**Cell Wall Biosynthesis Inhibitors**

* Gram positive bacteria have peptidoglycan in their cell wall that determine its rigidity and teichoic acid to regulate cation movement.
  + First drop down: lipids, peptidoglycan, cellulose, teichoic acid
  + Second drop down: teichoic acid, porins, cellulose, peptidoglycan
* In gram negative bacteria the area between the cytoplasmic membrane and thin layer of peptidoglycan is called the periplasmic space
  + First drop down: pericardium space, endoplasmic space, periplasmic space, pleuraplasmic space
* Source of acetate in N-acetyl glucosamine (NAG) is acetyl coA
  + First drop down: MurA, pyrophosphatase, phosphoenolpyruvate, acetyl coA
* Fosfomycin is a irreversible inhibitor of MurA and targets the enzyme UDP-NAG Transferase
  + Cycloserine, Bactoprene, Forfomycin, Nitrofurantoin
* Fosfomycin is indicated for UTI
  + Meningitis, UTI, pneumonia, yeast infection
* Cycloserine is a reversible competitive inhibitor of Alanine racemase and D-Ala D-Ala ligase
  + Fosfomycin, Bacitracin, Vancomycin, Cycloserine
* A serious side effect of cycloserine is neurotoxicity caused by NMDA binding
  + Muscle aches, ototoxicity, nephrotoxicity, neurotoxicity
* Bacitracin binds to pyrophosphatase and prevents regeneration of Bactoprene
  + First drop down: bacitracin, bactoprene, vancomycin, cycloserine
  + Second drop down: bactoprene, acetyl coA. Bacitracin, peptidoglycan
* Vancomycin binds to peptidoglycan to prevent crosslinking. Resistance to Vancomycin occurs through a change in structure of peptidoglycan from an amide to an ester.
  + First drop down: ester, amide, amine, imine, ether
  + Second drop down: amine, imine, amide, ether, ester
* Vancomycin is not orally absorbed but can treat C. Diff Infections
  + Meningitis, UTI, C. Diff, pheumonia
* To avoid the side effect Red Man Syndrome, vancomycin should be infused slow
  + First drop down: Steven’s Johnson Syndrome, Reye’s Syndrome, Red Man Syndrome, Extrapyramidal sympoms
  + Second drop down: fast, slow
* Daptomycin cannot be used for pneumonia because of inactivation by surfactant
  + UTI, pneumonia, otitis, sinusitis

**Beta Lactams**

* Penicillins bind and inhibit Penicillin Binding Proteins (PBP) to prevent crosslinking
  + Hydrophobic side chains, polar groups, B-Lactams, Penicillin Bind Proteins (PBP)
* Resistance to penicillins develops quickly due to  B-lactamases or PBP mutations
  + B-lactamases, acid-base condition changes, alteration of side chains
* Clavulanic acid, Sulbactam, and Tazobactam are all examples of B-lactamase inhibitors
  + Inducers, inhibitors, producers
* Cilastatin is combined with imipenem to avoid degradation in the kidney
  + Polymixin, colistin, cilastatin, clavulanic acid
* Carbapenem resistant Enterobacteriaceae (CRE) can be treated with polymixin and colistin
  + Cilastatin, clavulanic acid, sulbactam, colistin
* Carbapenems cannot be combined with aminoglycosides
  + Tetracyclines, other beta lactams, aminoglycosides, macrolides
* Cephalosporins are less active than Penicillins but more resistant to B-lactamases
  + First drop down: less, more
  + Second drop down: less, more
* Cephalosporins substituted with a MTT group can extend the spectrum but also cause side effects such as hypothrombocytopenia and Disulfiram-like effect
  + First drop down: amide, imine, MTT group, ester, sulfa group
  + Second drop down: hemolytic anemia, thrombocytosis, hypothrombocytopenia, leukopenia
* Monobactams are mostly reserved for serious gram-negative infections such as meningitis
  + Carbapenems, Beta Lactams, Aminoglycosides, Monobactams
* Aztreonam is an inhalent to treat chronic pseudomonas infections with CF patients, has activity against pseudomonas because it has ceftazidines side chain
  + First drop down: Imipenem, Azteronam, Meropenem, Ertapenem
  + Second drop down: Cefixime, ceftaxime, cephalexin, ceftazidine