**Classes of Antibiotics-Mechanism of Action and Spectrums of Activity**

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| **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 | 1ST generation: cephalothin, cephalexin,  2nd generation:  Cefuroxime  3rd generation: ceftriaxone, ceftazidime  4th generation: cefepime | Bactericidal  1st gen: Gram +, limited Gram -  2nd gen: Gram+, improved Gram – and some anaerobes.  3rd gen: limited Gram+, excellent Gram- and anaerobes |
| Glycopeptides | Vancomycin | Inhibit Peptidoglycan synthesis | Bacteriocidal; Gram+ve bacteria only MRSA | Red man syndrome  Nepro and ototoxicity |

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| **Inhibition of cell Membrane** | | | | |
| Polymyxin | Colistin | Alter cell memnrano permeability | Bacteriocidal; Gram-ve bacteria | Nephrotoxicity |

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| **Inhibition of protein synthesis (Ribosome)** | | | | |
| Aminoglycosides | Gentamicin, amikacin, tobramycin, neomycin | Bind 30S ribosomal subunit; inhibit peptide elongation | Bactericidal; Gram-, including*Pseudomonas* and M*ycobacterium*, S*treptococcus* and anaerobes are resistant | Ototoxicity snd  Nephrotoxicity |
| Tetracyclines | Tetracyclines, doxycycline | Bind 30S subunit; inhibit RNA function | Bacteriostatic; Gram+ and Gram -; *Rickettsiae, Mycoplasma, Clamydophila* | 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+, *Legionella, Camphylobacter, Mycoplasma, Chlamydophila, Ricketstsiae*, good anaerobic spectrum | GIT pseudo-membranous colitis |

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| **Antibiotics class** | **Examples** | **Mechanism** | **Spectrum of Activity** | **S/E** |
| **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 |
| 1. Nitroimidazoles | Metronidazole | Metabolized by anaerobes to intermediates that prevent DNA synthesis | Bactericidal; anaerobes (Also antiprotozoal) | GIT |
| 1. 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 |

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