact dermatitis. May have additive effects, increase risk of bleeding with antiplatelet medications.
Fish oil	Hyperlipidemia, hypertriglyceridemia, hypertension, stroke, depression, rheumatoid arthritis, osteoporosis, psoriasis, Crohn's disease.	Can cause a fishy aftertaste, halitosis, heartburn, dyspepsia, nausea, loose stools, rash. May have additive effect with antihypertensive medication.
Garlic	Hypertension, hyperlipidemia, age-related vascular changes, atherosclerosis, chronic fatigue syndrome, menstrual disorders.	Dose-related effects including breath/body odor, mouth and GI burning/irritation, heartburn, flatulence, nausea, vomiting, diarrhea. May increase effects of antiplatelets (e.g., aspirin, clopidogrel, enoxaparin), anticoagulants (e.g., warfarin); may decrease effects of oral contraceptives, cyclosporine, protease inhibitors, and NNRTIs.
Ginger	Motion sickness, morning sickness, dyspepsia, rheumatoid arthritis, osteoarthritis, loss of appetite, migraine headache.	At high doses of 5 g/day may cause abdominal discomfort, heartburn, diarrhea, irritant effect in mouth and throat. May increase risk of bleeding with antiplatelet medications and anticoagulants (e.g., aspirin, clopidogrel, enoxaparin, warfarin).

Continued

Name	Uses	Comments
Ginkgo	Dementia (including Alzheimer's), vascular dementia, mixed dementia.	Mild GI upset, headache, dizziness, constipation, palpitations, allergic skin reactions. Decreases platelet aggregation; may increase risk of bleeding with antiplatelet and anticoagulants (e.g., aspirin, clopidogrel, enoxaparin, warfarin).
Ginseng	Increases resistance to environmental stress, improves well-being, boosts energy, aphrodisiac.	May cause insomnia, vaginal bleeding, headache, hypertension, hypotension. May decrease platelet aggregation (use caution with antiplatelet or anticoagulant medications).
Glucosamine	Osteoarthritis, glaucoma, temporomandibular joint arthritis.	May cause mild GI effects (e.g., nausea, heartburn, diarrhea, constipation). May increase risk of bleeding with anticoagulants (e.g., warfarin).
Gotu kola	Reduce fatigue, anxiety, depression, improve memory and intelligence.	May cause GI upset, nausea, drowsiness. May cause additive sedative effects/side effects with CNS depressants (e.g., clonazepam, lorazepam, zolpidem).
Grapefruit	Hyperlipidemia, atherosclerosis, weight loss and obesity.	May increase concentrations/effects of benzodiazepines, calcium channel blockers, carbamazepine, carvedilol, clomipramine, cyclosporine, estrogens, lovastatin, simvastatin, atorvastatin.
Green tea	Improves cognitive performance and mental alertness.	Can cause nausea, vomiting, abdominal bloating, dyspepsia, flatulence, diarrhea. Higher doses can cause dizziness, insomnia, fatigue, agitation. May increase effects of amphetamines, caffeine.
Kava kava	Anxiety disorders, stress, ADHD, insomnia, restlessness.	GI upset, headache, dizziness, drowsiness, enlarged pupils and disturbances of oculomotor equilibrium and accommodation, dry mouth, allergic skin reactions. May increase drowsiness, motor reflex depression with alcohol, benzodiazepines, other CNS depressants.

Name	Uses	Comments
L-carnitine	Treatment of primary L-carnitine deficiency, acute myocardial infarction, supplement to total parenteral nutrition, L-carnitine deficiency in those requiring hemodialysis.	Can cause nausea, vomiting, abdominal cramps, heartburn, gastritis, diarrhea, body odor, seizures.
Licorice	Gastric and duodenal ulcers, sore throat, bronchitis, dyspepsia, cough, osteoarthritis.	Excessive ingestion can cause pseudohyperaldosteronism with sodium and water retention, hypokalemia, alkalosis. May lead to hypertension, edema, arrhythmias. May reduce effect of antihypertensive medication therapy.
Melatonin	Jet lag, insomnia, shift-work disorder.	Can cause daytime drowsiness, headache, dizziness. May increase effect of antiplatelets, anticoagulants (e.g., aspirin, clopidogrel, enoxaparin, warfarin). May cause additive sedation with CNS depressants (e.g., alcohol, benzodiazepines).
Milk thistle	Liver disorders, chronic inflammatory liver disease, hepatic cirrhosis, chronic hepatitis.	Can cause nausea, diarrhea, dyspepsia, flatulence, abdominal bloating, anorexia.
Peppermint	Common cold, cough, inflammation of mouth and pharynx, sinusitis, fever, cramps of upper GI tract, dyspepsia, flatulence.	Can cause heartburn, nausea, vomiting, allergic reactions including flushing and headache. May increase concentration/effects of cyclosporine.
Red yeast	Maintain desirable cholesterol levels in healthy people; reduce cholesterol in hyperlipidemia; indigestion; diarrhea; improve blood circulation.	Can cause abdominal discomfort, heartburn, flatulence, dizziness. May increase risk of myopathy with cyclosporine, gemfibrozil, or niacin; may increase risk of liver damage with alcohol.

Continued

Name	Uses	Comments
SAMe	Depression, anxiety, heart disease, fibromyalgia, osteoarthritis, tendonitis, dementia, Alzheimer's disease, Parkinson's disease.	Higher doses can cause flatulence, nausea, vomiting, diarrhea, constipation, headache, mild insomnia, anorexia, sweating, dizziness, nervousness. May have additive adverse effects with MAOIs including hypertension, hyperthermia, agitation, confusion, coma. May have additive serotonergic effects and serotonin syndrome-like effects (e.g., agitation, tremors, tachycardia, diarrhea, hyperreflexia, shivering, diaphoresis) with antidepressants.
Saw palmetto	Symptoms of benign prostatic hyperplasia (BPH).	Can cause dizziness, headache, GI complaints (e.g., nausea, vomiting, constipation, diarrhea). May increase effect of antiplatelets, anticoagulants (e.g., aspirin, clopidogrel, enoxaparin, warfarin).
St. John's wort	Depression, anxiety, heart palpitations; mood disturbances associated with menopause, ADHD, OCD, SAD.	Can cause insomnia, vivid dreams, restlessness, agitation, irritability, GI discomfort, diarrhea, fatigue, dry mouth, dizziness, headache. May decrease effect of alprazolam, amitriptyline, oral contraceptives, cyclosporine, imatinib, irinotecan, NNRTIs, phenytoin, protease inhibitors, tacrolimus, warfarin. May cause additive serotonergic effects with antidepressants, paroxetine, sertraline, tramadol.
Valerian	Insomnia, anxiety-associated restlessness, sleeping disorders.	Can cause headache, excitability, insomnia, gastric discomfort, dry mouth, vivid dreams, morning drowsiness. May have additive sedative effects with alcohol, benzodiazepines, other CNS depressants.

Name	Uses	Comments
Yohimbe	Aphrodisiac, impotence, exhaustion, angina, hypertension, diabetic neuropathy, postural hypotension.	Can cause excitation, tremors, insomnia, anxiety, hypertension, tachycardia, dizziness, irritability, headache, fluid retention, rash, nausea, vomiting. High doses can cause respiratory depression. May have additive effects with MAOIs. Tyramine-containing foods increase risk of hypertensive crisis.

Appendix H

LIFESPAN, CULTURAL ASPECTS, AND PHARMACOGENOMICS OF DRUG THERAPY

LIFESPAN

Drug therapy is unique to pts of different ages. Age-specific competencies involve understanding the development and health needs of the various age groups. Pregnant pts, children, and elderly people represent different age groups with important considerations during drug therapy.

CHILDREN

In pediatric drug therapy, drug administration is guided by the age of the child, weight, level of growth and development, and height. The dosage ordered is to be given either by kilogram of body weight or by square meter of body surface area, which is based on the height and weight of the child. Many dosages based on these calculations must be individualized based on pediatric response.

If the oral route of administration is used, often syrup or chewable tablets are given. Additionally, sometimes medication is added to liquid or mixed with foods. Remember to never force a child to take oral medications because choking or emotional trauma may ensue.

If an intramuscular injection is ordered, the vastus lateralis muscle in the midlateral thigh is used because the gluteus maximus is not developed until walking occurs and the deltoid muscle is too small. For intravenous medications, administer very slowly in children. If given too quickly, high serum drug levels will occur with the potential for toxicity.

PREGNANCY

Women of childbearing years should be asked about the possibility of pregnancy before any drug therapy is initiated. Advise a woman who is either planning a pregnancy or believes she may be pregnant to inform her physician immediately. During pregnancy, medications given to the mother pass to the fetus via the placenta. Teratogenic (fetal abnormalities) effects may occur. Breastfeeding while the mother is taking certain medications may not be recommended due to the potential for adverse effects on the newborn.

The choice of drug ordered for pregnant women is based on the stage of pregnancy because the fetal organs develop during the first trimester. Cautious use of drugs in women of reproductive age who are sexually active and who are not using contraceptives is essential to prevent the potential for teratogenic or embryotoxic effects. Refer to the different pregnancy categories (found in Appendix C) to determine the relative safety of a medication during pregnancy.

ELDERLY

Elderly people are more likely to experience an adverse drug reaction owing to physiologic changes (e.g., visual, hearing, mobility changes, chronic diseases) and cognitive changes (short-term memory loss or alteration in the thought process) that may lead to multiple medication dosing. In chronic disease states such as hypertension, glaucoma, asthma, or arthritis, the daily ingestion of multiple medications increases the potential for adverse reactions and toxic effects.

Decreased renal or hepatic function may lower the metabolism of medications in the liver and reduce excretion of medications, thus prolonging the half-life of the drug and the potential for toxicity. Dosages in elderly people should initially be smaller than for the general adult population and then slowly titrated based on pt response and therapeutic effect of the medication.

CULTURE

The term *ethnopharmacology* was first used to describe the study of medicinal plants used by indigenous cultures. More recently, it is being used as a reference to the action and effects of drugs in people from diverse racial, ethnic, and cultural backgrounds. Although there are insufficient data from investigations involving people from diverse backgrounds that would provide reliable information on ethnic-specific responses to all medications, there is growing evidence that modifications in dosages are needed for some members of racial and ethnic groups. There are wide variations in the perception of side effects by pts from diverse cultural backgrounds. These differences may be related to metabolic differences that result in higher or lower levels of the drug, individual differences in the amount of body fat, or cultural differences in the way individuals perceive the meaning of side effects and toxicity. Nurses and other health care providers need to be aware that variations can occur with side effects, adverse reactions, and toxicity so that pts from diverse cultural backgrounds can be monitored.

Some cultural differences in response to medications include the following:

African Americans: Generally, African Americans are less responsive to beta blockers (e.g., propranolol [Inderal]) and angiotensin-converting enzyme (ACE) inhibitors (e.g., enalapril [Vasotec]).

