

Classes of Antibiotics~Mechanism of Action and Spectrums of Activity

Antibiotics class	Examples	Mechanisms	Spectrum of Activity	S/E
INHIBITION OF CELL WALL				
Penicillins	Natural; penicillin G Semi-synthetic: oxacillin, ampicillin- clavulanic acid, ampicillin- sulbactam Pipracillin	Inhibit peptoglycan synthesis necessary for cell-wall formation	Bactericidal-most active against gram +; synthetic and potentiated penicillin have improved gram – coverage	Hypersensitive, anaphylaxis GIT
CEPHALOSPHORINS	<u>1st generation:</u> cephalothin, cephalexin, <u>2nd generation:</u> Cefuroxime <u>3rd generation:</u> ceftriaxone, ceftazidime <u>4th generation:</u> cefepime		Bactericidal <u>1st gen:</u> Gram +, limited Gram – <u>2nd gen:</u> Gram+, improved Gram – and some anaerobes. <u>3rd gen:</u> limited Gram+, excellent Gram- and anaerobes	
Glycopeptides	Vancomycin	Inhibit Peptidoglycan synthesis	Bacteriocidal; Gram+ve bacteria only MRSA	Red man syndrome Nepro and ototoxicity

Inhibition of cell Membrane				
Polymyxin	Colistin	Alter cell membran permeability	Bacteriocidal; Gram-ve bacteria	Nephrotoxicity

Inhibition of protein synthesis (Ribosome)				
Aminoglycosides	Gentamicin, amikacin, tobramycin, neomycin	Bind 30S ribosomal subunit; inhibit peptide elongation	Bacteriocidal; Gram-, including <i>Pseudomonas</i> and <i>Mycobacterium</i> , <i>Streptococcus</i> and anaerobes are resistant	Ototoxicity and Nephrotoxicity
Tetracyclines	Tetracyclines, doxycycline	Bind 30S subunit; inhibit RNA function	Bacteriostatic; Gram+ and Gram -; <i>Rickettsiae</i> , <i>Mycoplasma</i> , <i>Chlamydomphila</i>	Teeth discoloration GIT photosensitivity
Chloramphenicol	Chloramphenicol	Bind 50S subunit, inhibit protein synthesis	Bacteriostatic; broad Gram+ and Gram- spectrum	BM a plastic anemia
Macrolides and lincosamides	Erythromycin Azithromycin Clarithromycin Clindamycin	Bind 50S subunit; inhibit protein synthesis	Bacteriostatic; Gram+, <i>Legionella</i> , <i>Camphylobacter</i> , <i>Mycoplasma</i> , <i>Chlamydomphila</i> , <i>Rickettsiae</i> , good anaerobic spectrum	GIT pseudo-membranous colitis

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INHIBITION OF NUCLEIC ACID SYNTHESIS				
1. Flouroquinolones	Nalidixic acid, Ciprofloxacin, Gatifloxacin Moxifloxacin	Inhibits DNA gyrase, preventing supercoiling →DNA degradation	Bactericidal; Gram +ve and gram -ve, INCLUDING Pseudomonas at a higher dosage	Cartilage damage
2. Nitroimidazoles	Metronidazole	Metabolized by anaerobes to intermediates that prevent DNA synthesis	Bactericidal; anaerobes (Also antiprotozoal)	GIT
3. Rifampicin	Rifampicin	DNA degradation	Bactericidal; Gram +ve and gram -ve bacteria	Discoloration of body fluid hepatotoxicity
INHIBITION OF BACTERIAL GROWTH				
Sulfonamides	Trimethoprim-sulfadiazine, ormethoprim sulfa	Competitive analogue of para-aminobenzoic acid (PABA) →inhibits dihydrofolate reductase →blocks folic acid synthesis	Bacteriostatic → bactericidal when combined. Gram -ve Chlamydia, nocardia, protozoa and pneumocystic	GIT

Antibiotics class	ACTION	USE	S/E
1. Anti TB isoniazide (INH)	Bacteriocidal All lung tissue	T.B treatment and prophylaxis	Hepatotoxicity peripheral neuropathy
2. Elhambiotd	bacteriocidal concentrated lung alveoli phagolysosome	TB treatment	Optic neuritis
3. Pyrazinamide	Acid environment of macrophages	TB treatment	Hepatitis gouty arthritis