Quick Study® ACADEMIC

Pharmacology

Drug Fundamentals, Plus the Most Frequently Prescribed Drug Classifications—Including Indications, Reactions, Examples & More

definitions

- **pharmacodynamics** Study of the mechanisms of action of drugs within the body and how drugs produce their effects in the body
- **pharmacogenetics** Study of drug reactions in the body that are unanticipated or unusual, and may have a hereditary basis for the response
- **pharmacokinetics** Study of drug actions as they move through the body; the way the body absorbs, distributes, metabolizes and excretes drugs; mathematical study of drugs based on time and dose
- **pharmacology** Study of biologically active compounds, how they react in the body and how the body reacts to them
- **pharmacotherapeutics** Study of drugs used to prevent, treat or diagnose disease
- **pharmacy** Preparation and dispensing of drugs
- **toxicology** Study of harmful or poisonous effects of drugs

drug *names*

DRUG

Chemical Name	Generic Name	Trade Name
Chemical Name: Scientific name, describes the atomic and molecular structure of a drug	**Generic Drug:** Nonproprietary name, abbreviation of the chemical name	**Brand Name:** Trade name, selected by the pharmaceutical company that made the drug

pharmacodynamics

Receptors

- Protein molecules with one or more binding sites, located on cell membranes
- Receive a signal from the body's chemicals: neurotransmitters, hormones, enzymes
- Signal will cause a molecular event on the inside of the cell to occur
- Drugs Enhance (*agonist*), diminish (*partial agonist*) or block (*antagonist*) the generation, transmission or receiving of the signal
- Affinity Attraction between a drug and a receptor
- High affinity Drug will bind easily to the receptor
- Low affinity Requires a higher concentration of the drug to get a therapeutic response

Drug Potency

- Amount of drug required to produce a therapeutic response

Dose Response Curve

- Effective Dose (ED) Amount of drug that produces a therapeutic response in 50% of the people taking it
- Toxic Dose (TD) Amount of drug that produces adverse effects in 50% of the people taking it
- Therapeutic Index (TI) Margin of safety; ratio between the TD and the ED
- The higher the TI, the safer the drug is considered to be; in general, nonprescription drugs have much higher TIs than prescription drugs

pharmacokinetics

Routes drugs take to get into the body

- Enteral:
  - Enters the body through the GI tract
  - Taken by mouth, through the rectum, under the tongue or held in the cheeks
- Parenteral:
  - Enters the body through a different means (i.e., other than the GI tract)
  - Can be injected into the veins, arteries, muscles, spinal cord, or under the skin; inhaled through the lungs; transdermally through the skin via ointment or patch

Absorption

- Bioavailability Percent absorbed into systemic circulation after administration
  - Bioavailability depends on route of administration as well as the drug's ability to cross membranes and reach its target
  - *First Pass Effect:*
    - Drugs absorbed through the stomach and small intestine must pass through the liver before circulating systemically
    - Liver can inactivate the drug, making less of the drug available to reach the target organ
- Absorption at cellular level occurs through passive transport, active transport, pinocytosis and facilitated diffusion

Distribution

- Influenced by several factors:
  - *Tissue permeability:* Ability of drug to pass through the membranes rapidly affects the extent to which the drug moves around in the body
  - *Blood flow:* Once in the blood stream, will get to the organs and tissues that are highly perfused
  - *Plasma proteins binding:* Drug can bind to a protein that will render the drug inactive; only an unbound drug can attach to the receptors
  - Binding to subcellular components
  - blood pH

Drug Storage Sites

- Adipose tissue Primary site; lipid-soluble; drugs tend to remain for long periods of time due to low metabolic rates of drugs and poor blood perfusion of tissue
- Bone Toxic agents like heavy metals
- Muscle Binding can cause muscle to store drugs
- Organs Liver and kidneys

Metabolism

- Biotransformation Chemical changes that occur in the drug following administration
- Metabolite Altered version of the chemical compound
- Can have a higher or lower rate of activity than the original drug; if higher, drug is given as an inactive or prodrug form
- Prodrug Requires metabolism or activation of drug in order for it to act within the body

Excretion

- First order Rate of removal of drug from the body is proportional to the concentration of the drug in the plasma
- Half-life Time required to decrease the blood levels of a drug by one-half
- A one-time drug dosage will be eliminated almost completely by 5 half-lives
- A drug given on a continuous dosage schedule will reach steady state concentration after 5 half-lives
- Steady state Rate of drug administration is equal to the rate of drug excretion
- Organs that excrete drugs Kidneys, lungs, sweat glands, mammary glands, salivary glands, skin and GI tract

schedule *drugs*

Schedule Class	Characteristics	Examples (C-I to C-IV)
Schedule 1: C-1	• High abuse potential; not legal; no acceptable medical use; no prescriptions available	• Heroin, LSD, cocaine, marijuana, methaqualone
Schedule 2: C-II	• High abuse potential and severe dependence liability; current, accepted medical use; prescription drug-signed; not stamped prescription; 30-day supply, no refills	• Opium, morphine, coca, methadone
Schedule 3: C-III	• Less abuse potential; low-moderate physical dependence; high psychological dependence; by prescription only, expires within 6 months; max. 5 refills on one script	• Amphetamines, codeine, barbiturates, Valium, Xanax, anabolic steroids
Schedule 4: C-IV	• Less abuse potential than C-III drugs; accepted medical use; limited physical and psychological dependence; written or verbal prescription, expires in 6 months; max. 5 refills on one script	• Chloral hydrate, meptrobamate, paraldehyde, phenobarbital
Schedule 5: C-V	• Limited abuse potential; accepted medical use; small amounts of narcotics used as antitussives (cough medicine) or antidiarrheals; may not need a prescription but must be recorded as a transaction	

