CHOLINOMIMETIC: Direct Stimulating			
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Choline Ester		**DYNAMICS:** *eye* - miosis, facilitates the outflow of aqueous humor; *CV* - Hypotension and brady, reflex tachy {***4 effects*** 1) vasodilation 2) dec in cardiac rate 3) dec conduction of SA and AV 4) dec in force of cardiac contraction}; Resp - bronchospasm, inc tracheobronchial secretions; *GI* - inc peristaltic act and relaxation of sphincter, inc salivary and gastic secretions; *GU* - stim of detrusor muscle and relax the trigone and sphincter; *Secretetory glands* - stim of secretory activity of the lacrimal, tracheobroncial, salivary, digestive, and exocrine; *CNS* - nicotine has mind altering action, tremors, emesis, and stim of resp centers, cunvulsions, and fatal coma; ***NM junct -*** *nicotinic effect* - fasiculation to strong contraction of entire muscle - lead to depolarization blockade	**CONTRA:** Asthma, hyperthyroidism (inc receptors), Coronary insufficiency, acid-peptic disease. **TOXICITY:** *pilocarpine and choline esters*: Nausea, vomiting, diarrhea; salivation, sweating; cutaneous vasodilation, tremors, bronchial constriction, AV block, bradycardia, and PVC's. **TOXICITY:** *nicotine:* acute - CNS stimulation, Hypertension, Cardiac arrhythmias, convulsions, coma, neuromuscular blockade resulting in resp paralysis: Chronic exposure - recurrance of ulcer in pts with peptic ulcers
Acetylcholine* - no therapeutic value; forms from glucose and choline	IV, Oral	Rapid hydrolysis by Ach-esterase and plasma esterase - butylcholinesterase; rapid hydrolysis in GI tract; CNS penetration limited	**USE:** diagnostic tool, no therapeutic value
Methacholine - clinical apps		twice as resistant to hydrolysis; > muscurinic activity then nicotinic; See effects when administered subcutaneously	**USE:** diagnostic tool for broncial hyperactivity
Bethanechol - clinical apps; carbomic esters = long acting - 6 hrs		activates bowel and bladder smooth muscle; mainly muscurinic action	**USE:** postoperative abdominal distention and gastric atony; postoperative and postpartum urinary retention; promotes salivation
Carbachol - clinical apps; carbomic esters = long acting - 6 hrs		substantial nicotinic activity (especially on autonomic ganglia, therefore can activate the adreanal medulla	**USE:** glaucoma
Natural Alkaloids			
Pilocarpine		Well absorbed; from leaf of SA shrub pilocarpus; muscurinic exceeds nicotinic; Hypertension after a brief hypotensive responce	**USE:** glaucoma
Muscurine		from poisonous mushroom (amanita muscuria); muscurinic receptor site	
Arecoline		from areca or betel nuts (areca catechu); nicotinic receptors	

CHOLINOMIMETIC: Indirect Stimulating (Anticholinesterases) accumulates ACH		**DYNAMICS: Muscurinic Effects** - miosis, bronchoconstriction, inc secretions, inc peristaltic activity, brady, hypotension. **Nicotinic Effects** - dose dep effect - higher dose results in fibrillation of muscle fibers, fasciculation, and non-depolarizing blockade. **CNS Effect** - dose dep effect - *low conc.* results in diffuse activation of the ECG and subjective alerting response. *High conc.* results in generalized convulsions, coma, and resp arrest.	
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Reversible - Carbamoyl Esters			
Physostigmine		*carbamate ester* that covalently bonds with Achesterase. **KINETICS:** well absorbed (lipid soluble); duration 1/2 - 60 hrs	**USE:** in glaucoma, Alzheimer's disease, atropine overdose
Neostigmine - also has some *direct nicotinic agonist* activity		*carbamate ester* that covalently bonds with Achesterase. **KINETICS:** poorly absorbed; post-op; duration 1/2 - 6 hrs	**USE:** adynamic ileus, non-obstructive urinary retention, diagnostic tool and **treatment** of myasthenia gravis, *Nondepolarizing neuromuscular blockade reversal*
Edrophonium - quaternary alcohol		forms *reversible* electrostatic and hydrogen bonds to active site of the enzyme ~ short duration; diag-X-short; 2-10 min duration	**USE:** diagnostic tool for myasthenia gravis
Pyridostigmine [Mestinon]		**KINETICS:** poorly absorbed	
Donepezil [Aricept] - 1st piperidine-type reversible cholinesterase inhibitor; > affinity for CNS, therefore less peripheral effects	oral: t1/2 = 70 hrs	**KINETICS:** 1st pass 100%; metabolized CP450 2D6 and 3A4 and glucoronidation; excreted in urine (17% unchanged), no food interaction, peak levels 3-4 hrs, *once a day dosing*. **TOXIC:** GI - nausea, vomiting, diarrhea, anorexia. Also reported - headache, pain (various locations), syncope, ecchymosis, weight loss, arthralgia, insomnia, dizziness, dyspepsia, and increase urine frequency	**USE:** alzheimer's disease. **CONTRA:** GI bleeds and hepatic disease (for cautionary measures - not hepatotoxic but could be)
Tacrine [Cognex] - has direct agonist activity (both direct cholinomimetic and reversible inhibition of ACH-esterase	oral: t1/2 =1.5-4 hr	**KINETIC**: 1st pass 5-30%; metabolized CP4501A2; excreted in urine, food dec absorption by 30-40%, peak levels 1-2 hrs. **TOXIC:** hepatic* - elevated liver enzymes; GI* - nausea, vomiting, diarrhea, anorexia, constipation, dyspepsia, flatulence; CNS* - myalgia, syncope, dizziness, tremors, insomnia and mental status change; also seizures, asthma, exacerbations [*-expected]	**USE:** alzheimer's disease. **CONTRA:** GI bleeds and hepatic disease
Irreversible - Organophosphates		Bind with phosphates and form covalent phosphorus-enzyme complex that may undergo 'aging' where bond is strengthened	
Parathion	pesticides -	**KINETICS:** highly toxic b/c not detoxed in vertebrates; highly toxic pesticide - absorbed dermally	
Malathion			
Isoflurophate [Floropryl]			**USE:** in glaucoma
Echothiophate [Phospholine]		**KINETICS:** not well distributed in body	**USE:** in glaucoma
Treatment for Poisoning: Antidotes		80% exposure to pesticides - occupational exposure, dermal absorption	1) CV support 2)Decontamination 3) TX of seizures (anti siezure meds)
Atropine		antagonist to Ach	decrease effect of too much Ach
Pralidoximine (2-PAM) [Protopam]		effect in 24 hr (best), no later then 48 hrs; Ach-esterase reactivator	

Anticholinergics

Name	ADMIN	INFO	USE/CONTRA/RXN's
Belladonna Alkaloids			
Atropine* - From atropa belladonna {nightshade]; *Reversible Competitive antagonism* of Ach @ muscurinic receptor sites (however non specific for subtypes); low potency at nicotinic; @ high conc. Able to produce partial blockade -PROTOTYPE	Oral, Conjunct: t 1/2 = 2-4 hr	**KINETICS:** Well distributed 30 min - 1 hr; well absorbed GI and conjunctival; metabolism liver, excretion - 60% unchanged in urine. **DYNAMICS:** CNS - dose dependent - @ low dose mild vagal excitation as a result of stim of medulla and higher cerebral centers. Ocular - mydriasis, cycloplegia, reduction of lacrimal secretion; CV - tachy; Blood Vessels - moderate to toxic doses cause *atropine flush*; Resp - bronchodilation and decreased secretory gland secretions, dec mucillary clearance; GI - dec motility, reduction in gastric secretions, dec salivation; GU - relax sm of ureter and bladder wall (reduce voiding); sweat glands (suppressed)- thermoreg, inc body temp. **TOXIC:** CNS - restlessness, irritability, disorientation, hallucinations, and delirium; @ inc conc. - circ collapse, paralysis of parasym organs, coma, death	**CONTRA:** glaucoma, prostate hyperplasia, gastric ulcer. **SIDE EFFECTS:** *dry as a bone, blind as a bat, hotter then a hen red as a beet, mad as a hatter,* plus tachy
Scopolamine [Transderm-Scop] - greatest *CNS penetration*	dermal patch	≈ to Atropine except the CNS toxicity; @ thereputic doseage = depression; **TOXIC:** CNS - drowsiness, amnesia, fatigue	**USE:** treatment of motion sickness
Semisynthetic/Synthetic Derivatives of the Belladonna Alkaloids		***QUATERNARY:** *mech* is same as atropine w/ greater nicotinic ganglionic blocking resulting in adverse rxn that are attributable to ganglionic blockade. **KINETICS:** Absorption - poorly and unreliable after oral (10-30%) absorption; distribution - more ionized ∴ less cross @ BBB and conjunctival barrier; duration of action longer. **PHARM:** less CNS penetration. **TOXIC:** = to belledonna, but less CNS effects; significant ganglionic blockage produce sig nicotinic side effects; *OD leads to curariform NM block - respiratory paralysis*. ***TERTIARY:** better lipid soluability, useful in ophthalmic and centrally mediated diseases. **TOXIC:** equal to that of natural products, systemic effects possible, but less likely.	
Ipratropine [Atrovent] - Quaternary	inhalation (<1% absorbed, 90% swallowed):	max response 30-90 mins, 4 hr duration, eliminated in feces; **PHARM:** bronchodilations with no effect on mucillary clearance	**USE:** COPD
Methscopolamine [Pamine] - Quaternary		less potent then atropine, poorly absorbed, duration 6-8 hrs; derivative of scopolamine w/o central effects (different then atropine - MECH unknown)	**USE:** Gastrointestinal diseases (adjunct to treating ulcers - decrease secretion)
Benzatropine [Cogentin] - tertiary		similar to trihexyphenidyl but less CNS effects; synthetic compound similar to atropine and diphenhydramine; [*has anti-muscurinic, anti-histaminic, and local anesthetic effects.*]	**USE:** parkinsonism and drug induced extrapyramidal side effects
Tropicamide [Mydriacyl] - tertiary	topical, ophthalmic	shorter duration then atropine, scopolomine or homatropine	**USE:** topical administration [ophthalmic formula]; Mydriasis, induction of cycloplegia
Cyclopentolate [Cyclogy] - tertiary			
Dicyclomine [Bentyl] - tertiary		less potent the atropine and minimal effect on salivary or sweat glands or CV system	**USE:** irritable bowel disease [antispasmodic properties]
Homatropine hydrobromide [Isopto Homatropine] - tertiary	topical, ophthalmic	semisynthetic derivative of atropine;	**USE:** topical administration [ophthalmic formula]; *Mydriasis,* induction of cycloplegia

Oxybutynin [Ditropan] - tertiary		synthetic antimuscurinic compound - has nonspecific relaxation effect	**USE:** adult urinary incontinence and neurogenic bladder (relaxation of sphincter)
Tolterodine [Detrol] - tertiary		M3 receptor selective; effects similar to oxybutynin, but lipophilicity is 30x less - limited CNS penetration - less CNS side effects	**USE:** Adult urinary incontinence
Trihexyphenidyl [Artane] - tertiary		CNS permeability exploited; synthetic compound *similar to atropine*	**USE:** parkinsonism and drug induced extrapyramidal side effects

Drugs effecting the Ganglia			
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Indirect Ganglionic Blocker			
Nicotine [Nicoderm, Nicotrol, Hibitrol, Nicorette]	absorbed from resp tract, buccal mem, and skin; ionized in stomach: t1/2 = 2 hr	**DYNAMICS:** Ganglionic Blockade - initial stim, followed by depression; NM junction initial stim followed by *paralysis,* NM bloackade by receptor *desensitization;* CNS - stim followed by depression, dose dep tremors, convulsions, resp stim followed by depression = death - central paralysis and peripheral blockade; CV - vasoconstriction, tachy, and elevated BP; GI - parasym stim, nausea, vomiting, and occasional diarrhea; Exocrine glands - initial stim of salivary and bronchial secretions then inhibition. **KINETIC:** majority of absorption in sm intestines; 80-90% altered in body by liver (also in kidney, lung); Renal elimination - dependent on pH b/c it is basic; found in breast milk. **TOXIC:** acute exposure - accidental ingestion/sprays, nausea, salivation, abdominal pain, vomiting, diarrhea; cold sweat, headache, dizziness; disturbing hearing and vision, mental confusion, and marked weakness, hypotension, resp diff, CV collapse, terminal convulsions, death due to resp failure.	*inhaled nicotine - metabolized mainly by the lungs
Ganglionic Blockers			
Mecamylamine [Inversine] - non-competitive antagonist at several nicotinic acetylcholine receptor subtypes	oral	**KINETICS:** absorption decreased by effect of ganglionic blockade on the GI tract; readily enters CNS; accumulates in liver and kidney, excreted slowly by kidney in unchanged form - long duration of action. **PHARM:** CNS - sedation, tremors, choreiform movements, mental aberrations reported; Eye - cycloplegia, moderate mydriasis; CV - hypotension, ortho hypo, tachy; GI - reduction in secretions, inhibition of motility, GU - hesitancy in urination, impaired erection; loss of thermoregu control. **TOXIC:** exacerbation of side effects, visual disturbances, dry mouth, urinary hesitancy, moderate constipation, abdominal discomfort, anorexia, heartburn, nausea, postural hypotension; **SEVERE RXN:** - marked hypotension, constipation, syncope, paralytic ileus, urinary retention, cycloplegia, *CNS* - tremors, mental confusion, seizures, mania, or depression	**USE:** hypertensive emergencies **CONTRA:** history of cardiac problems, uremia, glaucoma (b/c moderate mydriasis), organic pyloric stenosis.

