

PP3 EXAM NOTES

ANTIMICROBIAL DRUGS

Substances produced by some microorganisms (moulds, yeasts, bacteria) that kill or inhibit growth of other microorganisms, also synthetic manufacture

Spectrum

Broad: wide variety gram +ve and gram -ve bacteria (e.g. Chloramphenicol)

Narrow: limited variety, particular species (egg. Penicillins)

Mechanisms of action

1. Inhibitor of synthesis or damage to cell wall

Beta-lactams bind to penicillin binding proteins (PBPs) on cytoplasmic membrane- inhibition transpeptidase necessary for final step of cell wall synthesis- activate autolytic enzymes destroy cell wall

Penicillins (suff. cillins) & cephalosporins (pre. ceph/cef)

2. Inhibition of synthesis or damage to cytoplasmic membrane

Polymixins (polymixin B & colistin) bactericidal agents against gram -ve, selective effect bacterial cell membranes disrupt phospholipids increase permeability leading to cell death

3. Modify synthesis/metabolism of nucleic acids (nucleic acid synthesis inhibitors)

Rifamycins (pre. rifa) & quinolones (suff. floxacin)

4. Modify/inhibit protein synthesis (at ribosomes)

Aminoglycosides (suff. micin, mycetin, mycin), macrolides (erythromycin), tetracyclines (suff. Cycline) and chloramphenicol

5. Modification of energy metabolism within cytoplasm (at folate cycle)

Sulphonamides (pre. Sulf) & trimethoprim

Bacteriostatic: bacterial growth + reproduction inhibited, host defense kills organism- reversed on removal of drug unless host mechanisms have killed organism (eg. Erythromycin, chloramphenicol, trimethoprim, sulphonamides, tetracyclines)

Bactericidal: organism is killed, less dependent on host mechanisms (eg. Beta-lactams (penicillins + cephalosporins), rifampin, polymixins, aminoglycosides)

-Bactericidal may be mandatory when treating immune-compromised patients-

Selective toxicity: ideally antimicrobial drug should be more toxic to pathogen than host cells
The ability of drug to injure target organisms without injuring other cells

1. *Accumulation of drug in higher levels in microorganisms than human cells* (eg. Uptake pumps)
2. *Action of drug on cellular structures unique to microorganisms* (eg. Cell wall)
3. *Action of drug on biochemical processes more critical for pathogen than host cells* (Folate)

Allergic reactions: repeated exposure defense mechanisms become sensitized resulting in allergic reactions

Common: penicillins + cephalosporins

S&S: rash, difficulty breathing (swelling, spasms), loss of consciousness, rash, low BP, nausea, vomiting- use adrenaline 1:1000 IV, antihistamines + corticosteroids