Pharmaceutical *Classifications*

adrenergics

Mimic naturally occurring catecholamines (epinephrine, norepinephrine and dopamine) or stimulate the release of norepinephrine

Indications Alpha-adrenergic agonists used to treat hypotension

Common drug examples:
- Norepinephrine Lovophed
- Pseudoephedrine Cenafed, Dimetapp, Sudafed, Triaminic DM (OTC used to treat other conditions)

Adverse reactions: Increased blood pressure, AV block; other effects include: nausea, vomiting, sweating, goose bumps, rebound miosis, difficulty in urinating, headache, dilated pupils, photophobia, burning, stinging and blurry eyes

Beta 1 adrenergic agonists Bradycardia, low cardiac output, paroxysmal atrial or nodal tachycardia, ventricular fibrillation, cardiac output

Common drug examples:
- Dobutamine hydrochloride Dobutrex

Adverse reactions Tachycardia, palpitations and other arrhythmias, premature and ventricular contractions, tachyarrhythmias and myocardial necrosis

Beta 2 adrenergic agonists Acute and chronic bronchial asthma, emphysema, bronchitis, acute hypersensitive (allergic) reaction to drugs, delays delivery in premature labor, dysmenorrhea

Common drug examples:
- Albuterol sulfate Proventil, Ventolin, Volmax
- Bitolterol mesylate Tornalate
- Metaproterenol sulfate Alupent
- Pirbuterol acetate Maxair
- Salmeterol xinafoate Serevent
- Terbutaline Brethine, Bricanyl

Adverse reactions Nervousness, tremors, headaches, tachycardia, palpitations, hypertension, nausea, vomiting, cough

Dopamine Improves blood flow to the kidneys; used in acute renal failure, heart failure and shock

Common drug examples:
- Dopamine hydrochloride Intropin

Adverse reactions Headaches, ectopic beats, tachycardia, hypotension, bradycardia, nausea, vomiting, hyperglycemia, asthma attacks, anaphylactic reactions

adrenocorticoids

Glucocorticoids Regulate carbohydrate, lipid and protein metabolism; block inflammation; regulate body's immune response

Indications Asthma, advance pulmonary tuberculosis, pericarditis, acute and chronic inflammation, adrenal insufficiency, antenatal use in preterm labor, hypercalcemia, cerebral edema, acute SCI, MS, shock

Common drug examples:
- Betamethasone Beclovent, QVAR, Vanceril
- Hydrocortisone Cortet, Hycort
- Methylprednisone Medrol, Meprolone, Metacort
- Prednisone Apo-prednisone, Deltasone, Meticort, Orasone, Sterapred
- Triamcinolone Azmacort, Nasacort

Adverse reactions Primarily a catabolic effect on muscle, bone, ligament, tendon; suppression of hypothalamic-pituitary-adrenal pathway; Cushingoid syndrome with long-term use; other effects include euphoria, insomnia, psychotic behavior, pseudotumor, mental changes, nervousness, restlessness, heart failure, hypertension, edema, acute tendon ruptures, delayed wound healing
- Withdrawal symptoms if drugs stopped abruptly Fever, myalgias, arthralgias, malaise, nausea, orthostatic hypotension, dizziness, fainting, dyspnea, hypoglycemia

Mineralocorticoid Regulates electrolyte homeostasis

Indications Adrenal insufficiency, orthostatic hypotension in diabetics

Common drug examples
- Fludocortisone acetate Florinef

Adverse reactions Salt and water retention, hypertension, cardiac hypertrophy, edema, heart failure, bruising, diaphoresis, urticaria, allergic rash, hypokalemia

[*Note:* All adrenocorticoid drugs have both glucocorticoid and mineralocorticoid properties to some extent]

alpha-adrenergic *blockers*

Lower blood pressure by dilating peripheral blood vessels, reducing peripheral resistance

Indications Raynaud's disease, acrocyanosis, frostbite, phlebitis, diabetic gangrene, hypertension, benign prostatic hyperplasia

Common drug examples:
- Doxazosin mesylate Cardura
- Prozosin hydrochloride Minipress
- Tamsulosin hydrochloride Flomax
- Terazosin hydrochloride Hytrin

Adverse reactions Orthostatic hypotension, headache, palpitations, fatigue, nausea, weakness, dizziness, fainting

aminoglycosides

Indications:
- Treat infections resistant to penicillin, septicemia, urinary tract infections, infections of skin, soft tissue and bone, gram-negative bacillary meningitis
- Used in combination with other antibiotics to treat staphylococcal infections, endocarditis, tuberculosis, pelvic inflammatory disease

Common drug examples:
- Amikacin sulfate Amikin
- Gentamicin sulfate Cidonycin, Gentasol
- Neomycin sulfate Mycifradin

Adverse reactions Systemic ototoxicity and nephrotoxicity, skeletal weakness and respiratory distress; oral meds can cause nausea, vomiting, diarrhea; local injections can cause phlebitis and abscess

androgens

Testosterone used to promote maturation of male sex organs and development of secondary sex characteristics; promotes retention of calcium, nitrogen, phosphorus, sodium, and potassium; enhances anabolism

Indications Androgen deficiency resulting from testicular failure or deficiency of pituitary origin, palliative for metastatic breast cancer, postpartum breast engorgement, hereditary angioedema, endometriosis, fibrocystic breast disease

Common drug examples:
- Danazol Cyclomen, Danocrine
- Fluoxymesterone Halotestin
- Testosterone Testopel pellets

Adverse reactions:
- Extensions of hormonal action
  - *Males:* Frequent and prolonged erections, bladder irritability, gynecomastia
  - *Females:* Clitoral enlargement, deepening of the voice, facial or body hair growth, unusual hair loss, irregular or absent menses
- Metabolic reactions Fluid and electrolyte retention, hypercalcemia, decreased blood glucose level, increased serum cholesterol, hepatic dysfunction