Drugs effecting the Neuromuscular Junction Blockers		Depolarization results in the Na+ and K+ influx; Ach is metabolized by ACH-esterase; Transmission inhibited by competative agaonitst of Ach receptors (nondepolariziing blockade; Excessive agonist result in initial depolarization and desensativation	
Name	**ADMIN**	**INFO**	**Indication/CONTA**
Depolarizing (Non competitive Antagonist)			
Succinylcholine* - 2 Ach molocules together - PROTOTYPE	parenteral, IM, IV	**Mech:** PHASE 1: depolarization - binds to post synaptic nicotinic receptors, not metabolized in the synapse - remains depolarized resulting in flaccid paralysis PHASE 2: despite continued exposure, endplate becomes repolarized, AND desensatived to stimulation. **KINETIC:** duration 5-10 mins, ionized - no X @ BBB, rapid hydrolysis by plasma cholinesterases @ liver and plasma (effects prolonged in pts w/i abnormal plasma choilesterase. **DYNAMICS:** skeletal muscle paralysis (1st fasiculations over chest and abdomen, 2nd arms legs and neck, 3rd respiratory muscle weakness); CV - arrhythmias and bradycardia; hyperkalemia - leads to cardiac arrest; inc intraocular pressure, inc intragastric pressure - emisis, muscle pain. **TOXIC:** muscle fasiculations, tremors, jaw rigidity, postoperative myalgia, muscular weakness/pain, renal tubular obstructuon, muscle paralysis, prolonged apnea & CV collapse, hpersensativity, malignant hyperthermia (ine Ca release - muscle rigidity, *Tx Dantrolene [Dantrium]*)	**DRUG INTERACTIONS:** Antibiotics - exacerbate or potentiate; local anesthetics - enhance NM transmissions; non-depolarizing NM junct blocker - 50% more needed for effect. **CONTRA:** malignant hyperthermia, burns (extra inc in K+), cardiac disease. [Malignant hyperthermia - autosomal dominant; release of inordinaent Ca++ from sarcoplasmic reticulum; Tx - w/ Dantrolene {Dantrium} - controls levels of Ca++]
Non-Depolarizing (Competitive Antagonist)			
Tubocurarine* - PROTOTYPE	IV	long acting non depolarizing NM junction blocker; causes release of greatest amount of histamine. **MECH:** competative antagonism of Ach @ nicotinic receptor sites, higher dose - block the ion channels, theory - block prejunctional Na channels interfering w/ Ach release, BLock reversed by lg amts Ach or choinesterase inhibitors. **KINETICS:** onset 2-3 mins, distribution <1.5 hr, duration 30-60 min, limited VD of 80 - 140 ml/kg, high ionized - not X BBB, excreted unchanged in bile/urine. **DYNAMICS:** Skeletal Muscle - initial weakness - then paralysis, sm then lg effetced, last is diaphram - recovery is in reverse order; CV - hypotension, liberation of histamine - WHEALS when IntraQ or IA, bronchospasm, hypotension, excessive bronchial and salivary secretion, histamine relase is direct mast cell effect. **TOXIC:** histamine release + ganglionic blockade - rash and puritis, (flushing, edema, urticaria, puritus, erythema - rare), hypersalivation & bronchospasm, wheezing and arrhythmias, hypotension; sinus tachy; muscle paralysis, apnea, dyspnea, and resp depression, malignant hyperthermia	**USE:** for surgical anesthesia (intubation), diagnostic tool in myasthenia gravis. **DRUG INTERACTIONS:** inhaled anesthetics, antibiotics - inc Ach release; local anesthetics; non-depolarizing NM junct blocker - more needed for effect. ***ANTIDOTE:*** *cholinesterase inhibitors (neostigmine - b/c inc Ach competatively)*.
Atracurine [Tracrium] - intermediate acting	IV	produces a mild/moderate histamine release; readily crossed BBB, laudanosine is a toxic metabolite (responsible for seizures); less potent then Pancuronium or Vecuronium; has faster recovery time compares to tubocurarine or Pancuronium; less hypotension then Tubocurarine.	**USE:** adjunct to general anesthesia, tracheal intubation
Mivacurium [Mivacron] - Shorter acting	IV	short acting; rapidly metabolized by plasma cholinesterase (inc duration in pts w/ renal failure due to dec plasma levels); duration less then Atracurium, less hypotention then Tubocurarine	**USE:** endotracheal intubation, neuromuscular blockade

Pancuronium [Pavulon] - long acting	IV	long acting agent, minimal histamine release, metabolized in liver to active metabolite, excreted in urine; potency is 5x Tubocurarine	**USE:** endotracheal intubation, neuromuscular blockade
Vecuronium [Nocuron] - Intermediate acting		intermediate acting agent, minimal histamine release and is less likely to cause side effects *(as opposed to Atrcurium, Mivacurium, Succinylcholine, Tubocurarine)*, meabolized by liver; excreted in bile (85%) and urine (15%); more potent the Pancuronium or Atracurium	**USE:** endotracheal intubation, neuromuscular blockade

Sympathomimetic Drugs		**Thereputic uses:** Shock, Hypotension, Hypertension, Cardiac Arrhythmias, Congestive Heart Failure, Limiting Hemorrhage (topical vasoconstictor effects), inc duration of action of local anesthetics, nasal decongestion, asthma, allergic rxn, opthalmic indications: *mydiriasis, narcolepsy, weight reduction, ADHD*	
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Direct acting			
Epinephrine* - endogenous catacholamine	parenteral, inhalation	**MECH:** *potent stimulant of both β and α adernergic receptors*; **KINETICS:** metabolized by hepatic COMT and MOA; excretion urine; slow absorption following subQ - local vasoconstricion. **DYNAMICS:** CV - powerful stimulant w/ direct activity of β1 receptors, hypotension (potent vassopressor), raise systolic > then diastolic, inc CO, inc O2, arrhythmias(stim different pacemakers of the heart); Vasoconstriction; Smooth Muscle - relaxation of GI smmoth muscle, inhibits uterine tone and contraction, uriniary hesitancy and retension;Resp - relaxation of bronchial muscles, bronchodilation, negligable CNS due to polarity. **TOXIC:** fear, anxiety, tenseness, restlessness,; headaches, weakness, dizziness, pallor; resp difficulty; palp; hypertension (esp w/ hyperthyroid & hypertensive; cerebral hemorrhage and cardiac arrhythmias - depends on administration	**METABOLIC EFFECTS:** elevation of glucose and lactate blood levels, inc O2; (other effects stim lacrimation, mydrisis). **CONTRA:** pts who receive nonselective b-andrenergic blocking drugs - see only alpha response.
norepinephrine [Levophed] - endogenous catacholamine	(ineffective oral) poor subQ	95% β and 5% α; blood flow reduced to kidney, liver, and skeletal muscles. **KINETICS:** rapid met by COMT and MAO; small amount excreted in urine unchanged, ineffective orally; **DYNAMICS:** equipotent to epi @ β1 receptor, lil action @ β2; potent agonist at α (<epi) *however, it is less potent then epi on the α receptors of most organs*; CV - hypertension w/ inc systolic and diastolic pressures and pulse preassure are inc, marked vascoconstriction, inc total peripheral resistance, dec HR due vagal reflex, peripheral vascular resistance inc (blood flow reduced to kidney liver and skeletal muscle); hyperglycemia (<epi), *inc. freq of contraction in pregnancy*. **TOXIC:** ~ to epi, less pronounced and less frequent, anxiety, resp diff.; awaeness of slow, forceful beating heart, transient headaches; **O.D**. - severe hypotension, photophobia, retrosternal pain, pallor, intense sweating, and vomiting.	**CONTRA:** anesthesia with agents that sensatize the automatic tissue of the heart (Halothane); pregnancy
Isoproternol [Isuprel] - β adernergic agonist (low affinity to forα - adernergic receptors) - potent synthetic	parenteral or inhalation	**KINETICS:** metabolized by COMT in liver & others, poor substrate for MAO; longer duration then Epi and norE. **DYNAMICS:** CV - lowers peripheral vascular resistance, hypotension, inc CO (+ inotropic and chronotropic effect); relaxation bronchial and GI smoother muscle. **TOXIC:** palpatations, tachy, headache, fluched skin (common); lipolysis = epi	**METABOLIC EFFECTS**: less hyperglycemia then epi'; lipolysis equal to epi;
Dopamine [Intropin]	IV	metabolic precursor of norE and Epi; **KINETICS:** substrate for COMT and MAO - ineffective orally; **DYNAMICS:** CV - vsodilation (low conc. - inc GFR, renal blood flow, and Na+ excretion); positive inotropic effects on the myocardium acting on β1 receptors and stimulates release of norE; Less tachy then Isoperternol; Inc systolic blood pressure and pulse pressue (min effect on diastolic); stim of vascular α1 (high dose) - adernergic receptors leading to vasoconstriction and dec renal blood flow and urinary output; no CNS effects - no X BBB. **TOXIC:** Nausea, vomiting; tachy, anginal pain, arrhythmias, hypertension, vasoconstriction; headache	**USE:** Shock; Oliguria and with low or normal pheripheral vascular resistance

Doubutamine [Dobutrex] - β adernergic agonist (stuct sim to Dopamine)		**DYNAMICS:** inc CO(>isoperternol); **TOXIC:** hypertension and tachy, facillitates AV conductance, tolerance, myocardial infacts	
Clonidine [Catapres] - α2 adernergic agonist	oral: t1/2 = ~12 hrs	**KINETIC:** peak plasma concentration 1-3 hr;renal elimination (50% unchanged); ~100% bioavailability. **PHARM:** CV - transient hypertensive response followed by prolonged hypotension; Bradycardia. **TOXIC:** Dry mouth and sedation (50%); Sexual dysfunction; Marked Brady; Contact dermatitis (15-20%); withdrawl rxn w/ abrupt discontinuation of long term therapy	**USE:** Hypertension, adjunct in narcotics, alcohol, and tobacco withdrawl
Indirect acting			
Amphetamine♠ – non specific and Promotion of the release of Norepinephrine		CNS stimulant; **MECH:** releases biogenic amines from their storage sites in nerve terminals. **DYNAMICS:** CV effect - hypertention, reflex brady, arrhythmias (large doses); Effect on smoother muscle is similar to other sympathomimetic drugs; CNS stim, dec fatique, elevation of mood, euphoria, inc motor activty and speech; Resp stim; appetite suppressent (hypothalimic activity on feeding centers). **TOXIC:** *CNS STIM* - restlessness, dizziness, tremors, hyperactive reflexes, irritability, weakness, insomnia, fever, and euphoria; confusion, aggressiveness, anxiety, delirium, paranoid hallucinations; *CNS DEPRESSION* - fatique and depression; *CV* effects - headaches, pallor, flushing, palpatations, cardiac arrhythmias, anginal pain, blood pressure changes, and circ collapse; *GI* - dry mouth, metallic taste, anorexia, nausea, vomitting, diarrhea, and abdominal cramps; Convusions, coma, and cerebral hemorrhages; psychological dependence adn tolerance	
Methamphetamine [Desonxyn] - β2 adernergic agonist			
Dextroamphetamine [Dexedrine]		3x greater potency then Amphetamine; Greater CNS effects	
Dual Acting			
Ephedrine - direct and indirect acting sympathomimetic and Promotion of the release of Norepinephrine in excess	oral: t1/2 = 3-6 hrs	α and β andrenergic agonist; promotes release of NE from nearve terminal; **KINETIC:** majority excreted in urine unchanged; **DYNAMICS:** potent CNS stimulant; cardiac stimulan, tachy, inc CO, inc pheripheral resistance, hypertension; dec renal flow; bronchodilation; **TOXIC:** hypertension and arrhythmias, insomnia, tachyphylaxis(a decreased response to a medicine given over a period of time so that larger doses are required to produce the same response)	
Methoxamine [Vasoxyl] - α1 adernergic agonist (less specific @ high conc.)		Direct acting vasoconstrictiors; lacks CNS stim; dose related inc in peripheral vascular resistance; hypertension, reflex brady	**USE:** hypotensive states, paroxysmal atrial tachy
Pseudoephedrine [Sudafed]			
Phenylpropanolamine			
Phenylephrine [NeoSynephrine] - a1 adernergic agonist	IV	Direct acting vasoconstrictors; ~ Methoxamine, marked atrial vasoconstriction during IV infusion	**USE:** nasal decongestant, mydrriatic agent
Anti-Asthmatic		***ψ ADVERSE EFFECTS OF β 2-Selective Agonist: Skeletal muscle tremor(most common); Feeling restless, apprehhension, and axiety; tachy; arrhythmias or MI - inc risk in pts w/ heart disease, talking MAO inhibitors, tricyclic antidepressents.***	***ψ METABOLIC EFFECTS for β 2-selective agaonist: elevation in glucose, lactate, and free fatty acids***

Terbutaline [Brethine]ψ - β2 adernergic agonist	oral, subQ, inhalation	not metabolized by *COMT*	**USE:** obstructive airway diseases, acute bronchospasm (COPD and asthma)
Metaproterenol [Alupent, Metaprel]ψ - β2 adernergic agonist	oral, inhalation	less β2 selective then albuterol or terbutaline; resistanct to methylation by *COMT*	**USE:** obstructive airway diseases, acute bronchospasm (COPD and asthma)
Uterine Release			
Ritodrine [Yutopar]ψ - β2 adernergic agonist	oral and IV	renal elimination; 2 fold administrations: *1st IV, 2nd oral dose*	**USE:** *tocolytic* - inhibits uterine contractions
Inhibitor of Norepineprine release from the nerve terminal			
Bretylium [Bretylol]		prevent release of NE from nerve terminal (Cardiac Drug)	
Interference with Norepineprine release from the nearve terminal			
Metyrosine [Demser]		Inhibition of tyrosine hydroxylase (inhibits tyrosine change to Dopa)	
Methyldopa [Aldomet]		inhibition of L-amino acid Decarboxylase (False Dopa competes w/ Dopamine)	
Depletion of Vesicle Stores			
Reserpine		block the vesicular uptake of amines, promoting depletion of the transmitter from the vesicles and consequently the metabolism by *MOA*	USE: old time hypertensive
Interference with the reuptake of the transmitter			
Cocaine		Tricyclic Antidepressensts	
Imipramine [Tofranil]			
Interference with the Destruction of the transmitter			
Tolcapone [Tasmar]		inhibitors of *COMT*	
Selegiline [Carbex]		inhibitiors of *MOA*	