Asian Americans: On average, Asian Americans have a lower percentage of body fat, so dosage adjustments must be made for fat-soluble vitamins and other drugs (e.g., vitamin K used to reverse the anticoagulant effect of warfarin).

Hispanic Americans: Hispanic Americans may require lower dosages and may experience a higher incidence of side effects with tricyclic antidepressants (e.g., amitriptyline).

Native Americans: Alaskan Eskimos may suffer prolonged muscle paralysis with the use of succinylcholine when administered during surgery.

There has been a desire to exert more responsibility over one's health and, as a result, a resurgence of self-care practices. These practices are often influenced by folk remedies and the use of medicinal plants. In the United States, there are several major ethnic population subgroups (white, black, Hispanic, Asian, and Native Americans). Each of these ethnic groups has a wide range of practices that influence beliefs and interventions related to health and illness. At any given time, in any group, treatment may consist of the use of traditional herbal therapy, a combination of ritual and prayer with medicinal plants, customary dietary and environmental practices, or the use of Western medical practices.

AFRICAN AMERICANS

Many African Americans carry the traditional health beliefs of their African heritage. Health denotes harmony with nature of the body, mind, and spirit, whereas illness is seen as disharmony that results from natural causes or divine punishment. Common practices to the art of healing include treatments with herbals and rituals known empirically to restore health. Specific forms of healing include using home remedies, obtaining medical advice from a physician, and seeking spiritual healing.

Examples of healing practices include the use of hot baths and warm compresses for rheumatism, the use of herbal teas for respiratory illnesses, and the use of kitchen condiments in folk remedies. Lemon, vinegar, honey, saltpeter, alum, salt, baking soda, and Epsom salt are common kitchen ingredients used. Goldenrod, peppermint, sassafras, parsley, yarrow, and rabbit tobacco are a few of the herbals used.

HISPANIC AMERICANS

The use of folk healers, medicinal herbs, magic, and religious rituals and ceremonies are included in the rich and varied customs of Hispanic Americans. This ethnic group believes that God is responsible for allowing health or illness to occur. Wellness may be viewed as good luck, a reward for good behavior, or a blessing from God. Praying, using herbals and spices, wearing religious objects such as medals, and maintaining a balance in diet and physical activity are methods considered appropriate in preventing evil or poor health.

Hispanic ethnopharmacology is more complementary to Western medical practices. After the illness is identified, appropriate treatment may consist of home remedies (e.g., use of vegetables and herbs), use of over-the-counter patent medicines, and use of physician-prescribed medications.

ASIAN AMERICANS

For Asian Americans, harmony with nature is essential for physical and spiritual well-being. Universal balance depends on harmony among the elemental forces: fire, water, wood, earth, and metal. Regulating these universal elements are two forces that maintain physical and spiritual harmony in the body: the *yin* and the *yang.* Practices shared by most Asian cultures include meditation, special nutritional programs, herbology, and martial arts.

Therapeutic options available to traditional Chinese physicians include prescribing herbs, meditation, exercise, nutritional changes, and acupuncture.

NATIVE AMERICANS

The theme of total harmony with nature is fundamental to traditional Native American beliefs about health. It is dependent on maintaining a state of equilibrium among the physical body, the mind, and the environment. Health practices reflect this holistic approach. The method of healing is determined traditionally by the medicine man, who diagnoses the ailment and recommends the appropriate intervention.

Treatment may include heat, herbs, sweat baths, massage, exercise, diet changes, and other interventions performed in a curing ceremony.

EUROPEAN AMERICANS

Europeans often use home treatments as the front-line interventions. Traditional remedies practiced are based on the magical or empirically validated experience of ancestors. These cures are often practiced in combination with religious rituals or spiritual ceremonies.

Household products, herbal teas, and patent medicines are familiar preparations used in home treatments (e.g., saltwater gargle for sore throat).

PHARMACOGENOMICS

Traditionally, medications are prescribed using a "one size fits all" philosophy. In general, the genetic makeup is similar in all humans, regardless of race or sex. However, people inherit variations in their genes, which can affect the way a person responds to a medication. A genetic variation may make a medication stay in the body longer, causing serious side effects, or a variation may make the medication less potent.

For example, two people taking the same cancer medication may have very different responses. One may have severe, life-threatening side effects, whereas the second may have few, if any, side effects. The drug may shrink a tumor in one person but not in another.

Pharmacogenomics examines how a person's genetic makeup affects response to medications. Although widespread application still lies in the future, pharmacogenomics has the potential to personalize medical therapies. Physicians eventually will be able to prescribe medications based on an individual's genotype, thereby maximizing effectiveness and minimizing side effects.

PHARMACOGENOMICS

Pharmacogenomics is an expanding field that explores the effect of inter-individual genetic differences on pharmacokinetics, pharmacodynamics, drug efficiency, and safety of drug treatments. Pharmacogenomic biomarkers (proteins) can provide predictive tools for improving drug response and reducing adverse drug reactions. These biomarkers mainly originate from genes encoding drug-metabolizing enzymes, drug transporters, drugs targets, and human leukocyte antigens. Currently, more than 100 drugs contain pharmacogenomic information in the package labeling. The goal is to develop personalized genetic-based strategies that will optimize therapeutic outcomes.

Personalized treatments are especially warranted when prescribing medications with a narrow therapeutic index or when toxicity can be life threatening. Antineoplastics, anticoagulants, and anti-HIV therapies are often administered at maximum tolerated doses. This approach can result in toxicity and/or produce a poor response to therapy. Severe adverse drug reactions are one of the most common reasons for hospital admissions. Genetic testing for drug responses is expected to decrease hospitalizations by as much as 30%.

Carbamazepine (Tegretol) has been linked to dose-dependent side effects and life-threatening adverse effects. It is metabolized by enzymes encoded by the CYP3A4 gene to its active metabolite. An association has been found between the HLA-B*1502 allele and risk of Stevens-Johnson syndrome/toxic epidermal necrolysis, particularly in Asians. Before initiating carbamazepine treatment in high-risk patients, genetic testing for the HLA-B*1502 allele is recommended by the Food and Drug Administration (FDA).

Tumor cells carry the same genetic polymorphins of normal cells. However, malignant cells are genetically unstable and can produce genetic changes that can alter disposition of active drug at the tumor site. Genetic analysis of tumors can help predict therapeutic benefit (or lack thereof) of targeted biologics such as **trastuzumab (Herceptin)** for ERBB2 *(HER2)*–amplified breast cancers or **erlotinib (Tarceva)** for epidermal growth factor receptor (EGFR)–overexpressing lung cancers.

Genetic mutations in tumors can also predict resistance to treatment, as noted in colorectal cancers, where activating mutations in *KRAS* are known to be a predictive marker for resistance to the EGFR-specific monoclonal antibodies **cetuximab (Erbitux)** and **panitumumab (Vectibix).**

By utilizing the information provided by pharmacogenomic testing, drug therapy is changing to a more individualized approach. Anticipated benefits of pharmacogenomics include creation of better vaccines, safer medications targeted to specific diseases, and more appropriate dosing of medications at the onset of therapy. Ultimately, we may see a decrease in health care costs due to more efficient clinical trials, reduced adverse drug reactions, and less time needed to find effective therapy for patients.

Appendix I

NORMAL LABORATORY VALUES

HEMATOLOGY/COAGULATION

Test	Normal Range
Activated partial thromboplastin time (aPTT)	25–35 sec
Erythrocyte count (RBC count)	M: 4.5–5.5 million cells/mm^3 F: 4.0–4.9 million cells/mm^3
Hematocrit (HCT, Hct)	M: 41%–50% F: 36%–44%
Hemoglobin (Hb, Hgb)	M: 13.5–16.5 g/dL F: 12.0–15.0 g/dL
Leukocyte count (WBC count)	4.5–10.0 thousand cells/mm^3
Leukocyte differential count	
Basophils	0%–0.75%
Eosinophils	1%–3%
Lymphocytes	25%–33%
Monocytes	3%–7%
Neutrophils—bands	3%–5%
Neutrophils—segmented	54%–62%
Mean corpuscular hemoglobin (MCH)	26–34 pg/cell
Mean corpuscular hemoglobin concentration (MCHC)	31%–37% Hb/cell
Mean corpuscular volume (MCV)	80–100 fL
Partial thromboplastin time (PTT)	60–85 sec
Platelet count (thrombocyte count)	100–450 thousand/mm^3
Prothrombin time (PT)	11–13.5 sec
RBC count (see Erythrocyte count)	

CLINICAL CHEMISTRY (SERUM PLASMA, URINE)

Test	Normal Range
Alanine aminotransferase (ALT)	8–36 units/L 8–78 units/L (children 0–2 mos)
Albumin	3.2–5 g/dl
Alkaline phosphatase	33–131 (adults 25–60 yrs) 51–153 (adults older than 60 yrs)
Amylase	30–110 units/L
Aspartate aminotransferase (AST)	5–35 units/L
Bilirubin (direct)	0–0.3 mg/dL
Bilirubin (total)	0.1–1.2 mg/dL
BUN	7–20 mg/dL
Calcium, ionized	2.24–2.46 mEq/L
Calcium (total)	8.6–10.3 mg/dL

Test	Normal Range
Carbon dioxide (CO_2) total	23–30 mEq/L
Chloride	95–108 mEq/L
Cholesterol (total) HDL cholesterol LDL cholesterol	Less than 200 mg/dL 40–60 mg/dL Less than 160 mg/dL
Creatinine	0.5–1.4 mg/dl
Creatinine clearance	M: 80–125 ml/min/1.73 m^2 F: 75–115 ml/min/1.73 m^2
Creatine kinase (CK) isoenzymes CK-BB CK-MB (cardiac) CK-MM (muscle)	 0% 0%–3.9% 96%–100%
Creatine phosphokinase (CPK)	8–150 units/L
Ferritin	13–300 ng/ml
Glucose (preprandial)	Less than 115 mg/dL
Glucose (fasting)	60–110 mg/dL
Glucose (nonfasting, 2 hrs postprandial)	Less than 120 mg/dL
Hemoglobin A_{1c}	Less than 8
Iron	66–150 mcg/dL
Iron-binding capacity, total (TIBC)	250–420 mcg/dL
Lactate dehydrogenase (LDH)	56–194 units/L
Lipase	23–208 units/L
Magnesium	1.6–2.5 mg/dL
Osmolality	289–308 mOsm/kg
Oxygen saturation	90–95 (arterial) 40–70 (venous)
pH	7.35–7.45 (arterial) 7.32–7.42 (venous)
Phosphorus, inorganic	2.8–4.2 mg/dL
Potassium	3.5–5.2 mEq/L
Protein (total)	6.5–7.9 g/dL
Sodium	134–149 mEq/L
Thyroid-stimulating hormone (TSH)	0.7–6.4 milliunits/L (adults 20 yrs or younger) 0.4–4.2 milliunits/L (adults 21–54 yrs) 0.5–8.9 milliunits/L (adults 55–87 yrs)
Transferrin	Greater than 200 mg/dL
Triglycerides (TG)	45–155 mg/dL
Urea nitrogen	7–20 mg/dL
Uric acid	M: 2–8 mg/dL F: 2–7.5 mg/dL

Appendix J

CYTOCHROME P450 (CYP) ENZYMES

Most drugs are eliminated from the body, at least in part, by being changed chemically to a less lipid-soluble product (i.e., metabolized) and thus more likely to be excreted from the body via the kidney or bile. Drugs may go through two different metabolic processes: phase 1 and phase 2 metabolism.

