**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-sulbactamPipracillin | Inhibit peptoglycan synthesis necessary for cell-wall formation | Bactericidal-most active against gram +; synthetic and potentiated penicillin have improved gram – coverage | Hypersensitive, anaphylaxisGIT |
| 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 sndNephrotoxicity |
| Tetracyclines  | Tetracyclines, doxycycline | Bind 30S subunit; inhibit RNA function | Bacteriostatic; Gram+ and Gram -; *Rickettsiae, Mycoplasma, Clamydophila* | Teeth discoloration GITphotosensitivity |
| Chloramphenicol  | Chloramphenicol | Bind 50S subunit, inhibit protein synthesis  | Bacteriostatic; broad Gram+ and Gram- spectrum | BM a plastic anemia  |
| Macrolides and lincosamides  | ErythromycinAzithromycin 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, GatifloxacinMoxifloxacin | 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 |