α - Adernergic Receptor Antagonist		**DYNAMICS:** CV - pheripheral vascular resistance and blood pressure; tachy (β agonist - inc HR b/c α inhibited); compensatory inc in blood volume (chronic use); postural hypotension (dizy when standing) and reflex tachy; Ocular - miosis (dilation is antagonized) ; resp - nasal stuffiness; block constriction of trigone and sphincter muscle in the base of the urinary bladder in the prostrate (promotes urinations - promotes voiding)	
Name	**ADMIN**	**INFO**	**Indication/CONTA**
Nonspecific reversible			
Phentolamine [Regitine] - α antagonist	parentral only	**MECH:** An imiadazoline derivative that is a competative inhibitor of α1 and α2 receptors; produces an antagonist response @ muscurinic and H1 and H2 receptors. **KINETICS:** unknown, but is extensively metabolized. **TOXIC:** CV - hypotension, severe tachy(stim of unapposed β), arrhythmias, and MI (exacerbation by inc CO, O2 demand - exacerbation); GI diarrhea and inc gastric acid production	**USE:** Pheochromocytoma (catacholamine secreting tumor - causes hypotension), erectile dysfunction - non FDA approved method; used to prevent locally to prevent dermal necrosis after the inadvertent extravastation of an a adrenergic agonist(needle stick w/ epi). **CONTRA:** Acute MI, Angina, CAD, Peptic ulcer disease, Pregnancy (efficacy not established)
Ergotoamine [ergomar] - α antagonist		**MECH:** α adrenergic antagonist/partial agonist, seratonin receptor antagonist/partial agonist and dopamine receptor antagonist/partial agonist. **DYNAMIC:** potent peripheral and coranary vasoconstriction, brady, inc smooth muscle activity (uterus). **TOXIC:** Nausea and vomiting (essentially mediated side effects), vascular insufficiency and myocardial inschemia and gangrene (extreme vasoconstriction)	**USE:** post partum stim of uterus (dec bleeding); migraines - seratonin effect on vasculature **CONTRA:** pregnancy
Tolazoline [Priscoline] - dicontinued			
Nonspecific Irreversible		new receptors MUST be created	
Phenoxybenzamine [Dibenzyline] - α antagonist - only one		**MECH:** covalent bond to a receptors (duration 14-48 hrs), some selective for α1(but less so then Prazosin); inhibits reuptake of released norE by presympathetic; *blocks H1, Ach, and seratonin receptors.* **KINETICS:** absorption well after oral administration, low bioavailability, renal elimination. **DYNAMICS:** hypotension, Tachy, arrhythmia and MI, diarrhea, inc gastric secretion. **TOXIC:** CNS - fatigue, sedation, and nausea; Carcinogenic in animals	**USE:** Pheochromocytoma - catacholamine secreting tumor
α1 receptor specific antagonist		also inclused in this group is Labethalol [Normodyne, Transdate]	
Prazosin [minipress]	oral: t1/2 - 2-3 hr	**MECH:** highly potent and selective α1 receptor antagonist (low affinity for α2). **KINETIC:** 50-70% bioavailability on first pass (loose 50-30%); renal excretion; 95% protien bound. **DYNAMICS:** less tachy then Phentolamine; dec peripheral vacsular resistance.	**USE:** hypotension; [congestive heart failure = off lable use - build up tolerance]
Terazosin [hythrin] - struc analog of prazosin	t1/2 - 9-12 hrs	less potent then prazosin; highly specific for α1 receptors **KINETICS:** 90% bioavailability, duration 18 hrs, renal excretion, 10% unchanged	**USE:** hypertenssion, benign prostatic hypertrophy
Doxazosin [cardura] - struc analog of prazosin; once a day dosing	t1/2 - 10-22 hr	duration of action 36 hr. **TOXIC:** first dose phenomenon (marked postural hypotension and syncope; headache, dizziness, drowsiness, and nausea. **O.D.:** effects indistinguishable from α - non selective (@high enough conc.)	**USE:** hypertenssion, benign prostatic hypertrophy **CONTRA:** Acute MI, angine, CAD, peptic ulcer,pregnancy

β - Adernergic Receptor Antagonist		**DYNAMICS:** CV - inc peripheral resistance (acutely); lowers peripheral resistance in pts with hypertension (chronically - reflex becomes desensatived and resistance lowers back to normal); negative chronotrope (dec HR) and inotrope (dec CO) - lowers blood preassure; PULMONARY - Bronchospams (β1 specifics not completely void of β2); METABOLIC effect - inhibition of lipolysis and glycogenolysis; OCULAR - reduced intraocular preassure - dec aqueous humor production. **TOXIC:** *CV* - congestive heart failure (in pts w/ CAD; Bradycardia (only ones with ISA); cold extremities intermittent claudication (a effect is vascoconstriction); rebound effect - exacerbation of angina, sudden death; Bronchospasm; *CNS* - fatigue, sleep distrubances(insomnia, nightmares in elderly); *metabolic* - delayed recovery from insulin induced hypoglycemia, inc triglycerides; *other* - constipation, diarrhea, or indigestion, sexual dysfunct.	**O.D.:** hypotension, brady, prolonged AV cunduction times, widened QRS; siezures; hypoglycemia; bronchospasm. **DRUG interactions:** aluminum salts (kelation); Cholestyramine (clolesterol reducing agent - binds reducing absorption); phenytion, rifampin, phenobarbital (induces P450); Cimetidine (H2 blocker, inhibit P450); CA++ channel blockers (orthostatic hypotension). **CONTRA:** abrupt discontinuation, asthma, bradycardia, AV block
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Nonselective		*ISA - Intrinsic Sympathomimetic activity; MSA - Membrane-stabalizing activity*	
propanolol [inderal]* - prototype	oral	Large Vd (4 l/kg); high lipid soluability - X's BBB; **Metabolism** - extensive first pass (25% bioavailability); renal elimination	**USE:** Hypertension (dec CO); Angina (b/c dec O2 demand); arrhythmias; CV effects seen with hyperthyroidism (seem to have inc # of receptors); migraine (prophalaxic, effect on cerebral vasculature); dec lipolysis - dec prostoglandins
timolol [timoptic]	oral and topical: t1/2 = 4 hrs	Non selective agent with no ISA and no MSA. **KINETICS:** hepatic metabolism and renal elimination, 50% bioavailability	**USE:** glaucoma (dec intraocular preassure), migraine
nadolol [corgard]	t1/2 - 20 hr	Non selective agent with no ISA and no MSA. Longer duration, less lipid solubility then Propanolol (less penetration into CNS); limited metabolism - majority excrete unchanged in urine (Accumulatetion in pts w. renal failure)	**USE:** Glaucoma
pindolol [visken]	oral: t1/2 - 4 hr	Non selective agent with no ISA and low MSA. Mepatic metabolism; 20% metablized, 80% bioavailable; renal elimination of metabolites and unchanged drug	**USE:** Hypertention
Labetolol [Normodyne, Trandate]§ - specific a1 and nonspecific b adrenergic antagonis	oral, IV: t1/2 - 8 hr	competative antagonist at α1 and adrenergic receptors; affinity for α1 less then phentolamine; b inhibition is less then propranolol; less tachy (reflex) then Propanolol. **KINETICS:** extensive first pass metabolism with 20-40% bioavailability, renal elimination of metabolites	**USE:** hypertension
β1 selective			
Metoprolol [lopressor]	oral: t1/2 - 3- 4 hr	no ISA, weak MSA; extensive metabolism with bioavailability of 40%; renal elimination of metabolite and unchanged (10%)	**USE:** Hypertension and phrophylaxtic for migraine
Atenolol [terormin]	oral: t1/2 - 5-8 hr	no ISA; highly hydrophillic (limited BBB Xing). **KINETICS:** excreted unchanged in the urine	**USE:** Hypertension
Esmolol [brevibloc]	IV: t1/2 = 8 mins	minimal ISA; causes hypotension in norm individuals. **KINETICS:** metabolism w/ plasma esterases; excreted in urine	**USE:** critically ill pts in which there is a need for rapid withdrawal of drug = hypertensive crisis
Acebutolol [sectral] - NOT a prodrug - Diacetolol - active metabolite	oral: t1/2 = 3 hr (A), 8- 12 hr (D)	has ISA and MSA. KINETICS: metabolized in liver to active metabolite Diacetolol; excreted in urine	**USE:** hypotension, ventricular arrhythmias

Chemotherapy of Parasitic Infections			
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Anti-Malarials		*sporazoites invade liver cells; Schizonts mature in liver; Merozoites from liver invade RBC	
Choroquine [Aralen]א - used also and an antiaemebial - not a prodrug, but has active metabolite	oral, parentral: t1/2 1-2 mo	**MECH:** uncertain concentrates in food vaculoes of parasite; Intercalation with parasite DNA/RNA; **Resistance** - alteration of drug transport resulting in a dec ability to concentrate in cells; **KINETICS:** Vd - 100-1000 l/kg; plasma protien binging - 50%; accumulates w/in erythrocytes. **METABOLISM:** active metaolite is monodesethylchloroquine - contributes to avtivity. **TOXIC:** GI - Nausea, vomiting, adbominal pain; CNS - headache, anorexia, malaise; Ocular and dermal - blurring of visions, opacification, retinopathy, urticaria, puritics; *discoloration in nail beds and mucous membrane* (conc in melanin tissue); prolonged neuropathy(prolonged tx); Hypotension, vasodilation, EKG changes - eventual cardiac arrest; Hemolysis and blood dyscrasias *(G-6-P difficiency)*	**USE:** non-falciform, and sensative falciform; blood schizonticide; gametocytes of vivax, ovale, malariae; effective only in erythrocytic phase; *Hepatic Amebiasis* **CONTA:** pregnancy, ocular disease, hepatic disease or severe GI, Neurological, blood disorders, G-6-P Dehydrogenase dificiency; Porphyria psoriasis
Hydrocychloroquine [Plaquenii]			
Mefloquine [lariam]	oral only; t1/2 - 20 days	**MECH:** theory ~ choroquine; moy form toxic complexes with free heme; resistance (like chloroquine). **KINETIC:** absorption enhanced by food; high distribution, 98% protien bound; excretion mainly feces, min urine, 5% excreted unchanged. **TOXIC:** GI (most common) - Nausea, vomiting, abdominal pain, diarrhea, dysphoria, diziness; ataxia, headache, EKG changes(AV block), severe neuropsychiatric rxn - disorientation, siezures, encepholopathy, psycosis	**USE:** prevention and tx of chloroquine resistance and multidrug resistant faliciform; effective blood schizonticide, mature trozoite and schizont forms; no activity against hepatic stages and mature gametocytes of faliciform or latent vivax. **CONTRA:** pregnancy; epilepsy, psychiatric disorders (perputuate siezures); cardiac disease (EKG changes); Quinine or quinidine hypersensativity (X allergic rxn)
Primaquine	oral only: t1/2 - 6 hr	Drug of choice for the eradication of dormant liver forms of vivax and ovalis; **MECH:** uknown - theory - generates reactive O2 (superoxides) species or interfereing with electron transport in parasite **KINETICS:** three active metabolites (1 antimalarial, 2 toxic - hemolytic anemia); renal elimination. **TOXIC:** Nausea, epigastric pain, abdominal cramps, headache, cardiac arrhythmias; hematological effects - mild anemia, methemoglobinemia, leucopeonia, agranulocytosis and leukocytosis (rare)	**USE:** terminal prophylaxis and radical cure of vivax and ovale (relapsing); ineffective agains falciform erythrocytic stage; marked gametocideal effect against all 4 species (esp falciform). **CONTRA:** Pregnancy, history of Granulocytopenia or methemoglobinemia, parenteral administration (b/c of severe inc K); G-6-P dehydrogenace difficiency; iodine hypersensativity (X react w/ drugs); SLE and Rheumatoid Arthritis