In phase 1 metabolism, hepatic microsomal enzymes found in the endothelium of liver cells metabolize drugs via hydrolysis and oxidation and reduction reactions. These chemical reactions make the drug more water soluble. In phase 2 metabolism, large water-soluble substances (e.g., glucuronic acid, sulfate) are attached to the drug, forming inactive, or significantly less active, water-soluble metabolites. Phase 2 processes include glucuronidation, sulfation, conjugation, acetylation, and methylation.

Virtually any of the phase 1 and phase 2 enzymes can be inhibited, and some of these enzymes can be induced by drugs. Inhibiting the activity of metabolic enzymes results in increased concentrations of the drug (substrate), whereas inducing metabolic enzymes results in decreased concentrations of the drug (substrate).

The term "cytochrome P450" (CYP enzymes) refers to a family of more than 100 enzymes in the human body that modulate various physiologic functions. First identified in the 1950s, the CYP enzyme system contains two large subgroups: steroidogenic and xenobiotic enzymes. Only the xenobiotic group is involved in the metabolism of drugs. The xenobiotic group includes four major enzyme families: CYP1, CYP2, CYP3, and CYP4. The primary role of these families is the metabolism of drugs. These families are further subdivided into subfamilies designated by a capital letter and given a specific enzyme number (1, 2, 3, etc.) according to the similarity in amino acid sequence it shares with other enzymes (e.g., CYP1A2).

The key CYP450 enzymes include CYP1A2, CYP2C9, CYP2C19, CYP2D6, and CYP3A4 and may be responsible for metabolism of 75% of all drugs, with the CYP3A subfamily responsible for nearly half of this activity.

The CYP enzymes are found in the endoplasmic reticulum of cells in a variety of human tissue but are primarily concentrated in the liver and intestine. CYP enzymes can be both inhibited and induced, leading to increased or decreased serum concentration of the drug (along with its effects).

The following tables of CYP substrates, inhibitors, and inducers provide a perspective on drugs that are affected by, or affect, cytochrome P450 (CYP) enzymes. **CYP substrate** includes drugs reported to be metabolized, at least in part, by one or more CYP enzymes. **CYP inhibitor** includes drugs reported to inhibit one or more CYP enzymes. **CYP inducer** contains drugs reported to induce one or more CYP enzymes.

P450 ENZYMES: SUBSTRATES, INHIBITORS, INDUCERS

CYP1A2 ENZYME

CYP1A2 SUBSTRATES	CYP1A2 INHIBITORS	CPY1A2 INDUCERS
Caffeine	Cimetidine (Tagamet)	Barbiturates
Clozapine (Clozaril)	Ciprofloxacin (Cipro)	Carbamazepine (Tegretol)
Mirtazapine (Remeron)	Fluvoxamine	Rifampin (Rifadin)
Olanzapine (Zyprexa)	Zileuton (Zyflo)	Smoking
Ramelteon (Rozerem)		
Ropinirole (Requip)		
Tizanidine (Zanaflex)		

- CYP1A2 enzyme is increasingly involved in drug interactions.
- More potent inhibitors include cimetidine, ciprofloxacin, and fluvoxamine.
- Smoking is the most important inducer, but rifampin and barbiturates also can increase enzyme activity.
- Example of reaction: Tizanidine plasma concentrations increased more than 30-fold when the inhibitor fluvoxamine was given concurrently.

CYP2C9 ENZYME

CYP2C9 SUBSTRATES	CYP2C9 INHIBITORS	CYP2C9 INDUCERS
Candesartan (Atacand)	Amiodarone (Cordarone)	Barbiturates
Celecoxib (Celebrex)	Clopidogrel (Plavix)	Carbamazepine (Tegretol)
Diclofenac (Voltaren)	Fluconazole (Diflucan)	Rifampin (Rifadin)
Glipizide (Glucotrol)	Metronidazole (Flagyl)	St. John's wort
Glyburide (DiaBeta)	Sulfamethoxazole	
Ibuprofen (Advil, Motrin)	Valproic acid (Depakote)	
Irbesartan (Avapro)		
Meloxicam (Mobic)		
Warfarin (Coumadin)		

- More potent inhibitors include amiodarone, metronidazole, and sulfamethoxazole.
- All of the inducers can substantially increase enzyme activity.
- Both warfarin and oral hypoglycemics are of serious concern with regard to drug interactions. Substrates warranting attention include warfarin and oral hypoglycemics.

CYP2C19 ENZYME

CYP2C19 SUBSTRATES	CYP2C19 INHIBITORS	CYP2C19 INDUCERS
Citalopram (Celexa)	Cimetidine (Tagamet)	Barbiturates
Diazepam (Valium)	Clopidogrel (Plavix)	Carbamazepine (Tegretol)
Escitalopram (Lexapro)	Esomeprazole (Nexium)	Rifampin (Rifadin)
Omeprazole (Prilosec)	Fluconazole (Diflucan)	St. John's wort
Pantoprazole (Protonix)	Fluvoxamine	
Sertraline (Zoloft)	Modafinil (Provigil)	

- Inhibition by itself does not frequently cause adverse effects compared with other CYP enzymes because many of the substrates do not have serious toxicity.
- Inhibition or induction of the enzyme nonetheless may result in an adverse drug interaction.

- Racial background is important in the likelihood of being deficient in this enzyme (e.g., 3%–5% of Caucasians and 12%–23% of Asians are poor metabolizers of this enzyme).

CYP2D6 ENZYME

CYP2D6 SUBSTRATES	CYP2D6 INHIBITORS	CYP2D6 INDUCERS
Amitriptyline (Elavil)	Amiodarone (Cordarone)	See comment below
Atomoxetine (Strattera)	Bupropion (Wellbutrin)	
Duloxetine (Cymbalta)	Fluoxetine (Prozac)	
Fluoxetine (Prozac)	Paroxetine (Paxil)	
Metoclopramide (Reglan)		
Metoprolol (Lopressor)		
Paroxetine (Paxil)		
Risperidone (Risperdal)		
Tamoxifen (Nolvadex)		
Tolterodine (Detrol)		
Tramadol (Ultram)		
Venlafaxine (Effexor)		

- Potent inhibitors include fluoxetine and paroxetine.
- Evidence suggests that this enzyme is not very susceptible to enzyme induction.
- Genetics, rather than drug therapy, accounts for most ultra-rapid metabolizers (e.g., Greeks, Portuguese, Saudis, and Ethiopians have high enzyme activity).

CYP3A4 ENZYME

CYP3A4 SUBSTRATES	CYP3A4 INHIBITORS	CYP3A4 INDUCERS
Alfuzosin (Uroxatral)	Amiodarone (Cordarone)	Carbamazepine (Tegretol)
Alprazolam (Xanax)	Clarithromycin (Biaxin)	Efavirenz (Sustiva)
Budesonide (Entocort EC)	Diltiazem (Cardizem)	Phenobarbital
Carbamazepine (Tegretol)	Erythromycin (Ery-Tab)	Rifampin (Rifadin)
Cyclosporine (Neoral)	Fluconazole (Diflucan)	St. John's wort
Fluticasone (Flovent)	Fluoxetine (Prozac)	
Lovastatin (Mevacor)	Itraconazole (Spoiranox)	
Repaglinide (Prandin)	Ketoconazole (Nizoral)	
Sildenafil (Viagra)	Verapamil (Calan, Isoptin)	
Simvastatin (Zocor)		
Tadalafil (Cialis)		

- This enzyme metabolizes about half of all medications on the market.
- Drug toxicity of CYP3A4 substrates due to inhibition of CYP3A4 is relatively common.
- This enzyme is very sensitive to induction, tending to lower plasma concentrations of substrates, resulting in reduced efficacy of the substrate.
- Most potent inhibitors include clarithromycin, itraconazole, and ketoconazole.
- Rifampin is a potent inducer and may reduce serum concentrations of substrates by as much as 90%.

Appendix K

POISON ANTIDOTE CHART

Poisoning Agent	Antidote	Dosage
Acetaminophen	Acetylcysteine (Acetadote, Mucomyst)	PO: ADULTS, CHILDREN: Loading dose: 140 mg/kg, then 70 mg/kg q4h for a total of 18 doses. Total dose delivered: 1,330 mg/kg. IV: ADULTS, CHILDREN: Loading dose: 150 mg/kg over 60 min, then 50 mg/kg over 4 hrs, then 100 mg/kg over 16 hrs. Total dose delivered: 300 mg/kg.
Anticholinergic agents (e.g., atropine)	Physostigmine	IM/IV/SUBCUTANEOUS: ADULTS: Initially, 0.5–2 mg, then repeat q20min until response occurs or adverse effects occur. Repeat 1–4 mg q30–60min as life-threatening symptoms recur. IV: CHILDREN (Reserve for life-threatening situation only): 0.01–0.03 mg/kg/dose. May repeat after 15–20 min to maximum total dose of 2 mg, or until response occurs or adverse cholinergic effects occur.
Arsenic	Dimercaprol (BAL in oil)	Mild Poisoning IM: ADULTS, CHILDREN: 2.5 mg/kg/dose q6h for 2 days, then q12h for 1 day, then once daily for 10 days. Severe Poisoning IM: ADULTS, CHILDREN: 3 mg/kg/dose q4h for 2 days, then q6h for 1 day, then q12h for 10 days.
Benzodiazepines (e.g., midazolam)	Flumazenil (Romazicon)	IV: ADULTS: 0.2 mg over 30 sec. May give 0.3-mg dose after 30 sec if desired LOC not obtained. Additional doses of 0.5 mg can be given over 30 sec at 1-min intervals up to cumulative dose of 3 mg. CHILDREN: 0.01 mg/kg (**maximum:** 0.2 mg) with repeat doses of 0.01 mg/kg (**maximum:** 0.2 mg) given every minute to maximum total cumulative dose of 1 mg.
Beta blockers (e.g., propranolol)	Glucagon	IV: ADULTS: 5–10 mg over 1 min, followed by infusion of 1–10 mg/hr.
Calcium channel blockers (e.g., verapamil)	Glucagon	IV: ADULTS: 5–10 mg over 1 min, followed by infusion of 1–10 mg/hr.