Contraindicated Men with breast or prostatic cancer or symptomatic prostrate hypertrophy, patients with severe cardiac, renal or hepatic disease or with undiagnosed genital bleeding

angiotensin-converting *enzyme inhibitors*

Indications Treat high blood pressure and heart failure

Common drug examples:
- Benazepril hydrochloride Lotensin
- Captopril Capoten
- Enalapril maleate Vasotec
- Fosinopril sodium Monopril
- Lisinopril Prinvil, Zestril

Adverse reactions Persistent dry cough, skin rash, loss of taste, weakness, headaches, palpitations, fatigue, proteinuria, hyperkalemia

angiotensin II *receptor antagonists*

Vasodilates arterioles by blocking the effects of angiotensin II, enhance renal clearance of sodium and water

Indications Treatment of high blood pressure

Common drug examples:
- Candesartan cilexetil Atacand
- Eprosartan mesylate Teveten
- Irbesartan Avapro
- Losartan potassium Cozaar
- Telmisartan Micardis
- Valsartan Diovan

Adverse reactions Dizziness, anxiety, confusion, cough, upper respiratory infections, myalgia, insomnia, hypotension, visual changes, GI/GU effects

anticholinergics

Indications:
- Spastic conditions including Parkinson's disease, muscle dystonia, muscle rigidity and extra-pyramidal disorders

- Prevent nausea and vomiting from motion sickness, adjunctive treatment for peptic ulcers and other GI disorders, bronchospasms, and GU tract disorders
- Treat poisoning from certain plants and pesticides
- Use preoperatively to decrease secretions and block cardiac reflexes

⊙ **Common drug examples:**
- Antiparkinsonians:
  - ***Benztropine mesylate:*** cogentin
- Belladonna alkaloids:
  - ***Scopolamine hydrobromide:*** IsoptoHyoscine, Scopace
- Synthetic quaternary anticholinergics:
  - ***Glycopyrroltae:*** Robinul
- Tertiary synthetic and semisynthetic derivatives:
  - ***Dicyclomine hydrochloride:*** Antispas, A-spas, Dibent, Dilomine, Lomine, Ortyl

⊙ **Adverse reactions** Dry mouth, decreased sweating, headache, dilated pupils, blurred vision, dry skin, urinary hesitancy and urine retention, constipation, palpitations and tachycardia; other peripheral effects include dry mucous membranes, dysphasia, stupor, seizures, hyperthermia, hypertension and increased respiration
- Toxic doses May cause disorientation, confusion, hallucinations, delusions, anxiety, agitation and restlessness

anticoagulants

⊙ **Indications** Prevent clot formation in patients with DVTs and pulmonary embolism, provide anticoagulation during hemodialysis, prevention of postoperative clot formation after surgery, decrease risk of strokes, decrease risk of MI in patients with atherosclerosis

⊙ **Common drug examples:**
- Danaparoid Orgaran
- Delteparin Fragmin
- Enoxaparin Lovenox
- Heparin Heparin Lock Flush, Hep-lock
- Tinzaparin Innohep

⊙ **Adverse reactions** Insomnia, headache, dizziness, confusion, peripheral edema, nausea, constipation, pain, fever, vomiting, joint pain, rash

antihistamines

⊙ **Indications** Allergies, pruritis, vertigo, nausea and vomiting, sedation, suppression of cough, dyskinesia

⊙ **Common drug examples:**
- Allergies:
  - ***Azelastine hydrochloride:*** Astelin, Optivar
  - ***Chlopheniramine maleate:*** Aller-Chlor, Chlor-Trimeton, Chlor-Tripolon
  - ***Clemastine fumarate:*** Tavist
  - ***Diphenhydramine hydrochloride:*** Allergy DM, Benadryl, Diphen, Dormin, Midol PM, Nytol, Sominex, Twilite
  - ***Promethazine hydrochloride:*** Anergan 50, Phenergan
- Pruritus:
  - ***Cyproheptadine hydrochloride:*** Periactin
  - ***Hydroxyzine hydrochloride:*** Anxanil, Atarax, Multipax, Quiess, Vistacon
- Vertigo, nausea, vomiting:
  - ***Cyclizine hydrochloride:*** Marezine
  - ***Cyclizine lactate:*** Marezine, Marzine
  - ***Dimenhydrinate:*** Dimetab, Hydrate, Triptone
  - ***Meclizine hydrocholoride:*** Antivert, Antrizine, Bonine, Vergon
  - ***Promethazine hydrochloride:*** Anergan, Phenergan
- Sedation:
  - ***Diphenhydramine:*** Diphenhydramine syrup
- Cough suppression:
  - Diphenhydramine syrup
- Dyskinesia:
  - Diphenhydramine

⊙ **Adverse reactions** Drowsiness and impaired motor function; anticholinergic action will cause dry mouth and throat, blurred vision and constipation
- Toxic effects Sedation, reduced mental alertness, apnea, cardiovascular collapse, hallucinations, tremors, seizures, dry mouth, flushed skin, and fixed, dilated pupils; (reverses when drug is withdrawn)

anxiolytic skeletal *muscle relaxant*

⊙ **Indications** Anxiety, muscle spasm, tetanus, acute alcohol withdrawal, adjunct for epilepsy

⊙ **Common drug examples:**
- Diazepam Apo-Diazepam, Valium

⊙ **Adverse reactions** Drowsiness, slurred speech, tremor, fatigue, ataxia, headache, insomnia, hypotension, bradycardia, nausea, constipation, joint pain, physical or psychological dependence

barbiturates

⊙ **Indications** Seizure disorders (tonic-clonic and partial seizures), sedation, hypnosis, preanesthesia sedation, psychiatric use