Quinine [QM-260; Quinamm]	oral or parentral (IV no longer used): t1/2 - 11 hr	from bark of cinchona tree. **MECH:** *Unknown* ~ chloroquine (inhibit heme polymerase. **KINETIC:** distribution - 1.5 l/kg; metabolism in liver, excretion is renal. **TOXIC:** VERY TOXIC! *Cinchoism* - tinnitis, headache, nausea, and blurred vision(take pts off @ this pt.); vomiting, diarrhea, abdominal pain, dec auditory acuity, photophobia, night blindness; hypersensativity RXN - blackwater fever (hemolysis, hemoglobinemia, and hemogloinuria); Hematologic Effects - hemolysis, leucopenia, agranulocytosis, and thrombocytopenia; severe hypoglycemia(b/c quinine inc. insulin release); stim of uterine contractions (esp 3rd trimester); severe hypotension **DRUG INTERACTIONS:** Digoxin (dec clearance - toxicity); oral anticoagulants - warfarin - inc toxicity b/c Quinine inhibits clottong factors formed by K); NM blocking Drugs - potentiates NM blocking effects; Cimetidine - inhibits metabolism - increases Quinine toxicity	**USE:** Falciform malaria; blood schizonticide, little effect on sporozoite or preerythocytic forms; gametocidal for vivax, malariae, but not falciparum. **CONTRA:** pregnancy(congenital malformation - catagory X), previous hypersensativity; hypoglycemia(b/c of insulin stim effect); tinnitus, optic neuritis; cardiac arrhythmias, G-6P dehydrogenase)
Pyrimethamine [Daraprim]	oral: t1/2 - 3.5 days	**MECH:** inhibits plasmodial dihydrofolate reductase (needed to form folic acid); resistance (mutation of enzymes). **KINETICS:** 87% protien bound, widely distributed with conc occuring in the liver and kidney; extensive metabolism. **TOXIC:** GI effects, skin rash, pruritis; thrombocytopenia	**USE:** erythrocytic forms of all species, not effective agains gametocytes, not effective agains liver stage of vivax and ovale **CONTRA:** anemia, pregnancy (crosses placenta), Breat feeding (folate dif in infants); IM injections - localized side effects
Pyrimethamine + Sulfadoxine [Fansidar]	Oral: t1/2 - 170 hr (sulf) & 90 hrs (Pyr)	**MECH:** inhibits plasmodial dihydrofolate reductase (needed to form folic acid-Pyrimethamine) and onhibit dihydropteroate synthetase (Sulfadoxine) **KINETICS:** Renal elimination. **TOXIC:** GI effects; skin rash, pruritis; dermal rxn - erythema multiforme (steven johnson syndrome - is a severe and sometimes fatal form of erythema multiforme, a disorder that occurs in response to medications, illness, or infections) and toxic epidermal necrolysis	**USE:** Suppression of malaria esp chloroquinine strains of faciparum; toxoplasmosis; pneumocytosis. **CONTRA:** *Infants <2mo*; hepatic/renal diseae; hypersensativity; megoblastic anemia; *pregancy*; breast feeding; IM; andy pre-existing anemia - folic acid dif.
Atovaquine; Proguanil [Malarone]	oral: t1/2 (A)=2 3 days and (P)=12-21 hrs	combo to treat falcipram. **MECH:** Atovaquone - interferes w/ mitochondrial electron transport and ATP and pyrimidine buisynthesis; Proguanil (prodrug) - *active metabilte Cycloguanil* inhibits dihydrofolate reductase-thymidylate synthase of plasmodia *(inhib DNA synthesis and folate depletion)*; **KINETICS:** A - 23% bioavailabilty; 99% protien binding; hepatic met; 94% excreted unchanged in feces; P - 75% protien bound; hep met by P4502c19 to cytoguanil; elimination mainly feces, minor urine	
Tetracycline - tertracycline antibiotic therapy		No effect in liver stage	adjunct to therepy in treament of erythrocytic schozonts of all malarial parasites
Doxycycline - tetracycline antibiotic therapy			
Anti-Protozoals			
Chloroquine [Aralen]א - see malaria			

Metronidazole [Flagyl] - antiamebial	oral: t1/2 = 7.5 hrs	**MECH:** *unkown* - toxic rxn from formation of reative products and interactions of these products with the DNA in anearobic bact and protozoans (nitro grp. Reduced inside bact or prot - forms reactive product; **Resistance** - dec reduction in these cells. **KINETICS:** well distributed (CNS and breast milk - high lipophilicity); metabolism - liver; excretion - renal. **TOXIC:** CNS -nausea, headache, dry mouth or metallic taste; vomitting, diarrhea, insomnia, weakness, dizziness, thrush, rash, dysuria, dark urine, vertigom paresthesia, neutropenia; pancreatitis, siezures, encephalopathy	**USE:** Amebiasis; Giardiasis; Trichomoniasis **DRUG INTERACTIONS:** alcohol (disulfram like rxn) - build up of acetoaldehyde - adverse rxn; Warfarin - inhibit metabolism of warfarin (toxicity); phenytoin, phenobarbital - inc hepatic enzymes - dec effect of drug; Cimetitidine - enzyme inhibitor - drug toxicity
Iodoquinol [Yodoxin] - antiamebial	oral: t1/2 - 11-14 hr	**MECH:** unknown - activity is limited to GI. **KINETICS:** 10/% absorbption, excreted renally as glucuronide conjugate. **TOXIC:** diarrhea, anorexia, nausea, vomitting, abdominal pain; headache, rash, pruritus; neurotoxicity - optic neuritis, optic atrophy, and peripheral neuropathy; alopecia and agranulocytosis (rare)	**USE:** Amebiasis **CONTRA:** do not use in the renally and hepatically impaired; pre-existing optic neuropathy, or iodine; Hypersensativity or hypersenstivity to 8-hydroxyquinolines
Pentamidine [Pentacarinat] - anti amebial; damdage to pancrease with prolonged use - as pancreas get more destoryed there is inc in secretions resulting in hyperglycemis)	Parenteral or inhalation: t1/2 2-4 wk	**MECH:** Unknown - theories: interfearance w/ incorpotation of nucloetides into DNA/RNA; inhibition of oxidative phophorylation and biosynthesis of DNA, RNA, protiens, and phospholipids; inhibition w/ formation of folates. **KINETICS:** widely distributed; 69% protien bound; metabolism unknown; renal emilination. **TOXIC:** (VERY) nephrotoxicity (25%) - renal tubule necrosis; hyperkalemia (prevents reabsorption of NA in distal tubule, K can't exchange with NA); hypotension, tachy; pancreatitis; hypoglycemia/hyperglycemia (reflection of pancreatic damage: hypogly→pancrease becomes more destroyed→inc secretions (hyperglycemia); dizziness , dyspnea; rash, metallic taste, fever, nausea, vomiting	**USE:** Pnuemosytosis, African Trypanosomiasis; leishmaniasis **CONTRA:** IM (bruising/bleeding)
Diloxanide Furoate [Furamide] - CDC only	oral	**MECH:** Unknown. **KINETIC:** hydrolyzed to diloxanide and furoic acid in the intestinal lumen or mucosa; unabsorbed diloxanide has local amebicide activity; excreted renally as conjugate metabolite. **TOXIC:** Flatulance, vomiting, pruritis, and urticaria	**USE:** asympotomatic Luminal Amebiasis. **CONTRA:** pregnancy; children <2 years of age
Dehydroemetine [Mebadin] - CDC only		Synthetic derived from Emetine (not available in US), natural product derived from Ipecac w/ amebicidal prps. **MECH:** unknown - theory - inhibits protien synthesis **TOXIC:** diarrhea, nausea, vomiting; polyneuritis, CV effects, Hypotension, congestive heart failure, arrhythmias	**USE:** extraintestinal amebiasis in pts who do not respond to or cannot receive metronidazole
Paromomycin [Humatin] - antibiotic for treatment	oral	**MECH:** direct amebicidal activity and indirect activity by interfering with the enteric flora essential for pathogen prolif. **KINETICS:** 100% fecal elimination; no extraintestinal efficacy. **TOXIC:** abdominal cramping and diarrhea	**USE:** Luminal Amebiasis. **CONTRA:** Aminoglycoside hypersensativity; GI obstruction and Ileus (retain in GI tract longer - liklihood of absorption)
Erythromycin - antibiotic for treatment		MECH: interferes w/ enteric flora essential for pathologic prolif of amoebae	

Anthelmintics		local or systemic - eradicate adult helminthes or developmental forms that have invadedd organs and tissues	**GENERAL CONTRAINDICATIONS**: pregnancy; ulcers of GI tract (b/c inc systemic absorption)
•BENZIMIDAZOLE	oral t/1/2: - A (8-12hr), M (2-6hr), T (1.2 hr)	**MECH:** impairment of glocose uptake by nematodes (inhibit microtubule synthesis) **KINETICS:** limited absorption; inc w/ fatty meal; Metabolized in liver; elimination fecal (A & M) and urine (M & T)	
Albendazole [Albenza] - compassionate use; Benzimidazole •		*ELIMINATION FECAL.* **TOXIC:** abdominal pain, diarrhea, nausea, dizziness, and headache; INC in serum aminotransferase activity, jaundice or chemical cholestasis (rare)	**USE:** Ascariasis, Trichuriasis, hookworm, pinworm, Stronglyoidiasis, Hydatid disease, Neurocysticercosis
Mebendazole [Vermox] - Benzimidazole•	**dec t1/2 inc toxicity**	*ELIMINATION FECAL AND URINE.* **TOXIC:** abdominal pain, diarrhea; Allergic rxn, alopecia, reversile neutropenia, agranulocytosis (rare)	**USE:** Ascariasis, Trichuriasis, hookworm, pinworm, cutaneous larvea migrans
Thiabendazole [Mintezol] - Benzimidazole•		*ELIMINATION URINE.* **TOXIC:** Dizziness, anorexia, nausea, votiming; epigastic pain, abdominalcramps, diarrhea, pruritus, headache, and giddiness; fever, rashes, erythema multiforme, hallucinations, sensory disturbances, steven johnson syndrome; angioneurotic edema, shock, tinntus, convulsions and intrahepatic cholestasis (rare)	**USE:** Stongliodiasis
Ivermectin [Mectizam] - retained in GI tract	oral: t1/2 16-27 hr	**MECH:** unknown, may paralyze the nematode and arthropods by intensifying GABA mediated trasmission signals in peripheral nerves (paralyzes N and A). **KINETICS:** excretion in feces unchanged (retained in GI tract). **TOXIC:** fatigue, nausea, vomiting, abdominal pain and rashes; *Mazzotti-like RXN* - due to dying microfilariae (milding itching and swollen, tender lymph nodes)	**USE:** Onchocerciasis; Stronglyoidiasis. **CONTRA:** pregnancy and breat feeding. **DRUG INTERACTIONS:** barbituated and benzodiazephines
Niclosamide [Niclocide]	oral	**MECH:** inhibits mitocondrial oxidative phosphorylation and inhibits glucose uptake in parasites. **KINETICS:** minimal absorption; fecal elimination (kept in GI for max effect). **TOXIC:** Nausea, vomiting, diarrhea, abdominal discomfort, anorexia, drowsiness, headache, rash	**USE:** Taeniasis (tape worm); Hymenolepsanan (dwarf tapeworm); intestinal flike infections
Piperazine	oral	**MECH:** Non depolarizing drugs that blocks Ach at the myoneural junction of the Ascaris Muscle, causing flacid paralysis of the worm. **KINETICS:** excreted renally unchanged. **TOXIC:** Nausea/vomiting, abdominal cramps; headache, dizziness, vertigo, ataxia, seizures (CNS); cateracts, blurred vision	**USE:** Ascariasis. **CONTRA:** epilepsy, renal dysfunction
Prazquantel [Bitricide] - mild CNS effect	oral: t1/2 - 2 hr	**MECH:** Inc. cell membrane permeability to calcium - inc muscular activity followed by contraction and spastic paralysis, dislodgement and death. **KINETIC:** Extensive first pass; *80% plasma protien bound*; elimination feces and urine; **TOXIC:** malaise, abdominal discomfort, anorexia, dizziness, headache, fever; transient elevation of liver enzymes	**USE:** Schistosomiasis; Clonorchiasis; Opisthorchiasis. **DRUG INTERACTION:** carbamazepine; phenobarbital
Pyrantel Pamoate [Antiminth]	oral	**MECH:** depolarizing nm bloackade of the nicotinic receptors - stimulates Ach release *and* inhibits ACHesterase @ ganglionic neurons w/l worm - resulting in paralysis, detachment, and expulsion. **KINETICS** poor absorption, activity limited to luminal oranism; fecal and renal elimination of unchanged drug and metabolites. **TOXIC:** GI - Nausea, vomiting, diarrhea, abdominal cramps; CNS -dizziness, drowsiness, headache, insomnia; rash, fever, weakness	**USE:** enterobius vermicuraris; Ascariasis; Hookworm and Trichostrongylus orientalis; trichinosis

Sulfonimindes		derivatives of sulfonilamide; **MECH:** sulfonamides are struc analogs and competative antagonist of PABA, inhibiting dihydropteroate synthare and dec synthesis of folic acid; *effective against bact that produce own folic acid*; bact that use preformed folic acid not affected; inc levels of PABA counteract bacteriostasis produced by sulfonimides (competative); Must get into cell to take effect **ANTI-BACTERIAL SPECTRUM:** (broad spectrum) E-coli, Strep. Pneumoniae, Strep Pyogenes, H. Influenza, H. Ducreyi, Yersinia pestis, Chlamydia trachomatis, Actinomyces, Nocardia asteroids, Plasmodium Falciparum, Toxoplasmosis Gondii. **TOXIC:** *Renal* - crystaluria (greater incidence w/ older compounds); *Hemetological effects* - G-6-P - acute hemolytic anemia, Agranulocytosis, aplstic anemia; *Hypersensativity rxn* - rashes (urticarial, erythema nodosum, erythema multiforme(steven-johnson type), exfoliative dermatitis, and photosensativity; Fever malaise, and pruritis; *Hepatic* - necrosis, hepatomegaly, jaundice, kernicterus (displaces bilirubin in newborns - causes encephalopathy); *GI* - anorexia, nausea, and vomiting	**Resistance:** alteraction in dihydropteroate synthase; inc metabolism of the sulfonamide by the bact, alternative mech for folate production; inc production of PABA (competative antagonism) **USE:** UTI (Primary Tx), Trachoma and inclusion conjunctivitis **DRUG INTERACTIONS:** Oral anticoagulant; oral sulfonyurea (hypoglycemic); Phynytoin; Tetracycline (side effect is photosensativity - potentiated); Local anesthetics - metabolite PABA formed, dec effectiveness; Acsorbic Acid - acidifies urine - inc crystalluria; Salicylates, NSAIDs - displaces sulfonimides; Methotrexate in some populations causes bone marrow suppression
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
rapidly absorbed/eliminated			
Sulfisoxazole [Gantrisin] - rapidly absorbed and eliminated; oral - 70-100% absorption; topical - limited absoption	oral and topical: t1/2 - 5 8 hrs	Highly protien bound, inc likelihood of displacement rxn (wide distribution); readily X's BBB; metabolized in liver - Acetylation (non-microbial metabolite) and Glucuronidation (anti-microbial metabolite); renal elimination - 70% unchanged; high soluability of drug decreases liklihood of crystalluria (insoluable in urine - obstruction)	**USE:** Trachoma and Inclusion Conjunctivitis; Nocardiosis
Sulfamethoxazole [Gantanol] - rapidly absorbed and eliminated	oral	metabolism - hepatic with a higher formation of crystalluria	**USE:** UTI; Trachoma and Inclusion Conjunctivitis; Nocardiosis
Sulfadiazine - rapidly absorbed and eliminated	oral	hepatic metabolism w/ renal elimination of uncharged drug and aceylated form (15-45%); Poor soluability of drug increases likelihood of crystalluria(slower rxn); less water soluable, higher precipatiation	**USE:** Combination w/ Pyrimethamine for treatment of toxoplasmosis and Malaria; Nocardiosis
Poorly abosrbed			
Sulfasalazine [Azaline, Azulfidine]* - poorly absorded; PRODRUG		Metabolized by intestinal bact to Sulfapyridine (responcible for toxic effect) and 5-aminosalicylic acid (mesalamine - anti-inflamitory; responsible for drug efficacy); *Phase 2 drug*. **TOXIC:** Nausea, fever, arthragias (severe joint pains), and rashes; Heinz-body anemia, acute hemolysis in pts w/ *G-6-P* dehydrogenase deficiency, and agranulocytosis	**USE:** ulcerative colitis and rheumatoid arthritis (*disease modifying agent - NOT 1st choice*). **CONTRA:** same as sulfonimide plus salicylate hypersensativity (asprin/NSAID allergy)
Sulfonimides for topical use only			
Sulfacetamide [isoptocetamide, Sulamyd sodium] - for topical use	opthalmic or topical	derivative of Sulfanilamide; inc soluability and stabe in solution at pH 7.4 allows it to be used in an opthalmic formulation (most sulfonimides have alkaline pH); 90% more soluable	**USE:** opthalmic infections **CONTRA:** persons w/ sulfer allergy
Silver Sulfadiazine [Silvadene] - for topical use	topical	**MECH:** does NOT inhibit folic acid synthesis; toxicity is due to disruption of the bacterial cell membrane and cell wall (silver contributes to toxicity) **TOXIC:** *sulfonamide profile + buring, rash, itching, and skin discoloration*	**USE:** Prophylaxically; topically to reduce microbial colonization and the incidence of infection of wounds from burns. **SENSATIVITY:** bacteria and yeast