Continued

Poisoning Agent	Antidote	Dosage
Carbamate pesticides	Atropine	IV: ADULTS: Initially, 1–5 mg doubled q5min until signs of muscarinic excess abate. IV INFUSION: ADULTS: 0.5–1 mg/hr. IM: ADULTS (Mild symptoms): 2 mg. If severe symptoms develop after first dose, 2 additional doses should be repeated in 10 min. (Severe symptoms): Immediately administer three 2-mg doses. IV: CHILDREN: 0.02–0.05 mg/kg q10–20min until atropine effect observed, then q1–4h for at least 24 hrs. IM: 0.5–2 mg/dose based on weight (0.5 mg: 15–40 lb, 1 mg: 41–90 lb, 2 mg: greater than 90 lb). (Mild symptoms): 1 injection. (Severe symptoms): 2 additional injections given in rapid succession 10 min after receiving first injection.
Digoxin (Lanoxin)	Digoxin immune FAB (Digibind)	**ADULTS** Unknown amount of ingestion: 800 mg IV infusion if acute ingestion, 240 mg IV infusion if chronic ingestion. **Dosing for Ingestion of Single Large Dose** Dose (in no. of vials) = (Total digitalis body load in mg)/(0.5 mg of digitalis bound per vial). Total digitalis body load in mg = (No. of tablets/capsules ingested) × (mg strength of tablet/capsule) × (bioavailability of tablet/capsule). Digoxin tablets and elixir are 80% bioavailable. Digoxin capsules and injection are 100% bioavailable. **Dosing Based on Serum Level** Digoxin: Dose (in no. of vials) = (Serum digoxin level in ng/mL) × (weight in kg)/(100). Digitoxin: Dose (in no. of vials) = (Serum digitoxin level in ng/mL) × (weight in kg)/(1,000). **CHILDREN** **Dosing for Ingestion of Single Large Dose** Dose (in no. of vials) = (Total digitalis body load in mg)/(0.5 mg of digitalis bound per vial). Total digitalis body load in mg = (No. of tablets/capsules ingested) × (mg strength of tablet/capsule) × (bioavailability of tablet/capsule). Digoxin tablets and elixir are 80% bioavailable. Digoxin capsules and injection are 100% bioavailable. WEIGHING 20 kg or less: Dilution of reconstituted vial to 1 mg/ml may be desirable for doses of 3 mg or less. Dose (in no. of mg) = Dose (in no. of vials) × 38 mg/vial. Dose (in no. of vials) = (Serum digoxin level in ng/ml) × (weight in kg)/(100).

Poisoning Agent	Antidote	Dosage
Ethylene glycol	Fomepizole (Antizol)	IV: ADULTS, CHILDREN: Loading dose 15 mg/kg, then 10 mg/kg q12h for 4 doses, then 15 mg/kg q12h thereafter until ethylene glycol levels reduced to less than 20 mg/dl and patient is asymptomatic with normal pH.
Extravasation vasoconstrictive agents (e.g., dopamine)	Phentolamine (Regitine)	ADULTS, CHILDREN: Infiltrate area with small amount of solution made by diluting 5–10 mg in 10 ml 0.9% NaCl within 12 hrs of extravasation. In general, do not exceed 0.1–0.2 mg/kg (5 mg total).
Heparin	Protamine	IV: ADULTS, CHILDREN: Dosage is determined by most recent dosage of heparin or low molecular weight heparin (LWH): 1 mg protamine neutralizes 90–115 units of heparin and 1 mg (100 units) of LWH. **Maximum dose:** 50 mg.
Iron	Deferoxamine (Desferal)	Acute IM: ADULTS: Initially, 1,000 mg, then 500 mg q4h for 2 doses. Additional doses of 0.5 g q4–12h. **Maximum:** 6 g/24 hrs. CHILDREN 3 YRS AND OLDER: 90 mg/kg/dose q8h (not to exceed 1 g/dose). **Maximum:** 6 g/24 hrs. IV: ADULTS, CHILDREN: 15 mg/kg/hr. **Maximum:** 6 g/24 hrs. Chronic IM: ADULTS: 500–1,000 mg/day. IV: ADULTS, CHILDREN: 15 mg/kg/hr. **Maximum:** 12 g/24 hrs.
Isoniazid	Pyridoxine (vitamin B_6)	IV: ADULTS, CHILDREN: Total dose of pyridoxine equal to amount of isoniazid ingested as first dose of 1–4 g IV, then 1 g IM q30min until total dose completed. If not known, give 5 g at rate of 1 g/min. May repeat q5–10min.
Lead	Calcium EDTA	Symptomatic Treat for 3–5 days; give in conjunction with dimercaprol. IM: ADULTS, CHILDREN: 167 mg/m^2 q4h. IV: ADULTS, CHILDREN: 1 g/m^2 as 8- to 24-hr infusion or divided q12h. Lead Encephalopathy Treat for 5 days; give concurrently with dimercaprol. IM: ADULTS, CHILDREN: 250 mg/m^2 q4h. IV: ADULTS, CHILDREN: 50 mg/kg/day as 24-hr continuous infusion.

Continued

Poisoning Agent	Antidote	Dosage
Lead	Dimercaprol (BAL in oil)	Mild IM: ADULTS, CHILDREN: Loading dose 4 mg/kg, then 3 mg/kg/dose q4h for 2–7 days. Begin calcium EDTA with second dose. Severe and Lead Encephalopathy IM: ADULTS, CHILDREN: 4 mg/kg/dose q4h for 3–5 days. Begin calcium EDTA with second dose.
Lead	Succimer (Chemet)	PO: ADULTS, CHILDREN: 10 mg/kg/dose q8h for 5 days, then q12h for 14 days. **Maximum:** 500 mg/dose. Note: For children younger than 5 yrs, dose based on mg/m^2.
Methanol	Fomepizole (Antizol)	IV: ADULTS, CHILDREN: Loading dose 15 mg/kg, then 10 mg/kg q12h for 4 doses, then 15 mg/kg q12h thereafter until ethylene glycol levels reduced to less than 20 mg/dl and patient is asymptomatic with normal pH.
Opioids (e.g., morphine)	Naloxone (Narcan)	IV/IM/SUBCUTANEOUS: ADULTS: 0.4–2 mg/dose. May repeat every 2–3 min as needed. Therapy may need to be reassessed if no response is seen after cumulative dose of 10 mg. CHILDREN (5 YRS OR OLDER or WEIGHING 20 KG OR GREATER): 2 mg/dose IV/IM/SUBCUTANEOUS. May repeat every 2–3 min as needed. Therapy may need to be reassessed if no response is seen after cumulative dose of 10 mg. CHILDREN (WEIGHING LESS THAN 20 KG): 0.1 mg/kg/dose. May repeat every 2–3 min as needed.
Organophosphate pesticides	Atropine	IV: ADULTS: Initially, 1–5 mg doubled q5min until signs of muscarinic excess abate. IV INFUSION: ADULTS: 0.5–1 mg/hr. IM: ADULTS (Mild symptoms): 2 mg. If severe symptoms develop after first dose, 2 additional doses should be repeated in 10 min. (Severe symptoms): Immediately administer three 2-mg doses. IV: CHILDREN: 0.02–0.05 mg/kg q10–20min until atropine effect observed, then q1–4h for at least 24 hrs. IM: 0.5–2 mg/dose based on weight (0.5 mg: 15–40 lb, 1 mg: 41–90 lb, 2 mg: greater than 90 lb). (Mild symptoms): 1 injection. (Severe symptoms): 2 additional injections given in rapid succession 10 min after receiving first injection.

Poisoning Agent	Antidote	Dosage
Organophosphate pesticides	Pralidoxime (Protopam)	IM/IV: ADULTS: 1–2 g. Repeat in 1–2 hrs if muscle weakness has not been relieved, then at 10- to 12-hr intervals if cholinergic signs recur. CHILDREN: 20–50 mg/kg/dose. Repeat in 1–2 hrs if muscle weakness is not relieved, then at 10- to 12-hr intervals if cholinergic signs recur.
Warfarin (Coumadin)	Phytonadione (vitamin K)	PO/IV/SUBCUTANEOUS: ADULTS: 2.5–10 mg/dose. May repeat in 12–48 hrs if given PO, 6–8 hrs if given by IV or subcutaneous route. CHILDREN: 0.5–5 mg depending on need for further anticoagulation, severity of bleeding.

Appendix L

PREVENTING MEDICATION ERRORS AND IMPROVING MEDICATION SAFETY

Medication safety is a high priority for the health care professional. Prevention of medication errors and improved safety for the pt are important, esp. in today's health care environment when today's pt is older and sometimes sicker and the drug therapy regimen can be more sophisticated and complex.

A medication error is defined by the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) as "any preventable event that may cause or lead to inappropriate medication use or pt harm while the medication is in the control of the health care professional, pt, or consumer."

Most medication errors occur as a result of multiple, compounding events as opposed to a single act by a single individual.

Use of the wrong medication, strength, or dose; confusion over sound-alike or look-alike drugs; administration of medications by the wrong route; miscalculations (esp. when used in pediatric pts or when administering medications intravenously); and errors in prescribing and transcription all can contribute to compromising the safety of the pt. The potential for adverse events and medication errors is definitely a reality and is potentially tragic and costly in both human and economic terms.

Health care professionals must take the initiative to create and implement procedures to prevent medication errors from occurring and implement methods to reduce medication errors. The first priority in preventing medication errors is to establish a multidisciplinary team to improve medication use. The goal for this team would be to assess medication safety and implement changes that would make it difficult or impossible for mistakes to occur. Some important criteria in making improved medication safety successful include the following:

- Promote a nonpunitive approach to reducing medication errors.
- Increase the detection and the reporting of medication errors, near misses, and potentially hazardous situations that may result in medication errors.
- Determine root causes of medication errors.
- Educate about the causes of medication errors and ways to prevent these errors.
- Make recommendations to allow organization-wide, system-based changes to prevent medication errors.
- Learn from errors that occur in other organizations and take measures to prevent similar errors.

Some common causes and ways to prevent medication errors and improve safety include the following:

Handwriting: Poor handwriting can make it difficult to distinguish between two medications with similar names. Also, many drug names sound similar, esp. when the names are spoken over the telephone, poorly enunciated, or mispronounced.

- Take time to write legibly.
- Keep phone or verbal orders to a minimum to prevent misinterpretation.

- Repeat back orders taken over the telephone.
- When ordering a new or rarely used medication, print the name.
- Always specify the drug strength, even if only one strength exists.
- Express dosages for oral liquids only in metric weights or volumes (e.g., mg or ml), not by teaspoon or tablespoon.
- Print generic and brand names of look-alike or sound-alike medications.

Zeros and decimal points: Hastily written orders can present problems even if the name of the medication is clear.