⊙ **Common drug examples:**
- Amobarbital Amytal
- Phenobarbital Bellatal, Solfoton
- Primidone Mysoline
- Secobarbital sodium Seconal

⊙ **Adverse reactions** Drowsiness, lethargy, vertigo, headaches and CNS depression, hypersensitivity can occur (rash, fever)
- After hypnosis hangover effect, impaired judgment, mood distortion, rebound insomnia
- Geriatric patients Confusion
- Pediatric patients Hyperactivity

benzodiazepines

Enhance/facilitate actions of the gamma-aminobutyric acid (GABA)

⊙ **Indications** Seizure disorders, anticonvulsants, anxiety, tension and insomnia, surgical adjuncts for conscious sedation or amnesia, skeletal muscle spasms or tremors, delirium, schizophrenia as an adjunct, nausea and vomiting induced by chemotherapy, neonatal opiate withdrawal

⊙ **Common drug examples:**
- Alprazolam Alprazolam, Xanax
- Chlordiazepoxide Libritab
- Clonazepam Klonopin, Rivotril
- Clorazepate dipotassium Catapres, Dixarit
- Diazepam Valium, Zetran
- Estazolam ProSom
- Flurazepam Apo-Flurazepam, Dalmane
- Lorazepam Apo-Lorazepam, Ativan
- Midazolam Versed
- Oxazepam Apo-Oxazepam, Serax
- Temazepam Restoril
- Triazolam Halcion

⊙ **Adverse reactions** Drowsiness and impaired motor function; constipation, diarrhea, vomiting, changes in appetite, urinary alterations, nightmares, hallucinations, insomnia
- Toxic effects Visual disturbances, short-term memory loss, vertigo, confusion, severe depression, shakiness, slurred speech, staggering, bradycardia, difficulty breathing

beta *blockers*

Reduce the workload of the heart by blocking the sympathetic conductance at the beta receptors on the SA node and myocardial cells, thus decreasing the force of contraction and causing a reduction in heart rate

⊙ **Indications** Hypertension, angina, arrhythmias, glaucoma, myocardial infarction, migraine prophylaxis

⊙ **Common drug examples:**
- Beta 1 Blockers:
  - ***Acebutolol:*** Sectral
  - ***Atenolol:*** Tenormin
  - ***Betaxolol hydrochloride:*** Betoptic, Kerlone
  - ***Bisoprolol fumarate:*** Zebeta
  - ***Esmolol:*** Brevibloc
  - ***Metoprolol tartrate:*** Lopressor
- Beta 1 & 2 Blockers:
  - ***Carteolol:*** Cartrol, Ocupress
  - ***Carvedilol:*** Coreg
  - ***Labetalol hydrochloride:*** Normodyne, Trandate
  - ***Levobunolol hydrochloride:*** AKBeta, Betagen
  - ***Metipranolol hydrochloride:*** Opti Pranolol
  - ***Nadolol:*** Corgard
  - ***Pindolol:*** Visken
  - ***Propranolol:*** Inderal
  - ***Sotalol:*** Betapace
  - ***Timolol maleate:*** Blocarden, Timoptic

⊙ **Adverse reactions** Insomnia, nausea, fatigue, slow pulse, weakness, increased cholesterol and blood glucose levels, bradycardia, depression, hallucinations, sexual dysfunctions, skin hyperpigmentation
- Toxic effects Severe hypotension, bradycardia, heart failure, bronchospasms

bile *acid sequestrants*

⊙ **Indications** Lowering cholesterol

⊙ **Common drug examples:**
- Cholestyramine Locholest, Prevalite, Questran
- Colesevelam Welchol
- Colestipol Colestid

⊙ **Adverse reactions** Headache, anxiety, vertigo, dizziness, insomnia, fatigue, syncope, tinnitus, constipation, nausea, vomiting, anemia, muscle and joint pain

calcium *channel blockers*

Relaxes smooth muscle to provide vasodilation and affects cardiac muscle to reduce HR and SV

⊙ **Indications** Angina, arrhythmias, hypertension, migraine headaches, peripheral vascular disorders, subarachnoid hemorrhage, esophageal spasm (adjunctive therapy)

⊙ **Common drug examples:**
- Amlodipine besylate Norvasc
- Bepridil hydrochloride Vascor
- Diltiazem hydrochloride Cardizem, Dilacor, Tiazac
- Felodipine Plendil
- Isradipine DynaCirc
- Nicardipine Cardene
- Nifedipine Procardial
- Nimodipine Nimotop
- Nisoldipine Sular
- Verapamil hydrochloride Calan, Isoptin, Verelan

⊙ **Adverse reactions** Bradycardia, hypotension, fluid retention, palpitations, headaches from vasodilatation, flushes, rash, dizziness
- Verapamil can cause constipation
- Nifedipine can cause hypotension, reflex tachycardia, peripheral edema, flushing, light-headedness and headache
- Diltiazem can cause anorexia, nausea, heart block, bradycardia, heart failure and peripheral edema

cephalosporin

Antibiotics that inhibit bacterial cell wall synthesis, causing bacterial cell death

⊙ **Indications** Serious infections of the lungs, skin, soft tissue, bones, joints, urinary tract, blood (septicemia), abdomen and heart (endocarditis), second and third generation drugs can treat CNS infections (meningitis), Lyme disease