Mafenide [Sulfamylon] - for topical use	topical	has Gram -/+ coverage. **TOXIC:** *intense pains @ site of application*, allergic rxn, and loss of fluids by evaporization from burn surface (not used w/ dressing - open site); Metabolic acidosis, hyperventilation *(ability to inhibit carbonic anhydrase - elimination of bicarbonate)*	**USE:** adjunctive therepy to second and third degree burns
Long Acting			
Sulfadoxine - long acting		**TOXIC:** severe, fatal, steven-johnson syndrome	**USE:** In combination with pyrimethamine for malaria and toxoplasmosis
SYNERGIST			
Trimethoprim-Sulamethoxazole [bactrim] - synergist - **Sulfonimide:** competative antagonist of PABA inhibiting dihydropteroate synthase and dec synthesis of folic acid; **Trimethoprim:** competative inhibitor of microbial dihydrofolate reductase, dec metabolism of folic acid to terahydrofolate and the precurso required in purine synthesis (does not form DNA).	Oral: t1/2 (T)=11 hr and S=10 hr	**KINETICS:** (T) is rapidly distributed on concentrated in tissue, @ 40% is bound to plasma protien in presence of (S); Vd of (T) is 9x (S); 65% of (S) is bound to plasma protien; renal elimination of uncharged drug and metabolite **TOXIC:** Megoloblastosis, leukopenia, or thrombocytopenia in pts w/ dec folic acid levels; derm - exfoliative dermatitis, steven johnsome syndrome and toxic epidermal necrolysis; *GI* nausea, vomiting, glossitis. and stomatitis (common*); mild and transient Jaundice (allergic cholestatic hepatitis); *hematological* - enemia (aplastic, hemolytic, macrolytic), coagulation disorders, granulocytopenia, agranulocytosis, purpura, Henoch-Schonlein purpura, sulfhemoglobinemia(dec in folic acid synthesis); nephrotoxicity	**ANTI - Bact sprectrum** - most gram -/+; E. colr, Proteus mirabilis, P. Morganii, P. rettgeri, Salmonella, Shigella, Brucella abortus, Chlamydia diphtheriae, N. Meningitis, N. Asteroides, Serratia, Klebsiella, Enterobacter species. **USE:** UTI, Resp. tract infect., GI infect, Infec by P. Carinii, Propylaxis in Neutropenic pts., nocardia infect., brucellosis. **RESISTANCE:** mutation of the enzymes.
Quinolones	oral: t1/2 = 3-10 hr	**MECH:** inhibition of toperisomerase II (DNA gyrase) and Toperisomerase IV - dec bacterial synthesis; resistance - alterination in enzyme binding sites, or dec premeability of drug into bact. **KINETICS:** bioavailability 80-90%, wide distribution, renal elimination (some feces)	**DRUG RXN:** Antacids - dec absorption (Al, Ca, Mg - kelate); Caffine and Theophylline - dec met - caffine/theopylline toxicity; Warfarin - drug displacement rxn - inc bleeding time; drugs which inc QT - interval (some Gen III); Digoxin - inc drug levels; retinoids - photosensativity potentiation; probenecids - sequesters release of quinolones - stops renal tublue secretion of quinolones
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
First Generation: Quinolones			
Cinoxacine [Cinobac] - 1st oral antibiotic	Oral	*suseptable org. :* enterobacter sp., E. coli, Klebsiella sp., Proteus Miribilis, Proteus vulgaris	**USE:** UTI caused by gram - org.
Nalidixic acid [NegGram]	oral	*suseptable org. :* enterobacter sp., E. coli, Klebsiella sp., Morganella morganii, Proteus Miribilis, Proteus vulgaris, providencia rettgeri, Salmonella sp., Shigella sp.	**USE:** UTI caused by gram - org.

Second Generation: Fluoroquinolones			
Norfloxacin [Noroxin] - mainly gram - , some gram +	oral and opthalmic SHORTEST t1/2	Poor oral bioavailability SUSEPTIBLE ORGS.: Citrobacter freundii; Enterobacter cloacae; E. coli; Klebsiella pneumoniae; Proteus mirabilis; Pseudomonas aeruginosa; Staph. Epidermidis; Indole + Proteus species (grm +) Groupd D strep; Neisseria gonorrhoeae. ****TOXIC:**** *GI* - nausea, vomiting, abdominal pain, anorexia; *Hepatic* - elevated hepatic enzymes, hepatitis, jaundice, pancreatitis (rare); *CNS* - headaches (2.9%), Dizziness (1.8), and Fatigue; Maculopapular rash; *hypersensativity rxn* - erythema multiforme and stenvens johnsons syndrome, and exfoliative dermatitis; Hematologic - hemolytic anemia, leukopenia, neutropenia, thrombocytopenia; Crstalluria (dose dependent)	**USE:** UTI; uncomplicated ponorrhea; bacterial conjunctivitis **CONTRA:** Previous hypersenstivity to any quinolone; pregnancy, breast feeing children <18 (tranfer to fetus - chill - joint pain/changes); tendon pain (rupture)*
Ciprofloxacin [Cipro]	Oral, parentral and topical	***BEST COVERAGE FOR PSUDOMONAS***. Suseptable org.: broad spectrum antiinfective agent, not effective against anaerobic organisms; most potent floroquinolone agains P. aeruginosa (no effect on anaerobic organisms). **TOXIC:** *GI* - nausea, vomiting, abdominal pain, anorexia; *Hepatotoxicity; CNS* - headaches (2.9%), dizziness (1.8%), and fatigue; RARE - siezures, inc intracranial pressure and toxic psychosis (has occured @ high concentrations); *Hypersensativity rxn* - maculopapular rash, fever, eosinophillia; can lead to jaundice, hepatic necrosis - DINCONTINUE USE	**USE:** bact. Conjucntivitis, bone and joint infection, lower respiratory infection, gonorrhea, typoid fever, sexually transmitted diseases, skin and soft tisse infections, UTI. **CONTRA:** ~Norafloxacin
Ofloxacin [Floxin]	oral, IV, opthalmic, otic	most complete oral bioavailability in class, highest renal elimination of uncharged drug; less potent then Ciprofloxacin; Most effective against gram - org.; **TOXIC:** *GI* - nausea, vomiting, diarrhea; *CNS:* Insomnia, headache, dizziness, drowsiness and dysarthria (slurred speech)	**USE:** UTI, Prostatitis; lower resp tract infect.; skin infect.; uncomplicated gonorrhea; non-gonococcal urethritis and cervicitis; otis media **CONTRA:** Same as Norfloxacin
Enoxacin [Penetrex]		more limited bacterial spectrum then other floroquinolones. Greatest effect on hepatic metabolism of other drugs; **TOXIC:** Same as Norfloxacin	**USE:** UTI; gonorrhea. **CONTRA:** Same as Norfloxacin
Lomefloxacin [Maxaquin]	Oral	long t1/2 allows *once a day dosing*, no food interactions (lesser incidence of interactions). **TOXIC:** greater incidence of phototoxicity; same as Norfloxacin	**CONTRA:** Same as Norfloxacin
Third Generation			
Moxifloxacin [Avelox]	Oral and IV	long t1/2 allows once a day dosing, no effect on P450. **TOXIC:** Q-T prolongation; same as Norfloxacin	**USE:** Bronchitis, Sinusitis, Pneumonia **CONTRA:** pts w/ QT prolongation; same as Norfloxacin
Levofloxacin [Levaquin] - levo isomer of Olfoxacin	oral, IV, opthalmic	once a day dosing. **TOXIC:** Same as Moxifloxzcin *BUT no QT prolongation	**USE:** Bact. Conjucntivitis, Sinusitis, Bronchitis, community-aquired pneumonia, skin and skin structure infect., UTI, Pyeloneprititis. **CONTRA:** same as Moxifloxacin
Gatifloxacin [Tequin]	oral and IV	an 8-methoxyfluroquinolone; broad spectrum once a day dosing; no interaction w/ hepatic P450 enzymes. **TOXIC:** Same as Moxifloxzcin	**USE:** UTI; Community-acquired pneumonia; acute sinusitis; gonorrhea. **CONTRA:** same as Moxifloxacin
Sparfloxacin [Azgam]	Oral	**TOXIC:** same as moxifloxacin and QT prolongation	**USE:** community aqired pneumoia; bronchitis. **CONTRA:** same as Moxifloxacin

Fourth Generation			
Trovafloxacin/Alatrofloxacin [Trovan] - alatrofloxacin is a prodrug	oral (T) and iv (A)	T is the active form of the drug; A is an iv formulation and a *PRODRUG* that is metabolized into active trovofloxacin **TOXIC:** elevation og hepatic enzymes and hepatic failure; same as moxifloxacin	**USE:** life of limb threatening infection for which the need for the antibiotic out weight the potential risk of hepatic disease **CONTRA:** hepatic disease ; same as moxifloxacin

Antiseptic and Analgesic Against for UTI			
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Methenamine [Hiprex] - degraded spontaneouly to formaldehyde	oral admin of enteric coated compound	**MECH:** @ low pH, spontaneous decomposistion to active form, formaldehyde, and ammonia occurs (broad spectrum use); renal elimination. **TOXIC:** GI (severe) effects include nausea/vomiting, diarrhea, abdominal cramps, stomatitis, and anorexia; dysuria, albuminuria, hematuria, and rashes; crystalluria(b/c of low water output)	**USE:** UTI **CONTRA:** renal insufficiency and hepatic Insufficiency(b/c inc ammonia accumulation); Dehydration - likelihood of crystaluria
Nitrofurantoin [Furadantin]	oral: t1/2 = 20-60 mins	**MECH:** reduction of parent drug to form highly reactive intermidiates that interact with bacterial DNA (alter DNA resulting in cell death). **KINETICS:** wide distribution, X's placenta, breast milk; Renal elimination, 40% unchanged. **TOXIC:** Pulmonary - cough, dyspnea, pneumonitis, pulmonary fibrosis , respiratory failure (occus quickly and severely); GI - nausea, vomtning, anorexia, diarrhea, and abdominal pain; rashes; CNS (widely distribtuted) - headaches asthenia, dizziness, drowsiness, nystagmus, and vertigo, peripheral neauopathy; hemolytic anemia; urine discoloration - brown; hepatotoxicity (rare)	**USE:** UTI. **ANTIMICROBIAL ACT.:** E. coli, enterococci. CONTRA: (pulmonary probs not a contra); renal impairment, oliguria, anuria (due to 40% unchanged); G-6-P dehydrogenase dificiency - hemolytic anemia; Pregnancy and caution breat feeding (to neonates).
Phenazopyrdine [Pyridium] - azo dye		provides analgesic action on the urinary tract, *NOT a urinary antiseptic*; **TOXIC:** Discoloration of urine - orange or red; Methemoglobinemia and hemolytic anemia; acute renal failure; hepatotoxicity; GI - nausea, vomiting	**USE:** decrease symptoms of dysuria, frequency, buring, and urgency. **CONTRA:** G-6-P dehydrogenase dificiency; hepatic disease; renal disease; uremia