- Never leave a decimal point "naked." Place a zero before a decimal point when the number is less than a whole unit (e.g., use 0.25 mg or 250 mcg, **not** .25 mg).
- Never have a trailing zero following a decimal point (e.g., use 2 mg, **not** 2.0 mg).

Abbreviations: Errors can occur because of a failure to standardize abbreviations. Establishing a list of abbreviations that should never be used is recommended.

- Never abbreviate unit as "U"; spell out "unit."
- Do not abbreviate "once daily" as OD or QD or "every other day" as QOD; spell it out.
- Do not use D/C, as this may be misinterpreted as either discharge or discontinue.
- Do not abbreviate drug names; spell out the generic and/or brand names.

Ambiguous or incomplete orders: These types of orders can cause confusion or misinterpretation of the writer's intention. Examples include situations when the route of administration, dose, or dosage form has not been specified.

- Do not use slash marks—they may be read as the number one (1).
- When reviewing an unusual order, verify the order with the person writing the order to prevent any misunderstanding.
- Read over orders after writing.
- Encourage that the drug's indication for use be provided on medication orders.
- Provide complete medication orders—do not use "resume preop" or "continue previous meds."
- Provide the age and, when appropriate, the weight of the pt.

High-alert medications: Medications in this category have an increased risk of causing significant pt harm when used in error. Mistakes with these medications may or may not be more common but may be more devastating to the pt if an error occurs. A list of high-alert medications can be obtained from the Institute for Safe Medication Practices (ISMP) at www.ismp.org.

Technology available today that can be used to address and help solve potential medication problems or errors includes the following:

- Electronic prescribing systems—This refers to computerized prescriber order entry systems. Within these systems is the capability to incorporate medication safety alerts (e.g., maximum dose alerts, allergy screening). Additionally, these systems should be integrated or interfaced with pharmacy and laboratory systems to provide drug–drug and drug–disease interactions alerts and include clinical order screening capability.
- Bar codes—These systems are designed to use bar-code scanning devices to validate identity of pts, verify medications administered, document administration, and provide safety alerts.

- "Smart" infusion pumps—These pumps allow users to enter drug infusion protocols into a drug library along with predefined dosage limits. If a dosage is outside the limits established, an alarm is sounded and drug delivery is halted, informing the clinician that the dose is outside the recommended range.
- Automated dispensing systems; point-of-use dispensing system—These systems should be integrated with information systems, esp. pharmacy systems.
- Pharmacy order entry system—This should be fully integrated with an electronic prescribing system with the capability of producing medication safety alerts. Additionally, the system should generate a computerized medication administration record (MAR), which would be used by the nursing staff while administering medications.

Medication reconciliation: Medication errors generally occur at transition points in the pt's care (admission, transfer from one level of care to another [e.g., critical care to general care area], and discharge). Incomplete documentation can account for up to 60% of potential medication errors. Therefore, it becomes necessary to accurately and completely reconcile medication across the continuum of care. This includes the name, dosage, frequency, and route of medication administration.

Medication reconciliation programs are a process of identifying the most accurate list of all medications a pt is taking and using this list to provide correct medications anywhere within the health care system. The focus is on not only compiling a list but using the list to reduce medication errors and provide quality pt care.

Additional Strategies to Reduce Medication Errors

The Institute for Safe Medication Practices (ISMP), FDA, and other agencies have identified high-risk areas associated with medication errors. They include the following:

At-risk population: At-risk populations primarily include pediatric and geriatric pts. For both, this risk is due to altered pharmacokinetic parameters with little published information regarding medication use in these groups. Additionally, in the pediatric population, the risk is due to the need for calculating doses based on age and weight, lack of available dosage forms, and concentrations for smaller children.

In a USP report, more than one-third of medication errors reaching the pt occurred in pts 65 yrs of age and older. Almost 40% of people 60 yrs and older take at least five medications. More than 50% of fatal hospital medication errors involve seniors. In the senior population, age-related physiologic changes (e.g., decreased renal function, reduced muscle mass) increase the risk for adverse events.

Avoid abbreviations and nomenclature: The confusion caused by abbreviations has prompted the ISMP to develop a list of abbreviations that should be avoided (see back cover of handbook).

Recognize prescription look-alike and sound-alike medications: The ISMP has developed an extensive list of confused drug names (see www.jointcommission.org). See individual monographs for **DO NOT CONFUSE** information.

Focus on high alert medications: High alert medications are medications that bear a heightened risk of causing significant pt harm if incorrectly used. High alert medications in the handbook have a colored background for the entire monograph.

Look for duplicate therapies and interactions: Drug interactions and duplicate therapies can increase risk of adverse reactions. Refer to individual monographs for significant interaction information (drug, herbal, food).

Report errors to improve process: This action plays an important role in preventing further errors. The intent is to identify system failures that can be altered to prevent further errors.

Appendix M

PARENTERAL FLUID ADMINISTRATION

Replacing fluids in the body is based on body fluid needs. Water comprises approximately 60% of the adult body. Approximately 40% is intracellular fluid and 20% is extracellular fluid, of which 15% is interstitial (tissues) and 5% is intravascular. The walls separating these compartments are porous, allowing water to move freely between them. Small particles such as sodium and chloride can pass through the walls, but larger molecules such as proteins and starches usually are unable to pass through the walls.

Hydrostatic and osmotic pressures are forces that move water and regulate the body's water. Intravenous fluid manipulates these two pressures. Hydrostatic pressure reflects the weight and volume of water. The greater the volume, the higher the blood pressure.

Effects of Osmotic Pressure: *Osmosis* is the diffusion of water across a semipermeable membrane from an area of high concentration to an area of low concentration (water moves into the compartment of higher concentration of particles, or solute). This is similar to the action of a sponge soaking up water. This pull is referred to as *osmotic pressure.* It is the number of particles in each compartment that keeps water where it is supposed to be. By administering fluids with more (or fewer) particles than blood plasma, fluid is pulled into the compartment where it is needed the most.

How do we know where the water is needed? To assess water balance, measure the *osmolality* of blood plasma (number of particles [osmoles] in a kilogram of fluid). *Osmolarity* is the number of particles in a liter of fluid. Normal serum osmolality is approximately 300 milliosmoles (mOsm) per liter.

Crystalloids are made of substances that form crystals (e.g., sodium chloride) and are small, so easy movement between compartments is possible. Crystalloids are categorized by their tonicity (a synonym for osmolality). An isotonic solution has the same number of particles (osmolality) as plasma and will not promote a shift of fluids into or out of cells. Examples of isotonic crystalloid solutions are 0.9% sodium chloride and lactated Ringer's solution. Dextrose 5% in water is another isotonic crystalloid. However, it is quickly metabolized, and the fluid quickly becomes hypotonic. Hypotonic solutions (e.g., D_5W, 0.45% sodium chloride) are a good source of free water, causing a shift out of the vascular bed and into cells by way of osmosis. Hypotonic solutions are given to correct cellular dehydration and hypernatremia. Hypertonic solutions have more particles than body water and pull water back into the circulation, which can shrink cells.

SODIUM CHLORIDE

USES

- Extracellular fluid replacement when chloride loss is greater than or equal to sodium loss
- Treatment of metabolic alkalosis in the presence of fluid loss; chloride ions cause a compensatory decrease of bicarbonate ions
- Sodium depletion, extracellular fluid volume deficit with sodium deficit
- Initiation and termination of blood transfusion, preventing hemolysis of RBCs (occurs with dextrose in water solutions)

SIDE EFFECTS/ABNORMALITIES

- Hypernatremia
- **Acidosis:** 0.9% sodium chloride contains one-third more chloride ions than is present in extracellular fluid; excess chloride ions cause loss of bicarbonate, resulting in acidosis
- **Hypokalemia:** Increased potassium excretion at the same time extracellular fluid is increasing, which further decreases potassium concentration in extracellular fluid
- Circulatory overload

DEXTROSE (GLUCOSE)

EFFECTS

- Provides calories for essential energy
- Improves hepatic function because it is converted into glycogen
- Spares body protein, preventing unnecessary breakdown of protein tissue
- Prevents ketosis
- Stored in the liver as glycogen, causing a shift of potassium from extracellular to intracellular fluid compartment

USES

- Dehydration
- Hyponatremia
- Hyperkalemia
- Vehicle of drug delivery and nutrition

Note: Once infused, dextrose is rapidly metabolized to water and carbon dioxide, becoming hypotonic rather than isotonic.

SIDE EFFECTS/ABNORMALITIES

- Dehydration: Osmotic diuresis occurs if dextrose is given faster than the pt's ability to metabolize it
- Hypokalemia (see Effects)
- Hyperinsulinism due to rapid infusion of hypertonic solution
- Water intoxication due to an imbalance based on increase in extracellular fluid volume from water alone

SELECTED PARENTERAL FLUIDS

Solution	Comments
Dextrose 5% in water (D_5W)	Supplies approximately 170 cal/L and free water to aid in renal excretion of solutes Avoid excessive volumes in pts with increased antidiuretic hormone activity or to replace fluids in hypovolemic pts
0.9% Sodium chloride (0.9% NaCl)	Isotonic fluid commonly used to expand extracellular fluid in presence of hypovolemia Can be used to treat mild metabolic alkalosis

Solution	Comments
0.45% Sodium chloride (0.45% NaCl)	Hypotonic solution that provides sodium, chloride, and free water; sodium and chloride allow kidneys to select and retain needed amounts Free water is desirable as aid to kidneys in elimination of solutes
3% Sodium chloride	Used only to treat severe hyponatremia
Lactated Ringer's solution	Isotonic solution that contains sodium, potassium, calcium, and chloride in approximately the same concentrations as found in plasma Used to treat hypovolemia, burns, and fluid loss as bile or diarrhea

Appendix N

COMMON TERMINOLOGY CRITERIA FOR ADVERSE EVENTS (CTCAE)

The Common Terminology Criteria for Adverse Events (CTCAE) is descriptive terminology used for reporting an adverse event (AE) in a concise and standardized manner. It is supported by the U.S. Department of Health and Human Services, National Institutes of Health, and National Cancer Institute. An AE term is a unique representation of a specific event that can be used for medical documentation and scientific analyses. Along with cancer medications, other drugs may use the CTCAE system for dose and treatment modifications.

CTCAE terms are grouped by system organ classes, such as *Blood/Lymphatic, GI, Nervous, Renal,* and *Respiratory* disorders. Within each system organ class, AEs are listed and accompanied by a brief description. A grading scale is then provided for each AE term, and each grade refers to a specific severity.