⊙ **Common drug examples:**
- First Generation:
  - *Cefadroxil:* Duricef
  - *Cefazolin sodium:* Ancef, Defzol
  - *Cephalexin monohydrate:* Biocef, Keflex, Novo-Lexin
  - *Cephradine:* Keftab
- Second Generation:
  - *Cefaclor:* Ceclor
  - *Cefamandole nafate:* Mandol
  - *Cefotetan disodium:* Cefotan
  - *Cefprozil:* Cefzil
  - *Cefuroxime axetil:* Ceftin
  - *Cefuroxime sodium:* Kefurox, Zinacef
- Third Generation:
  - *Cefdinir:* Omnicef
  - *Cefditoren pivoxil:* Spectracef
  - *Cefixime:* Suprax
  - *Cefoperazone sodium:* Cefobid
  - *Cefotaxime sodium:* Claforan
  - *Cefpodoxime proxetil:* Vantin
  - *Ceftazidime:* Ceptaz, Fortaz, Taxicef, Taxidime
  - *Ceftizoxime sodium:* Cefizox
  - *Ceftriaxone sodium:* Rocephin
- Fourth Generation:
  - *Cefepime hydrochloride:* Maxipime

⊙ **Adverse reactions** Mild rash, fever, fatal anaphylaxis (hypersensitivity); thrombocytopenia, transient neutropenia, reversible leucopenia; other effects include nausea, vomiting, diarrhea, abdominal pain, glossitis, dyspepsia; local venous pain and irritation are common at injection site

diuretics

Loop *Increase the excretion of sodium and water and control high blood pressure and fluid retention*

⊙ **Indications** Edema associated with heart failure, hypertension, renal impairment, hypertensive crisis

⊙ **Common drug examples:**
- Bumetanide Bumex
- Ethacrynic acid Endecrin
- Furosemide Lasix
- Torsemide Demadex

⊙ **Adverse reactions** Metabolic and electrolyte disturbances, hypochloremic alkalosis, hyperglycemia, hyperuricemia, hypomagnesemia, may cause hearing loss and tinnitus

Potassium-sparing *Less potent than the other types, protects against potassium loss*

⊙ **Indications** Edema associated with hepatic cirrhosis, nephritic syndrome, and heart failure, hypertension, primary hyperadosteronism

⊙ **Common drug examples:**
- Amiloride hydrochloride Midamor
- Spironolactone Aldactone
- Triamterene Dyrenium

⊙ **Adverse reactions** Hyperkalemia leading to arrhythmias, nausea, vomiting, headaches, weakness, fatigue, bowel disturbances, cough and dyspnea

Thiazide

⊙ **Indications** Edema caused by heart failure and nephritic syndromes, edema caused by pregnancy, hypertension, diabetes insipidus

⊙ **Common drug examples:**
- Bendroflumethiazide Naturetin
- Chlorothiazide Diuril
- Chlorthalidone Hygroton
- Hydrochlorothiazide Esidrix, HydroDiuril, Microzide, Oretic
- Hydroflumethiazide Diucardin
- Indapamide Lozol
- Methychothiazide Aquatensen, Enduron
- Metolazone Mykrox, Zaroxolyn
- Trichlormethiazide Diurese, Metahydrin, Naqua

⊙ **Adverse reactions** Electrolyte and metabolic disturbances, hypochloremic alkalosis, hypomagnesemia, hyponatremia, hypercalcemia, hyperuricemia, elevated cholesterol levels, hyperglycemia, lethargy (overdose can progress to coma)

estrogens

⊙ **Indications** Menopause, carcinoma of the prostate, cardiovascular risk prevention, prophylaxis of postmenopausal osteoporosis, contraception, some drugs are used in treatment of breast cancer—must be carefully selected patients and drugs

⊙ **Common drug examples:**
- Dienestrol Orthodienestrol vaginal cream
- Esterified estrogen Estrab, Menest
- Estradiol Alora, Climara, Esclim, Estrace, Estraderm, Estring, Fem Patch, Vivelle
- Estradiol cypionate Depo-Estradiol Cypionate, DepGynogen, DepoGen
- Estradiol valerate Delestrogen, Gynogen LA 20, Valergen 20, Valergen 40
- Ethinyl estradiol Estinyl
- Estropipate Ogen, Ortho-Est

⊙ **Adverse reactions** Menstrual bleeding, abdominal cramps, swollen feet or ankles, bloated sensation, breast swelling and tenderness, weight gain, nausea, loss of appetite, headaches, photosensitivity and loss of libido; long-term use can cause hypertension, thromboembolic disease

fluoroquinolones

Antibacterial agent used against aerobic gram-positive and gram-negative organisms

⊙ **Indications** Bone and joint infections, bacterial bronchitis, endocervical and urethral chlamydia, bacterial gastroenteritis, endocervical and urethral gonorrhea, intra-abdominal infections, empiric therapy for febrile neutropenia, pelvic inflammatory disease, bacterial pneumonia, bacterial prostatitis, acute sinusitis, skin and soft tissue infections, typhoid fever, bacterial urinary tract infections, chancroid, meningococcal carriers, bacterial septicemia, prophylaxis in prevention of bacterial urinary tract infections

⊙ **Common drug examples:**
- Ciprofloxacin Ciloxan
- Esylate/alatrofloxacin mesylate Trovan IV
- Gatifloxacin Tequin
- Levofloxacin Quixin
- Lomefloxacin hydrochloride Maxaquin
- Moxifloxacin hydrochloride Avelox
- Norfloxacin Chibroxin
- Ofloxacin Floxin, Ocuflox
- Sparfloxacin Zagam
- Trovafloxacin Trovan

⊙ **Adverse reactions** Rarely seen; acute stimulation of the CNS causes acute psychosis, agitation, hallucinations and tremors; hepatotoxicity, tendonitis or tendon rupture; other effects include dizziness, headache, nervousness, drowsiness, insomnia, GI reactions and photosensitivity

histamine-receptor *antagonists*

⊙ **Indications** Duodenal ulcer, gastric ulcer, hypersecretory states, acid reflux, esophagitis, stress ulcer prophylaxis