Beta-Lactam Antibiotics		**MECH:** inhibition of cell wasll synthesis; Peptidoglycans is required comp of cell wall that maintains struct and rigidity of cell wall; cell wall prevents cell lysis; the *LAST STEP* is synthesis of peptidoglycan is the removal of terminal alanine from D-ala-Dala subtrate w/ transpeptidase; transpeptidase is catalyzed by penacillin;Beta-lactam form covalent bond w/ penicillin binding proteins inhibiting transpeptidase rxn; *ONLY WORK WHEN CELL IS GROWING.*	**RESISTANCE:** inactivation by beta-lactamases; modification of target protein; impaired penetration of drug to target penicillin binding protien(alter transport mech); presence of efflux pump (drug moved out of cell)
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Penicillins:	**Oral, parentral (IM, IV)**	**KINETICS:** oral absorption is dependent upon the stability of the compound in acid (most have rapid absorption; food delays reabsorption); Parentral (IM or IV) - absorption is rapid and complete; Distribution (liver, bile, kidney, semen, joint fluid, lymph, and intestine), w/ min penetration of BBB (except in inflamation, inc permeability) and wide range of plasma protien binding; Renal elimination. **TOXIC:** *hypersensativity rxn* - rash, urticaria, stevens-johnson syndrome, anaphylaxis; interstitial nephritis; phlebitis and thrombophlebitis (IV - irritating drug); *GI* - Nausea, vomiting Diarrhea, Psuedomembranous colitus (rare); *Neurotoxicity;* seizures (high enough dose); *Hema* - leukopenia, thrombocytopenia; *Electrolyte disturbances - hyperkalemia, hypokalemia* (pen G) **DRUG INTERACTIONS**: *probenecid* - dec renal elimination; *aminoglycosides antibiotics* - chemical antagonism *(kelate); methotrexate* - inhibit renal tubule secretion of methotrexate (toxicity of bone marrow suppression); *Potassium sparing diuretics* (Hyperkalemia - PEN G potentiates); *Warfarin* - dec W effectiveness; oral contraceptives	**Suceptible to:** inactivation by beta-lactamases; Susceptible - strep, meningococci, enterococci, pneumococci, Non-beta lactamase producing staphylocooi, tremponema pallidum (syphillis); bacillus anthracis; clostridium species,actinomyces **CONTRA:** previous penicillin hypersensativity; IV administration (Pen G procaine and Bezathine); procaine sensativity - *pts w/ cross hypersensativity w/ cephalosporins (10%)*
Penicillin G	IM, IV	TOXIC: Electrolyte disturbances - hyperkalemia, hypokalemia (pen G)	
Penicillin G Benzathine [Bicillin]	IM	extended release formulation	**CONTA:** IV
Penicillin G procaine	IM	extended release formulation	
Penicillin V	oral		
Antistaphylococcal Penicillins		Resistance to stalyococcal peniciilins; Suseptibille Orgs - Beta lactamase producing staph, strep, pneumococci	**USE:** bacteremia, soft tissue injections, bone and joint infections, UTI, upper respiratory infections
Nafcillin [Unipen]	oral and parentral	Hepatic Metabolism ~ 60%; excretion - bile and urine(minimal); less risk of nephritis **TOXIC:** Neutropenia	
Oxacillin [Bactocil]	oral and parentral	Better oral absorbtion compared to Nafcillin; less incidence of phlebitis from IV compared to Nafcillin; hepatic Metabolism ~50%; elimination by bile and urine; better oral absorption ten dicloxacillin - 2x; **TOXIC:** hepatotoxicity	
Cloxaciilin [Cloxapen]	oral and parentral	Hepatic Metabolism ~ 10%; excretion - bile and urine	
Dicloxacillin [Dynapen]	oral only	Hepatic Metabolism ~ 10%; excretion - bile and urine	
Extended Spectrum Penicillins: - ***Natural, greater coverage***		Greater efficacy against gram - org, inactivated by beta lactamases; *Susceptible orgs.* - strep, menigococci, enterococci, pneumococci, non-beta-lactamase producing staph, treponoma palladium, bacillus anthracis, clostridium species, actinomyces, listeria mocytogenes, salmonella species, gram negative cocci and bacilli	**USE:** otis media, sinusitis, bacterial cystitis, skin infection, upper resp tract infect, UTI

Carbenicillin [Geocillin]	Oral	1st extended release penicillin; renal elimination	**CONTA:** coagulopathy - show to inhibit platelet coagulability so don't give to hemophilliacs
Amoxicillin [Amoxil] - aminopenicillin	Oral	Better oral absorbtion compared to Ampicillin; Min hepatic Metabolism; Renal emimination; lesser incidence of GI side effect compared to Ampicillin; **TOXIC:** skin rash - non allergy - direct derm responce	
Ampicillin [Omnipen] - aminopenicillin	oral and parentral	renal elimination; **TOXIC:** skin rash - non allergy - direct derm responce	
Bacampicillin [Spectrobid]			
Mezlocillin [Mezlin]	parentral only	hepatic metabolism; renal and bile elimination;acid labile - destroyed by gastric secretions	
Piperacillin [Pipracil]	parentral only: t1/2 - 1 hr	hepatic metabolism; renal and bile elimination;	renal dysfunct - t 1/2 3-6 hr and hepatic dysfunct t 1/2 - 11 hrs
Ticarcillin [Ticar]	parentral only	more potent the Carbenicillin; hepatic metabolism; renal and bile emilination	
Cephalosporins -		Struc differences create a more stable drug which is more resistacnt to beta-lactamase and which have a broader spectrum of activity. **TOXIC:** hypersensativity rxn (same as penicillin) - anyphylaxis; fever, skin rashes, nephritis, granulocytopenia, hemolytic anemia, X allergy w. penicillins of 5-10%; GI - nausea, vomiting, diarrhea, pseudomembranous colitis (clostridium difficile); Local irrataiton @ site of injectiong (thrombophlebitis); renal toxicity - inerstitial nepritis and tubular necrosis; hypoprothombinemia (Cefmadole, Moxalactam, Cefmetazole, Cefotetan, Cefoperazone) - dec vit K absorption in GI tract - dec clotting factors; Disulfiram - like rxn (Cefmadole, Moxalactam, Cefmetazole, Cefotetan, Cefoperazone) - build up of acid aldehyde - nausea , vomiting, death	Super infection: eradication of normal bact - prolif of resistanct org and fungi. **DRUG interactions** - aminoglycoside - not a kelating effect - potentiate nephrotoxicity; probenacid - inhibit renal tubule secretion of cephalosporines; loop diuretics - potentiate nephrotoxicity. **CONTRA:** penacillin hypersensativity, cephalosporin hypersensativity
[First Generation] Cefadroxil [Duricef] - oral Cefazolin [Ancef] - IV, IM Cephalexin [Keflex] - oral Cephapirin [Cefadyl] - IV, IM Cepharadine [Anspor] - oral		**Suseptible Orgs**: (mostly gram + cocci) - Pneumococci, streptococci, stapylococci, (limited gram -) - E. coli, Klebsiella, H. Influenza; not effective against methicillin resistanct strains of staph; effect against anaerobic cocci. **KINETICS:** Wide distribution, does not X BBB at thereputic levels; renal elimination; dosage reduction required in pts w/ renal impairment	**USE:** UTI, Minor Staphyococcal lesions, cellulitis, surgical prophylaxis (cefazolin ONLY ONE)
[Second Generation] Cefaclor [Ceclor] - oral Cefamandole [Manole] - IV, IM Cefmetazole [Zefazone] - IV, IM Cefonicid [Monocid] - IV, IM Cefotetan [Cefotan] - IV, IM Cefoxitin [Mefoxin] - IV, IM Cefprozil [Cefzil] - oral Cefuroxime [Ceftin] - oral Loracarbef [Lorabid] - oral		Susceptible org: braod spectrum - same as first gen, extended gram - coverage **KINETICS:** widely distributed, does not penetrate the BBB, renal elimination, dosage reduction required in pts with renal impairment (renal insufficiency); Greates incidence of side effects (Cefamandole, Cefmetazole)	**USE:** UTI, Lower resp tract infect, peritonitis, septicemia, minor otapholocial lesions, cellulitis

[Third Generation] Cefdinir [Omnicef] - oral Cefixime [Suprax] - oral *Cefoperazone [Cefobid] - parentral Cefotaxime [Clatoran] - parentral Cefpodoxime proxetil [Banan]*- oral Ceftazidime [Ceptaz, Fortaz]- parentral Ceftibuten [Cedax] - oral Ceftizoxime [Cefizox] - parentral Cefditoren [Spectracef] - oral *Ceftriaxone [Rocephin] - parentral		more gram + coverafe; less gram - coverage; anearobic coverage; resistance to Beta-lactamase; **Suseptible oragaism** same as first and second gen; extended gram - coverage except for Cefoperazone; less potent then first gen for gram + coverage; NOT effective against hydrostable enterobacter chromosomal beta-lactamase; can see resistacne due to production of cephalosporinase from serratia providencia and citrobacter **KINETICS:** most penetrate the meneges @ thereputic levels; Renal elimination; dosage reduction in those with renal impairments	**Cefoperazone [Cefobid]** - extended gram - coverage except for Cefoperazone; *ELIMINATION* - bile and urine; **Ceftizoxime [Cefizox]** - *Longest* t 1/2 = 11 hrs; **Ceftriaxone [Rocephin]** - *ELIMINATION* - bile and urine. **USE:** gonorrhea, meningitis, sepsis, skine infections, upper resp infect.
[Fourth Generation] Cefepime [Maxipine]	Parentral	Susceptible org: (braod spectrum - *more resistant to some extended spectrum beta lactamases(MAJOR DIFFERENCE)* that inactive 3rd gen); P. arruginosa, Enterobacteriaceae, S. Auereus, S. Pneumoniae, Heamophilus, Neisseria, good act. w/ penicillin resistant strep **KINETICS:** good BBB penetration, renal elimination	**USE:** same at 3rd gen
Monobactams			
Aztreonam [Azactam]	IV: t1/2 = 1-2hr	**MECH:** same as penicillin. **KINETICS:** Plasma protien binding ~60%; wide distribution X's BBB and placenta; renal elimination **TOXIC:** *GI* - nausea and vomiting, Skin rashes, Elevation of serum aminotransferase; phlebitis (IV); Pseudmembranous Colitis	Spectrum for: *gram - only* **USE:** UTI, lower respiratory tract infections; Septicemia
Carbapenems		Struct related to Beta-lactam antibiotics (resistanct to hydrolysis); less potential for hydrolysis by beta-lactamases; NOT resistant to metallo beta lactamases ass w/ - enterococcus faecium*, meth resistant staph*, Clostridium difficile*, Burkholderia cepacia*, stenotrophomonas maltrophilia resistanct. **MECH** - inhibit cell wall synthesis **KINETICS:** Wide distribution, X's BBB and placenta, low protien binding, Renal elimination **TOXIC:** nausea, vomiting, diarrhea, skin rashes, infusion site rxn(thromboplebitis, phlebitis), seizures (BBB Xing), esp real compromised pts	**USE:** infection resistant to other drugs, UTI, Lower respiratory tract infec, pen resistant strain pneumococci, enterobacter infections, septicemia, bone and joint infections, endocarditis (stap aureus), childhood bact meningitis [Meropenem only] **CONTRA:** pen & cephalosporin hypersensativity, X senstivity
Imipenem/Cilastatin [Primaxin]		metabolized in the renal tubules by dehydropeptidase to toxic metbolites - renal damage; *co-admin w/ Cilastin* (dyhydropeptidase inhibitor); good penetration into bact, resistant to beta lactamases	Spectrum for activity: gram negative rods, gram positive org, anaerobes
Meropenem [Merrem IV]	IV only	Does not require renal dehydropeptidase inhibitor, less gram + activity compared to imipenem.	
Erapenem [Invanz]			

Beta-Lactamase Inhibitors: Clavulanic Acid & Sulfactam & Tazobactam		**MECH:** resembles beta lactam struct, but have weak antibact action (activity depends on antibact its paired with); potent inhibitor of many bact beta lactamases; most active against plasmid encoded beta lactamases - stph, H. influenza, N. gonorrheoeae, Slomonella, Shigella, E. coli, Kleb pneumoniae; Effective in chromosomal beta lactamases for legionella*, bacteroides, branhamella; NOT effective in chomosomal beta lactamases for Enterobacter*, Citrobacter*, Serratia*, Pseudomonas*; available in fixed combination products;	1) Ampicillin/subbactam sodium [Unasyn]; 2) Amoxicillin potassium clavulanate [Augmentin]; 3) Piperacillin and tozobactam sodium [Zosyn]; 4) Ticarcillin and clavulanate potassium [Timentin]
Misc. Inhibitors of cell wall synthesis			
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Vancomycin [Vancocin] - Renal elimination is really long	Parentral glycopeptide antibiotic: t1/2 - 6 - 10 days	**MECH:** same as Pen; *NOT A BETA-LACTAM* ; Resistance - modification of D-ala-D-ala binding site; **KINETICS:** Oral -poor, IV - used most often; Wide distribution, X's BBB; Renal elimination **TOXIC:** Phelbitis; Chills, fever; Ototoxicity - MAJOR SIDE EFFECT; Red - neck syndrome - flushed neck due to histamine flush; **DRUG INTERACTIONS:** Cholestyramine - kelate vanco and dec absorption; Aminoglycosides - potentiate ototoxicity and renal toxicity	**Spectrum:** gram + only, particular staphyococci; **USE:** Sepsis, endocarditis caused by methicillin resistant staph, antibiotic associated entercolitis causeby clostridium difficile (Per os)