The CTCAE grading scale displays Grades 1–5 with particular descriptions and/or recommendations. The severity for each AE is based on the following generalized guidelines: **Grade 1:** Asymptomatic or mild symptoms; clinical or diagnostic observations only; intervention not indicated. **Grade 2:** Moderate; minimal, local, or noninvasive intervention indicated; limiting age-appropriate instrumental activity of daily living (ADL). **Grade 3:** Severe or medically significant but not immediately life threatening; hospitalization or prolonged hospitalization indicated; disabling; limiting self-care ADL. **Grade 4:** Life-threatening consequences; urgent intervention indicated. **Grade 5:** Death related to AE.

CTCAE EXAMPLES

	Grade				
Adverse Event	1	2	3	4	5
Blood/Lymphatic **Anemia**	Hgb < lower limit of normal–10 g/dL	Hgb 8–10 g/dL	Hgb <8 g/dL; transfusion indicated	Life-threatening consequences Urgent intervention indicated	Death
Gastrointestinal **Diarrhea**	Increase of <4 stools/day over baseline Mild ostomy output	Increase of 4–6 stools/day over baseline Moderate ostomy output	Increase of 7 stools/day over baseline Severe ostomy output Hospitalization required	Life-threatening consequences Urgent intervention indicated	Death
General **Fever**	38–39°C (100.4–102.2°F)	>39–40°C (102.3–104° F)	>40°C (>104° F) for less than 24 hrs	>40°C (>104°F) for more than 24 hrs	Death

Continued

Adverse Event	Grade 1	2	3	4	5
Infections **UTI**	N/A	Localized; local intervention indicated (topical, antifungal, antiviral)	IV antibiotic, antifungal, antiviral intervention indicated. Radiologic or surgical intervention indicated	Life-threatening consequences Urgent intervention indicated	Death
Investigations **Lipase increased**	>ULN–1.5 times ULN	>1.5–2 times ULN	>2–5 times ULN	>5 times ULN	N/A
Metabolism/ Nutrition **Hyperkalemia**	>ULN–5.5 mmol/L	>5.5–6 mmol/L	>6–7 mmol/L	>7 mmol/L; life-threatening consequences	Death

General Index

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COMMONLY USED ABBREVIATIONS

ABG(s)—arterial blood gas(es)
ACE—angiotensin-converting enzyme
ADHD—attention-deficit hyperactivity disorder
AIDS—acquired immunodeficiency syndrome
ALT—alanine aminotransferase, serum
ANC—absolute neutrophil count
aPTT—activated partial thromboplastin time
AST—aspartate aminotransferase, serum
AV—atrioventricular
bid—twice per day
B/P—blood pressure
BSA—body surface area
BUN—blood urea nitrogen
CBC—complete blood count
Ccr—creatinine clearance
CNS—central nervous system
CO—cardiac output
COPD—chronic obstructive pulmonary disease
CPK—creatine phosphokinase
CSF—cerebrospinal fluid
CT—computed tomography
CVA—cerebrovascular accident
D_5W—dextrose 5% in water
dl—deciliter
DNA—deoxyribonucleic acid
EEG—electroencephalogram
EKG—electrocardiogram
esp.—especially
g—gram
GGT—gamma glutamyl transpeptidase
GI—gastrointestinal
GU—genitourinary
H_2—histamine
Hct—hematocrit
HDL—high-density lipoprotein
HF—heart failure
Hgb—hemoglobin
HIV—human immunodeficiency virus
HMG-CoA—3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase inhibitors (statins)
hr/hrs—hour/hours
HTN—hypertension
I&O—intake and output
ICP—intracranial pressure
ID—intradermal
IgA—immunoglobulin A
IM—intramuscular
IOP—intraocular pressure
IV—intravenous
K—potassium
kg—kilogram
LDH—lactate dehydrogenase
LDL—low-density lipoprotein
LOC—level of consciousness
MAC—*Mycobacterium avium* complex
MAOI—monoamine oxidase inhibitor
mcg—microgram
mEq—milliequivalent
mg—milligram
MI—myocardial infarction
min—minute(s)
mo/mos—month/months
N/A—not applicable
Na—sodium
NaCl—sodium chloride
NG—nasogastric
NSAID(s)—nonsteroidal anti-inflammatory drug(s)
OD—right eye
OS—left eye
OTC—over the counter
OU—both eyes
PCP—*Pneumocystis jiroveci* pneumonia
PO—orally, by mouth
prn—as needed
PSA—prostate-specific antigen
pt/pts—patient/patients
PT—prothrombin time
PTCA—percutaneous transluminal coronary angiography
q—every
qid—four times daily
RBC—red blood cell count
REM—rapid eye movement
RNA—ribonucleic acid
SA—sinoatrial node
sec—second(s)
SSRI—selective serotonin reuptake inhibitor
tbsp—tablespoon
tid—three times daily
TNF—tumor necrosis factor
tsp—teaspoon
UTI—urinary tract infection
VLDL—very-low-density lipoprotein
WBC—white blood cell count
wk/wks—week/weeks
yr/yrs—year/years

DANGEROUS ABBREVIATIONS

The 2004 National Patient Safety Goals of The Joint Commission (TJC) requires the elimination of dangerous abbreviations in an effort to promote patient safety by reducing medication errors. To achieve this goal, TJC developed a list of abbreviations, acronyms, and symbols that health care organizations must include in their "do not use" list. An abbreviation on the "do not use" list should not be used in any of its forms—uppercase or lowercase, with or without periods. For example, if Q.D. is on the organization's list, health care organizations cannot use QD or qd because any of those variations are confusing and can be misinterpreted.

Abbreviation	Potential Problem	Preferred Term
U (for unit)	Mistaken as zero, four, or cc	Write "unit"
IU (for international unit)	Mistaken as IV (intravenous) or 10 (ten)	Write "international unit"
Q.D., QD, q.d., qd (daily)	Mistaken for each other	Write "daily"
Q.O.D., QOD, q.o.d., qod (every other day)	Period after "Q" mistaken for "I" and the "O" mistaken for "I"	Write "every other day"
Trailing zero (e.g., 5.0 mg); lack of leading zero (e.g., .5 mg)	Decimal point is missed	Always write a zero before a decimal point (0.5 mg) and never write a zero by itself after a decimal point (5 mg)
MS, MSO_4, $MgSO_4$	Confused for one another; can mean morphine sulfate or magnesium sulfate	Write "morphine sulfate" or "magnesium sulfate"

In addition, TJC requires an organization to identify and apply at least another three "do not use" abbreviations, acronyms, or symbols of its own choosing. The following list was developed by TJC for organizations to consider including on their list.

μg (for micrograms)	Mistaken for mg (milligrams) resulting in one thousand-fold-dosing overdose	Write "mcg"
H.S. (for half-strength or Latin abbreviation for bedtime)	Mistaken for either half-strength or hour of sleep (at bedtime); q.H.S. mistaken for every hour; all can result in dosing error	Write "half-strength" or "at bedtime"
T.I.W. (for three times per week)	Mistaken for three times per day or twice weekly, resulting in an overdose	Write "3 times weekly" or "three times weekly"
S.C. or S.Q. (for subcutaneous)	Mistaken as SL for sublingual, or "5 every"	Write "Sub-Q," "subQ," or "subcutaneously"
D/C (for discharge)	Interpreted as discontinue whatever medications follow (typically discharge meds)	Write "discharge"
c.c. (for cubic centimeter)	Mistaken for U (units) when poorly written	Write "ml" for milliliters
A.S., A.D., A.U. (Latin abbreviation for left, right, or both ears)	Mistaken for OS, OD, OU, etc.	Write "left ear," "right ear," or "both ears"
> (greater than) < (less than)	Misinterpreted as number 7 or letter "L"	Write "greater than" or "less than"
Abbreviations for drug names	Misinterpreted due to similar abbreviations for multiple drugs	Write drug names in full

IV Compatibilities

The IV compatibility table provides data when 2 or more medications are given in a Y-site of administration. The data in this table largely represent physical incompatibilities (e.g., haze, precipitate, change in color). Therapeutic incompatibilities have not been included, so when using the table, professional judgement should be exercised.

C Physically compatible via Y-site administration.
I Physically incompatible.
N Information on compatibility not available or conflicting

