Penicillin

Natural	Semisy-nthetic	Ampicillin ester/prodrug	Active agansit pseudo-monas
1. **Benzyl penicillin (penic-illin G)**	1. **Ampicillin & Amoxyc-illin**	**Bacampicillin**	**Carbenicillin-Ticaricillin--Sulbenicillin**
Not suitable orally; Resistance occurs; narrow spectrum to G+	Orally active due to EWG on acylamino side chain.	Ester from COOH prevents its ionization--->increased apsorption	Have COOH (acidic/p-olar)gp that increases G- activity.
Can be in salts with organic amines to have longer duration but only IM:	2. **Methicill-in-Nafcillin-oxacillin**	Broken down into active form in bacteria by estrase.	Ester prodrugs can be formed to increase oral activity.
Procaine penici-llin: 12 Hr	B-lactamase resistant penicillin by R being a bulky gp that stearic hindrance preventing attachment of B-lactamase.		
Benzathine penicillin: 2-3 weeks	Methicillin & Nafcillin: Orally inactive.		
	Oxacillin(s): B-lactamase resistant + orally active		
	Temocillin: strong B-lactamase resistance but only parentral route.		
	3. **Ampicillin & amoxicillin**		

Penicillin (cont)

Broad spectrum (on G- too) because of a-amino gp as EWG and increasing hydrophilicty.

B-lactamase inhibitors

Clauvulinic acid-sulbactam

Have a B-lactam ring but irreversibly alkylate the B-lactamase enzyme in a mechanism based inhibition.

Augmentin: Amoxicillin + Clavulinic acid

Unacyn: Ampicillin + sulbactam

Tetracyclines

Sancycline	**Democlocycline**	**Minocy-cline**	**Rolitetracycline**
Natural parent compound; no clinical benefit	Natural, stable	Semisy-nthetic	Prodrug of N-mannich base of tetracycline
	Starting compound for minocycline semi-synthesis	-For red-bumbs and pimples	Semisynthsis with tetracycline in a mannich reaction.
		-For bacterial infections	- More soluble and less irritating than others so suitable as IV and IM

Glycylcyclines

New class; lack the clinical resistance issues of tetracyclines

Tigecycline "tygacil": broad spectrum

used for complicated intra-abdominal infections

Macrolide antibiotics

Large lactone ring of 12-17 atoms (macrolide) with 2 characteristic sugars attached to a 14-membered ring.

Erythromycin: Given as a film coated tablet to avoid GI acid causing hemiketal formation. can also be given in iral suspension as erythromycin stearate salt.

Clarithromycin: more acid stability.

Azithromycin/Azalide: from semi-synthetic ring expansion of erythromycin in a Beckmann rearrangement.

Cephalosporins

Gen 1	Gen 2	Gen 3	Gen 4
Cepalexin	**Cefaclor**	**Ceftibuten**	**Cefpirome & Cefepime**
7-ADCA deriv.	7-ADCA deriv.	7-ADCA	--
Orally active	Orally active	Orally active	Parenteral only
	Cefuroxime	B-lactamase resistant	B-lactamse resistant
	7-ACA deriv.		Broad spectrum activity including p.aueroginosa, G+ and G-.
	Not orally active (parenteral)		
	Prodrug: Cefuroxime axetil		
	COOH becomes an ester with axetil gp that increases lipophilicty--> better oral bioavialability		

Carbapenems

Thienamycin	**Imipenem**	**Meropenem**	**Biapenem**	**Doripenem**
B-lactamase resistant: Alpha-hydroxyethyl side chain at position 6.	Semisynthetic; is a N-formimino thienamycin that's chemically stable .	Synthetic	2nd gen carbapenems	Newest
Natural, broad spectrum, B-lactamase resistant and inhibitor	Taken with **Cilastatin**: a DHP-1 inhibitor (enzymatica stability)	No cilastatin needed with it due to side gp on position 3 and 4.	Broad spectrum; DHP-1 stable & B-lactamase resistant	Broad spectrum;- DHP-1 stable & B-lactamase resistant
Unstable; Susceptible to in-vivo deactivation by DHP-1 (t1/2=-30sec)		Parenteral	Parenteral	Parenteral
		For meningitis, sepsis, pneumonia, intrabdominal infection and anthrax		Potent against pseudomonas.

Aminoglycosides/aminocyclitols

protein synthesis inhibitors.

Water-soluble that must be given parenteral for systemic effect but can be given orally for a local GIT anti-septic effect.

Streptomycin

Drug-drug interaction:

Aminoglycosides + B-lactam= inactive compound that results in hearing loss, ototoxicity & nephrotoxicity.