ANTI-VIRAL AGENTS:			
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Antiherpes and Anti-CMV agents			
Acyclovir [Ziagen] - Acyclic guanosine derivative	IV, topical; *Oral: t1/2 = 3-4 hr*,	**MECH:** three phosphorylations - 1) in virus - concversion to monophosphate derivative by ***thymidine kinase***; 2) in host - conversion to diphosphates and triphosphates (competative inhibition of deoxy GTP for viral DNA polymerase and Binding to DNA template - resulting in chain termination). **KINETICS:** Bioavailability: 15 - 20% (oral); widely distributed X's BBB; elimination - renal. **TOXIC:** Nausea, diarrhea, heaches (*GI -most common*); Renal insufficiency and CNS effects - tremors and delirium (doses are higher, fast infusion rate = IV)	**RESISTANCE:** alteration of thymidine kinase or DNA polymerase. **USE:** HSV-1, hsv-2, Vericella
Valacyclovir [Valtrex] - Prodrug - ester of acyclovir - remember the herpes comercial with the hot girls… oh baby		**MECH:** converts to acyclovir for activity; **KINETICS:** >absorption with serum levels 3-5 x greater then Oral Acyclovir, and is almost = to IV Acyclovir. **TOXIC:** = Acyclovir	**USE:** HSV, Vericella, CMV
Famciclovir [Famvir] - diacetyl ester derivative of penciclovir Penciclovir [Denavir]	oral(F), topical(P)	. **MECH:** Famciclovir is a prodrug of Panciclovir, req hepatic metabolism; Penciclovir required the same three phosphorylation steps as Acyclovir *EXCEPT* - triphosphate form blocks DNA synthesis via competative inhibition of viral DNA polymerase only (*NO* effect on chain termination); X resistance with Acyclovir, Valacyclovir, and Ganciclovir. **KINETICS:** Bioabailability = 70%, elimination is renal. **TOXIC:** Nausea, Diarrhea, Headache	USE: HSV
Ganciclovir [Cytovene] - Acyclic guanosine analog that	oral and IV t1/2 - 2-4 hr	Req. triphosphorylation for activation. **MECH:** ~ Acyclovir (EXCEPTION - enzyme used for initial step is dependent on virus targeted); *CMV* - protein kinase phosphotransferase UL97; *HSV* - viral thymidine kinase. **KINETIC:** poor oral bioavailability (6-9%); wide distribution - X's BBB; Renal clearance; **TOXIC:** *NEUTROPENIA* (20-40%); CNS - headaches, mental status changes, siezures; Carcinogenic and embryotoxic (Catagory 'C') in animals; GI side effects	USE: CMV
Cidofovir [Vistide] - Cytosine nucleotide analog	IV: t1/2=2-3 hr	**MECH:** the *phosphorylation step* does **not** req the viral enzyme; competative inhibiton of the DNA synthesis via inhibiton of DNA polymerase and false incorporationin the viral DNA chain (~ Acyclovir); **KINETICS:** Renal elimination. **TOXIC:** Nephrotoxicity(w/in 1-2 doses), ocular hypotony (12%); RARE - NEUTROPENIA and metabolic acidosis (directly related to nephrotoxicity)	**RESISTANCE:** pt mutation in the DNA Polymerase; X resistance seen w/ Ganciclovir. **USE:** administered with Probenicid to dec renal tubular secretions (w/ CMV) **CONTRA:** *creatinine > 1.5 mg/dl; creatinine clearance <55ml/min; urine protien >2+ (b/c of potential of nephrotoxicity)*
Foscarnet [Foscavir] - Inorganic pyrophosphate compound	IV: t1/2=4-7 hr	**MECH:** does not require phophorylation; Direct inhibition of DNA polymerase, RNA polymerase, and HIV reverse transcriptase. **KINETICS:** wide distribution, X's BBB; Renal elimination. **TOXIC:** Renal insufficiency, *CNS:* headache(30%), hallucinations and siezures(10%); GI: 50% - nausea and vomiting	**RESISTANCE:** Pt mutation in the DNA Polymerase gene (HSV and CMV); mutation in HIV-1 reverse transcriptase gene. **USE:** HSV, CMV

Fomivirsen [Vitravene]	intervitreous	**MECH:** Binds to target mRNA resulting in inhibition of immediate early region 2-protien synthesis. **KINETICS:** Admininstered intervitreally (w/in vitreous humor). **TOXIC:** Iritis; vireitis; increased ocular preassure	**USE:** *CMV retinitis* in AIDS pts
Trifluridine [Viroptic] - a fluorinated pyramidine nucleoside	opthalmic topical	(interaction w/ DNA synthesis). **MECH:** req triphosphorylation; competes with thymidine triphosphate for false incorporation into the DNA by DNA polymerase. **KINETICS:** opthalmologic topical. **TOXIC:** Ocular irritation - buring, stinging, sandy feeling; Increased intraocular pressure	**USE:** keratoconjunctivitis and epithelial keratinitis due to HSV-1 and HSV-2
Vidarabine [Vira-A] - an adenine arabinoside and is an adenosine analog.	topical ointment	**MECH:** phosphorlyation by host enzyme to ara-ATP (~Acyclovir); the ara-ATP inhibits viral DNA polymerase; ara-ATP is falsely incorporated into the viral and host DNA = cell death). **KINETICS:** rapid metabolism to hypoxanthine arabinoside by adenosine deaminase. **TOXIC:** limited side effects because it is just topical	**USE:** HSV-1; HSV-2; Epstien-Barr virus, Varicella
Antiretroviral agents: ***Nucleoside Reverse Transcriptase Inhibitors (NRTIs)***		**MECH:** require s the same three phosphorylation steps as Acyclovir (EXCEPT final interaction differs) - competative inhibiton of HIV1 reverse transcriptase and incorportatuon into viral DNA chain	**USE:** most have activity against HIV-1 and HIV-2
Zidovudine [AZT, Retinovir] - synthetic thyamine AZT = Azidothymidine - (a deoxythymidine analog)	Oral and Parentral: t1/2 1 hr	**KINETICS:** wide distribution including CNS; high protien binding 35%; hepatic metabolism; renal elimination. **TOXIC:** Myelo-suppression (anemia, neutropenia, thrombocytopenia); GI- intolerance; Headaches, insomnia; Hyperpigmentation of nails; Myopathy - long chronic use; Rare fatal lacticacidosis and severe hepatomegly (every reverse transcription inhibitor)	**USE:** HIV
Didanosine [Videx] - synthetic analog of deoxyadenosine	Oral: t1/2 <1.5 hr	**KINETICS:** food decreses AUC; wide distribution including the CNS; plasma protien binding <5%; renal elimination. ***Toxic:** Pancreatitis (dose dependent) - major side effect; peripheral distal neuropathy (tingling in hands); *Diarrhea* - 25% of pts get this *GI* side effect; Hepatitis; esophageal ulcerations; cardiomyopathy; hyperuricemia; retinal changes; *[rare reports of lactic acidosis or severe hepatomegaly (indication of removal)]*	**USE:** HIV
Lamivudine [Epivir] - is a cytosine analog	orally only: t1/2 - 2.5 hrs	**KINETICS:** *NO FOOD INTERACTION*; Bioavailability >80%; wide distribution, X's BBB; Plasma protien binding <5%; renal elimination. TOXIC: headache, insomnia, fatigue (most common -30%); *GI* discomfort	**USE:** HIV and Hepatitis B
Zalcitabine [Hivid] - is a cytosine analog	orally only: t1/2 - 2 hrs	Less effective against HIV-1, used in combination with Zidovudine. **KINETICS:** food dec absorption (dec peak levels up to 39%); antacids dec absorption; wide distribution, X's BBB; plasma protien binding <2%; renal elimination. **TOXIC:** periperal neuropathy(50% - most common); oral and esophageal ulcerations (stomotitis - mouth); **Pancreatitis* (less then didanosine); Headache, nausea, rash, and arralgias (CNS); (RARE - cardiomyopathy, lactic acidosis with severe hemmorage)	**USE:** HIV
Stavudine [Zerit] - a thymidine analog	oral only: t1/2 - 3.5 hrs	**KINETICS:** high bioavailability - 80%; no food interactions; negligable plasma protien binding; wide distribution, X's CNS; renal elimination. **TOXIC:** peripheral sensory neuopathy, rash (potentiation - 52%); pancreatitis; *skin rash (very common)*; elevation in serum transferase levels; (*RARE* - cardiomyopathy, lactic acidosis with severe hematomegaly)	**USE:** HIV

Abacavir [Ziagen] - Guanosine analog that is more effective than other agents w/in this class	oral only t 1/2 - 1.5 hrs	Not metabolized by P450. **KINETICS:** good absorption - 83%; no food interactions; 50% plasma protien binding; wide distribution, X's BBB; metabolized by alcohol dehydrogenase and glucuronosyltransferase to inactive metabolites. **TOXIC:** Fatal hypersensativity rxn = 2-5% (multiple organ systems from mild to extreme, fever, malaise, GI complaint, skin rash); nausea, vomitning, diarrhea, headache, fatique (most common); infrequent - pancreatitis, hyperglycemia and lactic acidosis	**USE:** HIV
Antiretroviral agents: ***Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs)***		**MECH:** they do not require phosphorylation for activation; they do not compete with the endogenous nucleoside triphosphates; bind (different site) to viral reverse transcriptase that is so close to but different from the binding sites used by the nucleoside reverse transcriptase inhibitors; *this results in a blockade of RNA and DNA dependent DNA polymerase activity; little cross risitance seen w/in this class, the nucloeside reverse transcriptase inhibitors class or protease inhibitors (good)	**USE:** HIV-1
Nevirapine [Viramune]	oral only	good absorption - 90%; no food interactions; 60% plasma protien binding; wide distribution, X's BBB; Metabolized by CYP3A P450 to inactivate metabolites (inc and dec effectiveneess using hepatic inhibitors/promotors); renal elinimation. **TOXIC:** Mild to severe life threatening skin rashes(1-2 months 30% require hospitalization); fever, nausea, headache, somnolence, fulminant hepatitis	**USE:** HIV
Delavirdine [Rescriptor]	oral only	**KINETICS:** good absorption - 85%; extensive plasma protien binding - 98%; wide distribution with limited penetration of CNS; Extensive Hepatic metabolism by CYP3A P450 and CYP2D P450; Able to inhibit its own metabolism therefore caution in pts with hepatic surgery. **TOXIC:** skin rashes (35%) first month; 5% of incidences - headaches, fatigue, nause, diarrhea, inc serum aminotransferase levels	**USE:** HIV
Efavirenz [Sustiva]	oral only: t1/2 - 40-55 hrs	Formally known as DMP 266. **KINETICS:** good absorption 45% (inc 65% w/ fatty meal); wide distribution w/ limited penetration into the CNS; extensive hepatic metabolism by CYP3A4 and CYP2B6 P450 enzymes to inactivate metabolite; Elimination - feces. **TOXIC:** CNS(50%) - drowsiness, dizziness, insomnia, headaches, confusions, amneisiaagitation, delusion, depression, nightmares, euphoria; Skin rashes (28%) resolves w/ continuation of medication; nausea, vomiting; diarrhea; elevated liver enzymes; inc serum cholesterol	**USE:** HIV **CONTRA:** congenital malfomation in primate test
Protease Inhibitors		imp role in viral replication in the late stage protien synthesis of HIV growth cycle. **COMMON SIDE EFFECTS**: *cushing's-like syndrome* of abnormal fat distribution, insulin resistance and hyperlipidemia; inc bleeding in hemophilia (spontaneous)	
Saquinavir [Inverase, Fortovase]	oral only: t1/2 - 12 hr	**KINETICS:** poor absorption - 4% (I), 12% (F); extensive plasma protien binding - 98%; wide distribution with limited penetration of CNS; Extensive first pass *CYP3A P450*; elimination - feces. **TOXIC:** *GI* - nausea, diarrhea, abdominal discomfort, dyspepsia; headache, lethargy, dizziness	**USE:** HIV

Ritoavir [Crixivan]	oral only: t1/2 - 3-5hr	**KINETICS:** High bioavailability - 75% inc when taken with food; Wide distribution with limited penetration into the CNS; extensive metabolism by P450 enzymes to inactive metabolites; Elimination - feces. **TOXIC:** nausea, vomiting, and abdominal pain (30%); Asthenia, fever (15%); paresthsia; Elevated serum aminotransferase levels; Hyperlipidemia (45%) - cushingnoid effect	**USE:** HIV
Idinavir [Crixivan]	oral	**KINETICS:** high bioavailability - 60% dec when taken with food; Wide distribution good, with penetration into the CNS; extensive metabolism by P450 enzymes to inactive metabolites; Elimination - feces. **TOXIC:** hyperbilirubinemia and nephrolithiasis; thrombocytopenia; elevation in serum transferase levels; nausea, diarrhea, *hemolytic anemia*.	**USE:** HIV
Nelfinavir [Viracept]	oral: t1/2 - 3.5-5hr	**KINETICS:** food inc absorption; extensive first pass by CYP3A P450; Elimination - feces. **TOXIC:** principle side effects; flatulance and diarrhea GI.	**USE:** HIV
Amprenavir [Agenerase]	oral: t1/2 - 3.5-5hr	**KINETICS:** no effects on absorption is seen with food; P450 metabolism. **TOXIC:** Rash; Paresthesia; Nausea, vomiting, diarrhea (GI)	**USE:** HIV
Anti-Influenza Agents			
Amantadine [Symmetral] - orthostatic hypotension; peripheral edema (Amantadine - 5% of pts) Rimantadine [Flumadine]	oral	Mantadine is the derivative of Amantadine. **MECH:** Inhibition of the uncoating of viral RNA reventing viral replication; Specifically targets the M2 protien within the viral membrane that is specific for the influenza A virus (Influenza B does not have M2) **TOXIC:** GI intolerance (b/c is it oral); CNS - dizziness, anxiety, impaired coordination, insomnia, nervousness;	**USE:** prophylaxis and treatment of Influenza A, in high risk pts - 50-90% efficacy
Rabavirin [Virazole]		**MECH:** Phosphorylation by the host cells' enzymes is essential - interferes w/ Guanosine triphosphate synthesis; inhbiits capping of viral messenger RNA; inhibits viral RNA-dependent RNA polymerase. **TOXIC:** Primary side effect is *Hemolytic anemia (10% of pts)*; psychiatric side effects (depression, suicidal behavior); tetrogenic in animals*(CATAGORY X - embryocidal)*	USE: Influenza A and B; Respiratory Syncytial Virus (RSV)
Zanamivir [Relenza] Osteltamivir [Tamiflu] - PRODRUG	Inhalation(Z), oral(O)	**MECH:** Inhibiton of Neuaminidase, the enzymes essential for viral replication and release from the host cell. **KIETICS:** (Z) has limited plasma protien binding and rapid renal elimination; (O) is a pro-drug metabolized in the GI tract and liver to its active form; Renal elimination. **TOXIC:** (GI for Z and O are ~); (Z) - **GI:* diarrhea, nausea, vomiting; Sinusitis, bronchitis, cough, nasal congestion (seen alot); (O) - **GI* - diarrhea, nausea, vomiting; bronchitis (seen more often then placebo group); Insomnia, vertigo	**USE:** influenza A and B