	Dextrose 5%	Sodium Chloride	Acyclovir	Amikacin	Amiodarone	Anidulafungin	Argatroban	Azithromycin	Aztreonam	Bivalirudin	Bumetanide	Calcium Gluconate	Cefazolin	Cefepime	Ceftaroline Fosamil	Ceftriaxone	Ciprofloxacin	Clindamycin	Daptomycin	Dexamethasone	Dexmedetomidine	Diltiazem	Diphenhydramine	Dobutamine	Dopamine	Enalapril	Epinephrine	Eptifibatide	Esmolol	Famotidine	Fluconazole	Furosemide	Gentamicin	Granisetron	Heparin	Hydrocortisone	Hydromorphone	Imipenem	Insulin	Labetalol	Levofloxacin	Linezolid	Lorazepam	Magnesium	Mannitol	Meropenem	Methylprednisolone	Metoclopramide	Metronidazole	Midazolam	Morphine	Nicardipine	Nitroglycerin	Nitroprusside	Norepinephrine	Octreotide	Ondansetron	Pantoprazole	Phenylephrine	Piperacillin/Tazobactam	Potassium Chloride	Propofol	Sodium Bicarbonate	Tigecycline	Tobramycin	Vancomycin	Vasopressin
Acyclovir	C	C	—	C	N	C	N	N	I	N	N	N	C	N	C	C	N	C	N	C	N	I	C	I	I	N	N	N	N	C	C	N	C	C	C	C	C	C	N	N	I	C	C	C	N	I	C	C	C	N	C	N	N	N	N	N	I	N	N	I	C	C	C	N	C	C	N
Amikacin	C	C	C	—	C	C	N	I	C	C	N	C	C	C	C	C	C	C	C	C	C	C	C	N	N	C	C	N	C	N	C	C	N	C	I	C	C	N	N	C	C	C	C	C	C	N	N	N	N	C	C	C	N	N	C	N	C	I	N	N	C	I	C	C	N	C	N
Amiodarone	C	C	N	C	—	N	I	N	N	N	N	C	I	N	C	C	C	C	N	N	C	N	N	C	C	N	C	C	C	C	C	C	C	N	I	N	N	I	C	C	N	N	C	I	N	N	C	N	N	C	C	N	C	I	C	N	N	I	C	I	C	N	I	N	C	C	C
Anidulafungin	C	C	C	C	N	—	N	N	N	N	N	N	C	C	N	C	C	C	N	C	N	N	N	C	C	N	C	N	N	C	C	C	C	N	C	C	N	C	N	N	C	C	N	N	N	C	C	N	C	C	C	N	N	N	C	N	N	C	C	C	C	N	I	N	C	C	N
Argatroban	C	C	N	N	I	N	—	N	N	N	N	N	N	N	N	N	N	N	N	N	N	C	C	C	C	N	N	C	N	N	N	C	N	N	N	C	N	N	N	N	N	N	N	N	N	N	N	N	N	C	C	N	C	C	C	N	N	N	C	N	N	N	N	N	N	N	C
Azithromycin	C	C	N	I	N	N	N	—	I	C	N	N	N	N	C	I	I	I	N	N	C	N	N	N	N	N	N	N	N	I	N	I	I	N	N	N	N	I	N	N	I	N	N	N	N	N	N	N	N	N	I	N	N	N	N	N	C	N	N	I	I	N	N	C	I	N	N
Aztreonam	C	C	I	C	N	N	N	N	—	C	C	N	C	N	N	C	C	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C	C	C	C	N	N	C	I	C	C	N	C	C	I	N	C	C	N	N	N	N	C	I	N	C	C	C	C	N	C	C	N
Bivalirudin	C	C	N	C	I	N	N	C	C	—	C	C	C	C	N	C	C	C	N	C	N	C	C	C	C	C	C	C	C	C	C	C	C	N	C	C	C	N	N	C	C	N	C	C	C	N	C	C	C	C	C	N	C	C	C	N	N	N	C	C	C	N	C	N	C	I	N
Bumetanide	C	C	N	N	N	N	N	N	C	C	—	N	N	N	C	N	N	N	N	N	C	C	N	I	N	N	N	N	N	N	N	C	N	C	N	N	N	N	N	N	N	N	C	N	N	N	N	N	N	I	C	N	N	N	N	N	N	N	N	C	I	N	N	N	N	N	N
Calcium Gluconate	C	C	N	C	C	N	N	N	C	C	N	—	C	N	C	I	C	N	N	N	C	N	N	C	N	C	C	N	N	C	I	C	N	C	C	C	N	N	N	C	N	C	N	C	N	C	I	I	N	C	N	C	N	N	C	N	N	I	N	C	C	C	C	N	C	C	N
Cefazolin	C	C	C	C	I	C	N	N	C	C	N	C	—	N	N	N	N	C	N	N	C	C	N	N	N	C	N	N	C	C	C	N	I	C	C	N	I	N	C	C	N	C	N	C	N	N	N	N	C	C	C	C	N	N	N	N	C	C	N	N	N	C	N	N	N	I	N
Cefepime	C	C	N	C	N	C	N	N	N	C	N	N	N	—	N	N	N	C	N	N	C	N	N	I	C	N	N	N	N	N	C	C	C	C	C	N	N	N	C	N	N	N	N	N	N	N	C	N	C	I	C	I	N	N	N	N	N	N	N	N	C	I	N	I	I	C	N
Ceftaroline Fosamil	C	C	C	C	C	N	N	C	N	N	C	C	N	N	—	N	C	N	N	C	N	C	C	I	C	C	N	N	N	C	C	C	C	C	C	C	C	N	C	I	C	N	C	C	C	N	C	C	C	C	C	N	N	N	C	N	C	C	N	N	C	C	C	N	C	N	C
Ceftriaxone	C	C	C	C	C	C	N	I	C	C	N	I	N	N	N	—	N	I	C	N	C	C	N	N	N	N	N	N	N	C	I	N	N	C	C	N	N	N	N	I	N	C	N	N	N	N	N	N	N	N	C	N	N	N	N	N	N	C	N	N	N	C	C	C	N	I	C
Ciprofloxacin	C	C	N	C	C	C	N	I	C	C	N	C	N	N	C	N	—	I	N	I	C	C	C	C	C	N	N	N	N	N	N	I	C	C	I	I	N	N	N	N	N	C	C	I	N	N	I	C	C	C	N	N	N	N	C	N	N	I	N	N	C	N	I	C	C	N	C
Clindamycin	C	C	C	C	C	C	N	I	C	C	N	N	C	C	C	I	I	—	N	N	C	C	N	N	N	C	N	N	C	N	I	N	C	C	C	C	C	N	N	C	C	C	N	C	N	N	C	C	N	C	C	C	N	N	N	N	C	N	N	C	C	C	C	N	C	N	N
Daptomycin	I	C	N	C	N	N	N	N	C	N	N	N	N	N	N	C	N	N	—	N	N	N	N	N	C	N	N	N	N	N	C	N	C	N	C	N	N	N	N	N	C	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Dexamethasone	C	C	C	C	N	C	N	N	C	C	N	N	N	N	C	N	I	N	N	—	C	N	I	N	N	N	N	N	N	C	C	N	N	C	C	C	C	N	N	N	C	C	C	N	N	C	N	C	N	I	C	N	N	N	N	N	C	N	C	C	C	C	C	N	N	N	N
Dexmedetomidine	C	C	N	C	C	N	N	C	C	N	C	C	C	C	N	C	C	C	N	C	—	C	C	C	C	N	C	N	C	C	C	C	C	C	C	N	C	N	N	C	C	C	C	C	N	N	C	C	C	C	C	N	C	C	C	N	C	N	C	C	C	C	C	N	C	C	N
Diltiazem	C	C	I	C	N	N	C	N	C	C	C	N	C	N	C	C	C	C	N	N	C	—	N	C	N	N	C	N	C	N	C	I	C	N	C	C	C	C	N	C	N	N	C	N	N	N	I	C	C	C	C	C	C	C	C	N	N	N	N	N	C	N	I	N	C	C	C
Diphenhydramine	C	C	C	C	N	N	C	N	C	C	N	N	N	N	C	N	C	N	N	I	C	N	—	N	N	N	N	N	N	C	C	N	N	C	C	N	C	C	N	N	N	C	N	N	N	C	N	C	N	C	C	N	N	N	N	N	C	I	N	C	C	C	N	N	N	N	N
Dobutamine	C	C	I	N	C	C	C	N	C	C	I	C	N	C	I	N	C	N	N	N	C	C	N	—	C	C	C	N	N	C	C	I	N	C	C	N	C	N	C	C	C	C	C	C	N	N	N	N	N	C	C	C	C	C	C	N	N	I	N	I	C	C	N	C	N	N	C
Dopamine	C	C	I	N	C	C	C	N	C	C	N	N	N	C	C	N	C	N	C	N	C	C	N	C	—	C	C	N	C	C	C	I	N	C	C	C	C	N	I	C	C	C	C	N	N	N	C	N	C	C	C	C	C	C	C	N	C	C	N	C	C	C	N	C	N	N	C
Enalapril	C	C	N	C	N	N	N	N	C	C	N	C	C	N	C	N	N	C	N	N	C	N	N	C	C	—	N	N	C	C	N	N	C	C	C	C	N	N	N	C	N	C	N	C	N	C	C	N	C	N	C	C	C	C	N	N	N	N	N	C	C	C	N	N	N	C	N
Epinephrine	C	C	N	C	C	C	N	N	N	C	N	C	N	N	N	N	N	N	N	N	C	C	N	C	C	N	—	N	N	N	N	C	N	N	C	C	C	N	N	C	C	N	C	N	N	N	N	N	N	C	C	C	C	C	C	N	N	I	N	N	N	C	I	C	N	N	C
Eptifibatide	C	C	N	N	C	N	C	N	N	C	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	—	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Esmolol	C	C	N	C	C	N	N	N	N	C	N	N	C	N	N	N	N	C	N	N	C	C	N	N	C	C	N	N	—	C	N	I	C	N	C	C	N	N	C	C	N	C	N	C	N	N	N	N	C	N	C	C	C	C	C	N	N	I	N	N	C	C	C	N	C	C	N
Famotidine	C	C	C	N	C	C	N	I	C	C	N	C	C	N	C	C	N	N	N	C	C	N	C	C	C	C	N	N	C	—	C	C	C	C	C	C	C	C	C	C	N	C	C	C	N	N	C	C	N	C	C	C	C	C	C	N	N	N	C	I	C	C	C	N	N	C	N
Fluconazole	C	C	C	C	C	C	N	N	C	C	N	I	C	C	C	I	N	I	C	C	C	C	C	C	C	N	N	N	N	C	—	I	C	C	C	N	N	I	N	N	N	N	C	N	N	C	N	C	C	C	C	N	C	N	N	N	C	I	N	C	C	C	N	C	C	C	C
Furosemide	C	C	N	C	C	C	C	I	C	C	C	C	N	C	C	N	I	N	N	N	C	I	N	I	I	N	C	N	I	C	I	—	I	C	C	C	C	N	N	I	I	C	C	N	C	C	N	I	N	C	C	I	I	C	C	N	C	C	I	C	C	C	C	N	C	N	I
Gentamicin	C	C	C	N	C	C	N	I	C	C	N	N	I	C	C	N	C	C	C	N	C	C	N	N	N	C	N	N	C	C	C	I	—	C	I	N	C	N	C	C	C	C	C	C	N	C	N	N	N	C	C	C	N	N	N	N	C	N	N	N	C	I	N	C	N	N	C
Granisetron	C	C	C	C	N	N	N	N	C	N	C	C	C	C	C	C	C	C	N	C	C	N	C	C	C	C	N	N	N	C	C	C	C	—	C	C	C	C	N	N	N	C	C	C	N	N	C	C	C	N	C	N	N	N	N	N	N	N	N	C	N	N	C	N	C	N	N
Heparin	C	C	C	I	I	C	N	N	C	C	N	C	C	C	C	C	I	C	C	C	C	C	C	C	C	C	C	N	C	C	C	C	I	C	—	C	C	N	C	C	I	C	C	C	N	C	C	C	C	C	C	I	C	C	C	N	C	I	N	C	C	C	C	C	I	I	C

IV Compatibilities

The IV compatibility table provides data when 2 or more medications are given in a Y-site of administration. The data in this table largely represent physical incompatibilities (e.g., haze, precipitate, change in color). Therapeutic incompatibilities have not been included, so when using the table, professional judgement should be exercised.