⊙ **Common drug examples:**
- Cimetidine Tagemet
- Famotidine Pepcid, Pepcid AC
- Nizatidine Apo-Nizatidine, Axid
- Ranitidine Zantac
- Rantidine bismuth citrate

⊙ **Adverse reactions** Mild transient diarrhea, neutropenia, dizziness, fatigue, arrhythmias, gynecomastia

HMG-CoA reductase *inhibitors*

⊙ **Indications** Hyper cholesterol, mixed dyslipidemia, secondary prevention of cardiovascular events (except atorvastatin)

⊙ **Common drug examples:**
- Atorvastatin Lipitor
- Fluvastatin sodium Lescol, Lescol XL
- Lovastatin Mevacor
- Pravastatin sodium Pravachol
- Simvastatin Zocor

⊙ **Adverse reactions** Photosensitivity, hepatotoxicity, GI complaints, myopathy (usually muscle aches and weakness), insomnia

leukotriene *receptor blockers*

⊙ **Indications** Asthma

⊙ **Common drug examples:**
- Montelukast Sodium Singulair
- Zafirlukast Accolate
- Zileuton Zyflo

⊙ **Adverse reactions** Headache, dizziness, fatigue, fever, dyspepsia, asthenia, abdominal pain, cough, influenza, pain

nitrates

⊙ **Indications** Angina pectoris, acute myocardial infarction, hypertensive emergencies, heart failure and pulmonary edema associated with MI

⊙ **Common drug examples:**
- Isosorbide dinitrate Apo-ISDN, Coronex, Isoril, Novosorbide, Sorbitrate
- Isosorbide mononitrate Imdur, ISMO, Isotrate ER, Monoket
- Nitroglycerin Nitro-Bid, Nitrogly, Nitrong, Nitrostat, Nitrolingual

⊙ **Adverse reactions** Headaches, orthostatic hypotension, dizziness, weakness and transient flushing, nausea, vomiting, restlessness, pallor, cold sweats, tachycardia, syncope or CV collapse can occur

non-steroidal *anti-inflammatory (NSAIDS)*

Analgesic, anti-inflammatory, antipyretic

⊙ **Indications** Pain, inflammation, and fever; rheumatoid arthritis, juvenile arthritis and osteoarthritis; low-intensity headaches, arthralgia, myalgia, neuralgia and mild to moderate pain from dental or surgical procedures or dysmenorrhea

⊙ **Common drug examples: (OTC and prescription)**
- Acetylsalicylic Acid (ASA) Aspirin
- Celecoxib Celebrex
- Diclofenac sodium Voltaren
- Diflunisal Dolobid
- Etodolac Lodine
- Fenoprofen calcium Nalfon
- Ibuprofen Advil, Medipren, Motrin, Nuprin, Rufen, Trendar
- Indomethacin Indocid, Novomethacin
- Ketoprofen Oradis, Oruvail
- Ketorolac tromethamine Toradol
- Nabumetone Relafen
- Naproxen Naprosyn
- Naproxen sodium Anaprox, Aleve, Naprelan
- Oxaprozin Daypro
- Piroxicam Feldene
- Sulindac Clinoril
- Tolmetin sodium Tolectin

⊙ **Adverse reactions** Abdominal pain, bleeding, anorexia, ulcers, liver toxicity, dyspepsia, heartburn (minimized if taken with meals); flank pain may indicate nephrotoxicity; drowsiness, headache, dizziness, confusion, tinnitus, vertigo, depression, bladder infections, blood in urine and kidney necrosis

nucleoside reverse transcriptase *inhibitors*

⊙ **Indications** Used in combination with other drugs to treat HIV infections and AIDS; prevention of maternal/fetal HIV transmission, prevention of HIV infection after an occupational exposure

⊙ **Common drug examples:**
- Abacavir sulfate Ziagen
- Didanosine Videx
- Lamivudine Combivir
- Stavudine Zerit
- Zalcitabine Hivid
- Zidovudine Retrovir

⊙ **Adverse reactions** Difficult to distinguish between disease-related side effects and drug-related side effects; anemia, leucopenia, neutropenia, thrombocytopenia
- Toxic effects Rare adverse effects that require medical attention: myopathy, neurotoxicity and hepatotoxicity; not requiring medical attention: headache, severe insomnia, myalgia, nausea or hyperpigmentation of nails

opioids *(previously called narcotics)*

Often used in combination with other medications, particularly acetaminophen

⊙ **Indications** Analgesic used for moderate to severe pain associated with acute and chronic disorders including MI, postoperative pain or terminal cancer; pulmonary edema, preoperative sedation, anesthesia, cough suppression, diarrhea

⊙ **Common drug examples:**
- Codeine phosphate; codeine sulfate
- Diphenoxylate hydrochloride Lofene, Lomotil
- Fentanyl citrate Sublimaze
- Fentanyl transdermal system Duragesic
- Meperidine hydrochloride Demerol
- Methadone hydrochloride Dolphine, Mehadose
- Morphine sulfate Epimorph, Kadian, Statex
- Oxycodone hydrochloride Endocodone, Percolone

⊙ **Adverse reactions** Respiratory depression, circulatory depression, respiratory arrest, cardiac arrest, dizziness, visual disturbances, mental clouding, sedation, coma, euphoria, weakness, agitation, restlessness, nervousness, seizures, nausea, vomiting, constipation; high potential for addiction

opioid mixed *agonist-antagonist*

Drugs have both agonistic and antagonistic properties; usually potent analgesics but less addictive than pure opioids

⊙ **Indications** [*See* Opioids]