Aminoglycosides - derived from streptomycete; 2 or more amino sugar w/ glycosidic linkages to a hexose nucleus	oral, topical, parentral (IM, IV)	**MECH:** Often used with beta-lactam antibiotics to enhance activity (better penetration into cell but at high concentration both become chemical antagonist); Irriversible inhibition of protien synthesis (passively diffuse through the porin channels of the bact cell wall, then by energy and O2 dependent transport through cell membrane); irriversibly binds to 30S ribosome (except Streptomycin - binds 12S); cell membranes becomes leaky - lyse -cell death. **KINETICS:** Oral absorption is poor(,1% bioavailability); Distribution limited distribution into cells due to ionic properties; negligable binding to plasma protiens; Vd - 25%; poor CNS penetration; X's placenta and by breat milk; Acc. in reanal cortex and inner ear; Renal elimination. **TOXIC:** Ototoxicity - tinnitis, vertigo, deafness; nephrotoxicity - protienuria, hyaline and granular cast, reduction in glomerular filtration rate, actue tubular necrosis; NM blockade and apnea; Peripheral neuritis - injection directly into nerve; paresthesia - 30-60 mins after administration and last hrs; hypersensativity rxn - rash, blood dyscrasias; anaphylaxis; psudomembranous colitis (oral only)	**RESISTANCE:** failure of permeation of antibiotic (must have high conc. In cell); low affinity of drug to bact ribosome; inactivation of drug by microbial enzymes(most common). **SPECTRUM:** gram - baccilli, minimal effect on anaerobic bact **CONTRA:** Amninoglycoside hypersensativity rxns; intestinal obstructive or ulcerative lesions; pregnancy (deaf child); renal impaiment (nephrotoxicity). **DRUG INTERACTIONS:** Gen Anesthetics; NM blockers; loop diuretics(ototoxic); Nsaids and Salicylates and Cephalosporins and Vancomycin (nephrotoxic)
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Streptomycin*	IM	least effective antibiotic of gram - rod (resistance); high ototoxicity; used in combination (beta lactams)	**USE:** streptococcal or Enterococcal endocarditis(used w/ penicillin); Tularemia; plague; tuberculosis
Gentimicin [Geramycin]	IM, IV, Topical, Interthecal	**No anerobic effect**; gram negative antibiotic derived from Actinomycetes Micromonospora	**USE:** Sepsis, Pneumonia, Endocarditis, Skin Lesions, burns (topical); meningitis, Peritonitis
Tobramycin [Nebcin] - Parentral; [Tobrex] - opthalmic	IM, IV, Opthalmic	Similar spectrum of antimicrobial activity to Gentamicin (similar Gram - ability BUT less activite againts Serratia, more active against pseudomonas)	**USE:** Same as gentamicin
Amikacin [Amikin]	IM, IV	Synthetic derivative of Kanamycin; less side effects then Kanamycin (nephro and ototoxicity Is less); Broad spectrum agains Gram - Activity, no effect against gram + anaerobic activity; Resistant to Aminoglycoside-inactivating enzymess	**USE:** same as gentimicin; Nosocomial gram - bacillary infection in hospitals where resistance to gentamicin and tobramycin; disseminated atypical mycobacterial infection in AIDS pts
Netilmicin [Netromycin] - newest	IM, IV, Topical, Interthecal	gram - antibiotic derived from Actinomycetes Micromonospora; synthetic derivative of sisomicin; no \anaerobic effect; resistant to Aminoglycoside-inactivating enzymes;	**USE:** same as gentimicin
Neomycin [Mycifradin] - different then the rest		Gram - and gram + (broad spectrum); limited oral and topical use - *SEVERE* renal and otic toxicity w/ parentral tx; Elimination in feces (unabsorbed), urine (absorbed)	**USE:** Skin infection; *preparation for elective bowel surgery*; hepatic coma
Kanamycin [Kantrex]	oral, parentral	b/c of toxicity and emergence of resistance - limited use; gram - antibiotic; *elimination via feces (unabsorbed) and urine (absorbed)	**USE:** Tuberculosis; hepatic coma
Spectinomycin [Trobicin]	IM	Aminocyclitol antibiotic prodced by streptomyces spectabilis; struc related to aminoglycosides **MECH:** same as aminoglycosides; Broad spectrum activity. **TOXIC:** Insomnia, dizziness; Urticaria, puritus; nausea, vomiting; chills, fever; Anaphylaxis (any drug)	**USE:** Acute gonorrheal urethritis in males; acute gonorrheal cervicitis and proctits in females
Paromomyin [Humatin]			

Tertracycline Antibiotics		**MECH:** inhibit bact protien synthesis by ***1)*** enters bact cell via passive diffusion through porion channels in the membrane and through an energy dependent active transport pump; ***2)*** the tetracycline concentrates w/in the bacterial; ***3)*** reversibly binds to the **30S** bacterial ribosome and prevents the aminoacyl tRNA from binding to the acceptor site on the mRNA-ribosome complex, resulting in inhibiton of protien synthesis. **TOXIC:** *GI* - nausea, vomiting, diarrhea (*severe enough for discontinuation*); esophagitis, esophaeal ulcers, Pseudomembranous Colitis; Dizziness, Vertigo(vestibular effectsDoxycycline); Discoloration of teeth(binds to Ca+); Growth deformation(b/c binds to Ca+ in bones); hepatic necrosis (high IV dosages); Renal Tubular Necrosis - Fanconi Syndrome (out dated teracycline); photosensativity (demicocycline); Pseudomembranous cerebri (benign in in intracranial pressure ass w/ children); Hypersensativity rxn. **DRUG INTERACTIRONS:** Food - *kelate;* Divalent cations; Dairy products (Ca+); Alkaline pH; Antacids - bind to tertacyclines and decrease their absorption; Cimetidine - dec absorption of tetracyclines due to changes in pH; Digoxin - tetracyclines can alter GI flora DECREASING amt of digoxin absorbed; *Iron Salts* - bind to tertacycline and dec GI adsoprtion); *Litium* - can inc/dec litium concentrations; *Methoxyflurane* - additive nephrotoxic effects; *Oral contraceptives* - dec effectiveness - results in break through bleeding or pregnancy - enterohepatic recirculation; Bleeding, pregnancy; Sulfonimide - potentiates photosensativity	**RESISTANCE:** ***1)*** dec conc in bact(efflux pump is primary method); ***2)*** alteration of ribosomeal protiens(can't bind, can't inhibit); ***3)*** enzymatic degradation **Spectrum:** tetracyclines are broad spectrum; bacteriostatic, aerobic and anaerobic gram +/- orgs, rickettsiae, mycoplasmas, chlamydiae. **USE:** Rickettsial infection (RMSF), mycoplasma, chlamydia, psittacosis, trachoma, STD's, brucellosis, Tularemia, Cholera, Acne
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Chlortetracycline [Aureomycin] - short acting	oral, topical (1° use), opthalmic; t1/2 = 6-8 hr	*use limited* to topical and opthalmic routes of administration b/c of the low oral bioavailability. **TOXIC:** Burning, stining, pruitus, rsh, nausea, vomiting, headache	
Tertracycline [Panmycin] - short acting	oral, topical; t1/2 = 6-8 hr	Produced semisynthetically from chortetracycline; oral bioavaillability is 60-70%; wide distribution - bones, CNS, placenta, and breast milk; NOT metabolized; excreted in the feces	
Oxytetracycline [Terramycin] - short acting	Oral and IV; t1/2 = 6-8 hr		
Demeclocycline [Declomycin] - intermediate acting	t1/2 = 12 hr	Product of mutant strain of Strep. Aureofaciens; *Main clinical use if to *treat inapporpriate secretion of ADH secondary to its ability to produce nephrogenic Diabetes Incipidus*; *Photosensativity* is more frequent and more severe then with other tetracyclines; not metabolized; renal elimination. **TOXIC:** as above PLUS polydipsia and polyuria	
Doxyxycline [Doxy] - long acting	oral, IV, Subgingival; t1/2 = 16-18 hr	Semisynthetic derivatives tetracycline dervived from oxytetracycline; tetracycline of choice in pts with poor renal function due to its limited renal clearance; Oral absorption ~ 95-100%; *NO food interactions*; more lipid soluable then short and intermidiate acting tetracyclines; less penetration into the CNS; NOT metabolized; elimination - feces; Neutropenia and eosinophillia - chronic useage; drug interaction with *CP450 inducers (effect t1/2)*	

Minocycline [Minocin] - long acting	oral, IV; t1/2 = 16-18 hr	Semisynthetic derivativves, *most lipid soluable* and considered the most active of this group; oral absorption ~95-100%; minimal hepatic metabolism (partially metabolized); excretion bile and urine(4-19%); *Lupus like symptomes have been seen (autoimmune rxn)*	
Macrolide Antibiotics		**MECH:** Bacteriostatic agents; inhibit protien syntheis by *binding reversibly to the **50S*** ribosomal subunits of sensative microorganisms **Spectrum of activity:** Bacteriostatic (low dose) and Bactericidal (high dose); broad spectrum (gram +>-); Stapylococcus aureus; Streptococcus Agalactiae; S Pyogenes; S. pnumoniae; S. Viridans; Corynebacterium diptheria, clamydia trachomatis; entamoeba histolytica; listeria monocytogenes; borrelia burgdorferi; mycoplasma pneumoniae; treponoma pallidum; ureaplsma urealyticum - (no effet on virus, yeast, fungi) **TOXIC:** Hypersensativity rxn - fever, eosinophilia, and skin eruptions; cholestatic hepatitis (erythromycin estolate) - nausea, vomiting, dbominal cramps, jaundice w/ fever, leukocytosis, eosinophilia, and elevated activites of transaminases; Epigastric distress - abdominal cramps, nausea, vomiting, and diarrhea; Thrombophlebitis - IV) **DRUG INTERACTIONS**: + Ergot alkaloids, digoxin, warfarin, theophylline = inhibits P450, therefore inc t1/2	**RESISTANCE:** ***1)*** decrease in the permeation of the drug (efflux); ***2)*** Dec drug bindingto the ribosomal sub unit via production of methylase enzzyme; ***3)*** hydolysis of macrolides by esterases; ***4)*** mutation of the 50S ribosomal protien. **USE:** Mycoplasma pneumoniae infections; legionnaires' disease; chlamydia infections; diptheria; pertussis, streptococcal staphylococcal, campylobacter, tetanus, syphilis, gonorrhea, Atypical mycobacterial infections; Rhumatic Fever (prophylaxis); Penicillin-allergic pts - prevention of endocarditis (Clinamycin)
Name	**ADMIN**	**INFO**	**USE/CONTRA/RXN's**
Erythromycin* - Prototype	oral, parentral: t1/2* - 1.5-2 hr (shortest t1/2)	poor oral absorption - number's of different oral dosage forms are available to inc oral bioavailability; protien binding is 73-81%; wide distribution, but limited penetration to CNS; X's placenta and is distributed into breast milk; *metabolism - liver*; excretion - feces and urine(minor)	
Clarithromycin [Biaxin]	oral: t1/2 = 3-4 hr	better penetration of pulmonary tissue and macrophages compared to Erythromycin; *hepatic metabolism*; excretion is feces and urine (minor)	
Dirithromycin [Dynabec] - not a prodrug (active metabolite)	oral: t1/2* = 8 hr	better oral bioavailability compared to Erythromycin; non-enzamatic hydrolysis to active metabolite *Erythromycylamine;* excretion - feces and urine(minor)	
Azithromycin [Zithromax]	oral, IV; t1/2 = 68 hrs	better oral bioavailability compared to Erythromycin; better penetration of tissues and reaches higher intracellular concentrations (*up to 100x greater then Erythromycin*); NOT metabolized**; Excreation - feces and uring(minor)	
Clindamycin [Cleocin] - derivative of lincomycin(too toxic; off market)	oral, parentral, topical: t1/2 ~2.9 hr	**MECH:** SAME as Erythromycin. **SPRECTRUM OF ACTIVITY:** Gram + (anarobic and aerobic)and anaerobic gram - (not for aerobic gram -); S. Pyogenes; S. Pneumoniae; S. Viridans; Mycoplasma Pneumoniae. **KINETICS:** good oral absorption, wide distribution, including bones (limited to CNS); X's placenta and distributed into breast milk; hepatic metabolism; Excretion - feces and urine(minor). **TOXIC:** Psuedomembranous colitis, Nausea, vomiting, hypersensativity rxn (rashes to stevens-johnson syndrome); thrombosis (IV); Neutropenia (rare hemotological effect)	**USE:** anaerobic infections; acne; bacterial vaginosis

Bacitracin - also in aminoglycoside group; bacteria from tracy; Polymixin B - gram - w/ detergetnt like effect on cell membrane	topical	Polypeptide antibiotic, consisting of a mixture of *three components, bacitracin A (chief), B, and C.* **MECH:** inhibits the incorporation of aminoacids and nucleotides into the cell wall, inhibiting bacterial cell wall synthesis. **SPECTRUM:** *gram + cocci and bacilli*. *No metablism*; Renal elimination **TOXIC:** hypersensativity RXN; Nephrotoxicty (parentral use) - very severe	**USE:** topical treatment of skin and skin structure infections such as minor burns or skin abrasions; external opthalmic infections caused by susceptible orgs.