	Dextrose 5%	Sodium Chloride	Acyclovir	Amikacin	Amiodarone	Anidulafungin	Argatroban	Azithromycin	Aztreonam	Bivalirudin	Bumetanide	Calcium Gluconate	Cefazolin	Cefepime	Ceftaroline Fosamil	Ceftriaxone	Ciprofloxacin	Clindamycin	Daptomycin	Dexamethasone	Dexmedetomidine	Diltiazem	Diphenhydramine	Dobutamine	Dopamine	Enalapril	Epinephrine	Eptifibatide	Esmolol	Famotidine	Fluconazole	Furosemide	Gentamicin	Granisetron	Heparin	Hydrocortisone	Hydromorphone	Imipenem	Insulin	Labetalol	Levofloxacin	Linezolid	Lorazepam	Magnesium	Mannitol	Meropenem	Methylprednisolone	Metoclopramide	Metronidazole	Midazolam	Morphine	Nicardipine	Nitroglycerin	Nitroprusside	Norepinephrine	Octreotide	Ondansetron	Pantoprazole	Phenylephrine	Piperacillin/Tazobactam	Potassium Chloride	Propofol	Sodium Bicarbonate	Tigecycline	Tobramycin	Vancomycin	Vasopressin
Hydrocortisone	C	C	C	C	N	C	C	N	C	C	N	C	N	N	C	N	I	C	N	C	N	C	N	N	C	C	C	N	C	C	N	C	N	C	C	—	N	N	N	N	N	C	C	C	N	N	N	N	N	I	C	C	N	N	C	N	C	N	N	C	N	C	C	N	N	N	N
Hydromorphone	C	C	C	C	N	N	N	N	C	C	N	N	I	N	C	N	N	C	N	C	C	C	C	C	C	N	C	N	N	C	N	C	C	C	C	N	—	N	N	C	N	C	C	C	N	N	N	N	C	C	C	C	C	N	C	N	C	I	N	C	N	C	N	N	C	C	N
Imipenem	C	C	C	N	I	C	N	I	C	N	N	N	N	N	N	N	N	N	N	N	N	C	C	N	N	N	N	N	N	C	I	N	N	C	N	N	N	—	C	N	N	C	I	N	N	N	N	N	N	I	N	N	N	N	N	N	C	N	N	N	N	C	I	C	N	N	C
Insulin	N	C	N	N	C	N	N	N	C	N	N	N	C	C	C	N	N	N	N	N	N	N	N	C	I	N	N	N	C	C	N	N	C	N	C	N	N	C	—	I	C	N	N	C	N	C	N	N	N	N	C	N	C	N	N	N	N	C	N	N	N	C	C	N	C	C	C
Labetalol	C	C	N	C	C	N	N	N	N	C	N	C	C	N	I	I	N	C	N	N	C	C	N	C	C	C	C	N	C	C	N	I	C	N	C	N	C	N	I	—	N	C	C	C	N	N	N	N	C	C	C	C	C	C	C	N	N	N	N	N	C	C	N	N	C	C	N
Levofloxacin	C	C	I	C	N	C	N	I	N	C	N	N	N	N	C	N	N	C	C	C	C	N	N	C	C	N	C	N	N	N	N	I	C	N	I	N	C	N	I	N	—	C	C	C	N	N	N	N	N	N	C	N	I	I	N	N	N	N	C	N	C	N	C	N	N	C	N
Linezolid	C	C	C	C	N	C	N	N	C	N	N	C	C	N	N	C	C	C	N	C	C	N	C	C	C	C	N	N	C	C	N	C	C	C	C	C	C	C	N	C	C	—	C	C	C	C	C	N	C	C	C	C	C	N	N	N	C	N	N	C	C	N	C	C	C	C	C
Lorazepam	N	C	C	C	C	N	N	N	I	C	C	N	N	N	C	N	C	N	N	C	C	C	N	C	C	N	C	N	N	C	C	C	C	C	C	C	C	C	N	C	C	C	—	N	N	N	N	N	C	C	C	C	C	N	C	N	I	N	N	C	C	C	N	N	N	C	N
Magnesium	C	C	C	C	I	N	N	N	C	C	N	C	C	N	C	N	I	C	N	N	C	N	N	C	N	C	N	N	C	C	N	N	C	C	C	C	C	N	C	C	C	C	N	—	N	N	N	N	C	N	C	C	N	C	N	N	C	N	N	C	C	C	N	N	C	C	N
Mannitol	—	—	N	C	N	N	N	N	C	C	N	N	N	N	C	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	C	N	N	N	N	N	N	N	N	N	C	N	N	—	N	N	N	N	N	N	N	N	N	N	N	N	I	N	N	C	C	N	N	N	N	N
Meropenem	N	C	I	N	N	C	N	N	N	N	N	C	N	N	N	N	N	N	N	C	N	N	C	N	N	C	N	N	N	N	C	C	C	N	C	N	N	N	C	N	N	C	N	N	N	—	N	C	N	N	C	N	N	N	C	N	I	N	N	N	C	N	N	N	N	C	C
Methylprednisolone	C	C	C	N	C	C	N	N	C	C	N	I	N	C	C	N	I	C	N	N	C	I	N	N	C	C	N	N	N	C	N	N	N	C	C	N	N	N	N	N	N	C	N	N	N	N	—	N	C	C	C	C	N	N	N	N	I	I	N	C	I	I	C	I	N	N	N
Metoclopramide	C	C	C	N	N	N	N	N	C	C	N	I	N	N	C	N	C	C	N	C	C	C	C	N	N	N	N	N	N	C	C	I	N	C	C	N	N	N	N	N	N	N	N	N	N	C	N	—	N	C	C	N	N	N	N	N	C	N	N	C	N	N	N	C	N	N	N
Metronidazole	—	—	C	N	N	C	N	N	I	C	N	N	C	C	C	N	C	N	N	N	C	C	N	N	C	C	N	N	C	N	C	N	N	C	C	N	C	N	N	C	N	C	C	C	N	N	C	N	—	C	C	C	N	N	N	N	N	N	N	C	N	N	N	N	N	N	C
Midazolam	C	C	N	C	C	C	C	N	N	C	I	C	C	I	C	N	C	C	N	I	C	C	C	C	C	N	C	N	N	C	C	C	C	N	C	I	C	I	N	C	N	C	C	N	N	N	C	C	N	—	C	C	C	C	C	N	N	I	N	N	C	C	I	N	C	C	N
Morphine	C	C	C	C	C	C	C	I	C	C	C	N	C	C	C	C	N	C	N	C	C	C	C	C	C	C	C	N	C	C	C	C	C	C	C	C	C	N	C	C	C	C	C	C	N	C	C	C	C	C	—	C	C	C	C	N	C	C	N	C	C	C	C	N	C	C	N
Nicardipine	C	C	N	C	N	N	N	N	C	N	N	C	C	I	N	N	N	C	N	N	N	C	N	C	C	C	C	N	C	C	N	I	C	N	I	C	C	N	N	C	N	C	C	C	N	N	C	N	C	C	C	—	C	C	C	N	N	N	N	N	C	N	N	N	C	C	N
Nitroglycerin	C	C	N	N	C	N	C	N	N	C	N	N	N	N	N	N	N	N	N	N	C	C	N	C	C	C	C	N	C	C	C	I	N	N	C	N	C	N	C	C	I	C	C	N	N	N	N	N	N	C	C	C	—	C	C	N	N	C	N	N	N	C	N	N	N	N	C
Nitroprusside	C	C	N	N	I	N	C	N	N	C	N	N	N	N	N	N	N	N	N	N	C	C	N	C	C	C	C	N	C	C	N	C	N	N	C	N	N	N	N	C	I	N	N	C	N	N	N	N	N	C	C	C	C	—	C	N	N	N	N	N	N	C	N	N	N	N	N
Norepinephrine	C	C	N	C	C	C	C	N	N	C	N	C	N	N	C	N	C	N	N	N	C	C	N	C	C	N	C	N	C	C	N	C	N	N	C	C	C	N	N	C	N	N	C	N	N	C	N	N	N	C	C	C	C	C	—	N	N	C	N	N	C	C	N	N	N	N	C
Octreotide	C	C	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	—	N	I	N	N	N	N	N	N	N	N	N
Ondansetron	C	C	I	C	N	N	N	C	C	N	N	N	C	N	C	N	N	C	N	C	C	N	C	N	C	N	N	N	N	C	C	C	C	N	C	C	C	C	N	N	N	C	I	C	N	I	I	C	N	N	C	N	N	N	N	N	—	N	N	C	C	N	I	N	N	C	N
Pantoprazole	C	C	N	I	I	C	N	N	I	N	N	I	C	N	C	C	I	N	N	I	N	N	I	I	C	N	I	N	I	N	I	C	N	N	I	N	I	N	C	N	N	N	N	N	I	N	I	N	N	I	C	N	C	N	C	I	N	—	N	N	C	N	N	N	N	I	C
Phenylephrine	C	C	N	N	C	C	C	N	N	C	N	N	N	N	N	N	N	N	N	N	C	N	N	N	N	N	N	N	N	C	N	I	N	N	N	N	N	N	N	N	C	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	—	N	N	N	N	N	N	N	C
Piperacillin/Tazobactam	C	C	I	N	I	C	N	I	C	C	C	C	N	N	N	N	N	C	N	C	C	N	C	I	C	C	N	N	N	I	C	C	N	C	C	C	C	N	N	N	N	C	C	C	N	N	C	C	C	N	C	N	N	N	C	N	C	N	N	—	C	N	C	C	I	I	C
Potassium Chloride	C	C	C	C	C	C	N	I	C	C	N	C	N	C	C	N	C	C	N	C	C	C	C	C	C	C	N	N	C	C	C	C	C	N	C	N	N	N	N	C	C	C	C	C	C	C	I	N	N	C	C	C	N	C	C	N	C	C	N	C	—	C	C	C	N	N	N
Propofol	C	C	C	I	N	N	N	N	C	N	C	C	C	I	C	C	N	C	N	C	C	N	C	C	C	C	C	N	C	C	C	C	I	N	C	C	C	C	C	C	N	N	C	C	C	N	I	N	N	C	C	N	C	C	C	N	N	N	C	N	C	—	C	N	I	C	N
Sodium Bicarbonate	C	C	C	C	I	I	N	N	C	C	N	C	N	N	C	C	I	C	N	C	C	I	N	N	N	N	I	N	C	C	N	C	N	C	C	C	N	I	C	N	C	C	N	N	N	N	C	N	N	I	C	N	N	N	N	N	I	N	N	C	C	C	—	N	N	C	C
Tigecycline	C	C	N	C	N	N	N	C	N	N	N	N	N	I	N	C	C	N	N	N	N	N	N	C	C	N	C	N	N	N	C	N	C	N	C	N	N	C	N	N	N	C	N	N	N	N	I	C	N	N	N	N	N	N	N	N	N	N	N	C	C	N	N	—	C	C	N
Tobramycin	C	C	C	N	C	C	N	I	C	C	N	C	N	I	C	N	C	C	N	N	C	C	N	N	N	N	N	N	C	N	C	C	N	C	I	N	C	N	C	C	N	C	N	C	N	N	N	N	N	C	C	C	N	N	N	N	N	N	N	I	N	I	N	C	—	N	N
Vancomycin	C	C	C	C	C	C	N	N	C	I	N	C	I	C	N	I	N	N	N	N	C	C	N	N	N	C	N	N	C	C	C	N	N	C	I	N	C	N	C	C	C	C	C	C	N	C	N	N	N	C	C	C	N	N	N	N	C	I	N	I	N	C	C	C	N	—	N
Vasopressin	—	C	N	N	C	N	C	N	N	N	N	N	N	N	C	N	C	N	N	N	N	C	N	C	C	N	C	N	N	N	C	I	C	N	C	N	N	C	C	N	N	C	N	N	N	C	N	N	C	N	N	N	C	N	C	N	N	C	C	C	N	N	C	N	N	N	—

C Physically compatible via Y-site administration.
I Physically incompatible.
N Information on compatibility not available or conflicting