⊙ **Common drug examples:**
- Buprenorphine hydrochloride Buprenex
- Butorphanol tartrate Stadol
- Nalbuphine hydrochloride Nubain
- Pentazocine hydrochloride Talwin

⊙ **Adverse reactions** Respiratory depression, apnea, shock and cardiopulmonary arrest; sedation, dizziness, hallucinations, disorientation, agitation, euphoria, dysphoria; insomnia; headache; miosis, tachycardia, palpitations, chest wall rigidity, syncope and edema; nausea, vomiting and constipation; dry mouth; anorexia and spasms of the colon; urinary retention or hesitancy; decreased libido; rash, flushing; physical and psychological dependence can occur

penicillin

Family of effective antibiotics with low toxicity

⊙ **Indications:**
- Natural penicillin Infections like streptococcal pneumonia, enterococcal and nonenterococcal group D endocarditis, diphtheria, anthrax, meningitis, tetanus, botulism, actinomycosis, syphilis, and relapsing fever, Lyme disease; prophylaxis against pneumococcal infections, rheumatic fever, bacterial endocarditis
- Aminopenicillins Septicemia; gynecologic infections; respiratory, GU and GI tract infections, soft tissue, bone and joint infections
  - *Extended-spectrum penicillins:* Hard to treat gram-negative infections; given in combination with aminoglycosides
  - *Penicillinase-resistant penicillins:* Susceptible penicillinase producing staphylococci; much the same as for aminopenicillins

⊙ **Common drug examples:**
- Natural penicillin:
  - *Penicillin G benzathine:* Bicillin L-A, Permapen
  - *Penicillin G potassium:* Pfizerpen
  - *Penicillin G procaine:* Bicillin C-R, Wycillin
  - *Penicillin V potassium:* Apo-Pen, Veetids
- Aminopenicillins:
  - *Amoxicillin trihydrate with clavulanate potassium:* Augmentin, Clavulin
  - *Ampicillin:* Apro-Ampi Novo-Ampicillian, Omnipen, Penbritin
  - *Ampicllin trihydrate:* Principen, Totacillin
- Penicillinase-resistant penicillins:
  - *Dicloxacillin sodium:* Dycil, Dynapen, Pathocil
  - *Nafcillin sodium:* Nafcil, Nailpen, Unipen
  - *Oxacillin sodium:* Bactocil
  - *Mezlocillin sodium:* Mexlin
  - *Piperacillin sodium:* Pipracil
  - *Piperacillin sodium with tazobactam socium:* Zosyn
  - *Ticarcillin disodium:* Ticar
  - *Ticarcillin with clavulantate potassium:* Timentin

⊙ **Adverse reactions** Hypersensitivity reactions, hematological reactions, transient neutropenia, leucopenia, thrombocytopenia; bleeding can occur with high-dose extended-spectrum penicillins

phenothizines

⊙ **Indications** Psychoses involving hallucinations, agitation, manic phase of bipolar psychoses; nausea and vomiting induced by CNS dysfunctions; anxiety; severe behavioral problems, abdominal pain associated with porphyria, delirium, neurogenic pain

⊙ **Common drug examples:**
- Aliphatic derivatives:
  - *Chlorpromazine hydrochloride:* Chlorpromanyl—20, Largac-til, Thorazine
  - *Promethazine hydrochloride:* Anergan 50, Phenergan
- Piperazine derivatives:
  - *Fluphenazine hydrochloride:* Permitil, Prolixin
  - *Perphenazine:* Apo-Perphenazine, Trilafon
  - *Prochlorperazine:* Compazine, Stermetil
  - *Trifluoperazine hydrochloride:* Apo-Trifluoperazine, Stelazine
- Piperidine derivatives:
  - *Mesoridazine besylate:* Serentil
  - *Thioridazine:* Mellaril-S
  - *Thiothixene hydrochloride:* Navane

⊙ **Adverse reactions** Some medications may cause extra-pyramidal symptoms; in rare cases can cause neuroleptic malignant syndrome; other reactions include sedative and anticholinergic effects, orthostatic hypotension, reflex tachycardia, fainting, dizziness, arrhythmias, anorexia, nausea, vomiting, local gastric irritation, endocrine effects, hematological disorders, ocular changes

progestins

⊙ **Indications** Hormonal imbalance in women, endometriosis, carcinoma, contraception

⊙ **Common drug examples:**
- Medroxyprogesterone acetate Amen, Curretab, Cycrin, Provera
- Megestrol acetate Megace
- Norethindrone Micronor, Nor-Q.D.
- Norethindrone acetate Aygestin, Norlutate
- Norgestrel Ovrette
- Progesterone Crinone

⊙ **Adverse reactions** Change in menstrual bleeding pattern, breast tenderness and secretion, weight changes, increases in body temperature, edema, nausea, acne, somnolence, insomnia, hirsutism, hair loss, depression, cholestatic jaundice and allergic reactions; flushing, increased sugar levels, increase in BP, decreased sexual desire, headache

protease *inhibitors*

Antiviral medication used with HIV patients

⊙ **Indications** HIV infection and AIDS

⊙ **Common drug examples:**
- Amprenavir Agenerase
- Indinavir sulfate Crixivan
- Lopinavir and ritonavair Kaletra
- Nelfinavir mesylate Viracept
- Ritonavir Norvir
- Saquinavir Fortovase
- Saquinavir mesylate Invirase

⊙ **Adverse reactions** Kidney stones, pancreatitis, diabetes or hyperglycemia, ketoacidosis and paresthesia all require medical attention; less problematic are symptoms of generalized weakness, GI disturbances, headaches, insomnia, taste perversion, dizziness, somnolence

selective serotonin reuptake *inhibitors*

Enhance serotonergic transmission through blocked reuptake at the synapse

⊙ **Indications** Depression, panic and eating disorders, obsessive compulsion, premenstrual dysphoria, posttraumatic stress and bipolar disorders, alcohol dependence, premature ejaculation, diabetic neuropathy

⊙ **Common drug examples:**
- Citalopram hydrobromide Celexa
- Fluoxetine Proxac, Sarafem
- Fluvoxamine maleate Luvox
- Paroxetine hydrochloride Paxil
- Sertraline hydrochloride Zoloft

⊙ **Adverse reactions** GI complaints, headaches, dizziness, somnolence, sexual dysfunction, tremors; less common reactions include breast tenderness or enlargement, extra-pyramidal effects, dystonia, fever, palpitations, weight gain or loss, rash, hives, itching

skeletal *muscle relaxant I*

Polysynaptic inhibitors (inhibit interneuron transmission in the spinal cord)

⊙ **Indications** Muscle spasms caused by acute injuries, supportive therapy for tetanus

⊙ **Common drug examples:**
- Carisoprodol Soma
- Chlorzoxazone Paraflex, Parafon Forte
- Cyclobenzaprine hydrochloride Flexeril
- Methocarbamol Carbacot, Robaxin, Skelex
- Orphenadrine citrate Norflex

⊙ **Adverse reactions** Drowsiness, vertigo, tremor, headaches, lightheadedness, nausea, vomiting, confusion

skeletal *muscle relaxant II*

Indirect and direct skeletal muscle relaxants

⊙ **Indications** Spasticity caused by an upper motor neuron lesion like MS

⊙ **Common drug examples:**
- Baclofen Lioresal
- Diazepam Valium
- Dantrolene sodium Dantrium

⊙ **Adverse reactions** Drowsiness, dizziness, weakness, fatigue, hypotension, paresthesias, confusion, dysarthria, constipation, vomiting, liver dysfunction

sulfonamides

First drugs to treat systemic, bacterial infections

⊙ **Indications:**
- Bacterial infections Effective with staphylococci, streptococci, clostridium tetani, urinary tract infections, nocardiosis, otitis media
- Parasitic infections Inflammation, pneumonic plague

⊙ **Common drug examples:**
- Co-trimoxazole Apo-Sulfatrim, Bactrim, Cotrim, Septra
- Sulfasalazine Azulfidine

⊙ **Adverse reactions** Rash, fever, pruritus, erythema, photosensitivity, joint pain, bronchospasm; hematologic, renal and GI reactions all can occur

sulfonylureas

Lower blood glucose levels by stimulating insulin release from the pancreas

⊙ **Indications** Type 2 diabetes mellitus, neurogenic diabetes insipidus

⊙ **Common drug examples:**
- First Generation:
  - o Chlorpropamide: Diabinese, Novo-propamide
  - o Tolazamide: Tolinase
  - o Tolbutamide: Orinase
- Second Generation:
  - o Glimepiride: Amaryl
  - o Glipizide: Glucotrol
  - o Glyburide: DiaBeta, Glynase Pres Tab, Micronase

⊙ **Adverse reactions** Headache, nausea, vomiting, anorexia, heartburn, weakness and paresthesia
- Toxic effects Anxiety, chills, cold sweats, confusion, cool pale skin, difficulty concentrating, drowsiness, excessive hunger, nervousness, rapid heartbeat, weakness, unusual fatigue

tetracycline

Antibiotic

⊙ **Indications** Bacterial, antiprotozoal, rickettsial and fungal infections; sclerosing agent for pleural or pericardial effusion, adjunct therapy for H. pylori and other GI infections, Lyme disease

⊙ **Common drug examples:**
- Doxycycline hyclate Periostat, Vibramycin
- Minocycline hydrochloride Dynacin, Nimocin, Vectrin
- Tetracycline hydrochloride Achromycin, Panmycin, Tetralen

⊙ **Adverse reactions** Anorexia, flatulence, nausea, vomiting, stool disturbances, epigastric burning, abdominal discomfort, rash

thrombolytic *enzymes*

Developed to reduce a blood clot and prevent permanent ischemic damage

⊙ **Indications** Thrombosis, thromboembolism

⊙ **Common drug examples:**
- Alteplase Activase, Cathflo Activase
- Anistreplase, reteplase Eminase
- Streptokinase Streptase
- Tenecteplase TNKase
- Urokinase Abbokinase

⊙ **Adverse reactions** Cerebral hemorrhage, fever, hypotension, arrhythmias, edema, nausea, vomiting, arthralgia, headache

tricyclic *antidepressants*

Enhance adrenergic neurotransmitter transmission through blocked reuptake at the synapse

⊙ **Indications** Depression, obsessive compulsive disorder, enuresis, severe chronic pain, phobic disorders, bulimia, short-term treatment of duodenal or gastric ulcers

⊙ **Common drug examples:**
- Amitriptyline hydrochloride Elavil, Levate, Novotriptyn
- Clomipramine hydrochloride Anafranil
- Desipramine hydrochloride Norpramin
- Doxepin hydrochloride Sinequan, Triadapin
- Imipramine hydrochloride Apo-Imipramine, Impril, Novopramine
- Imipramine pamoate Tofranil-AM
- Nortriptyline hydrochloride Aventyl HCL, Pamelor
- Trimipramine maleate Surmontil

⊙ **Adverse reactions** Sedation, anticholinergic effects, orthostatic hypotension; specific drugs may cause seizures

vitamin K *inhibitors*

⊙ **Indications** Pulmonary emboli, DVT, MI, atrial arrhythmias

⊙ **Common drug examples:**
- Warfin Coumadin

⊙ **Adverse reactions** Fever, anorexia, nausea, vomiting, cramps, diarrhea, mouth ulcerations, hemorrhage, jaundice

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