Introduction to Antimicrobials

General Terms

- Chemotherapy
- Antibiotic – substance produced by a microbe that may harm another microbes
- Antimicrobial – any agent that harms a Microbe
- Anti-infective – any agent that reduces or eliminates infection

Selective Toxicity

- Ability of an antibiotic to destroy target cells without damaging host cells
- Differences between microbes and host
  - Prokaryotic vs Eukaryotic
  - Cell wall
  - Inhibition of microbial enzymes
  - Disruption of bacterial protein synthesis

Antibiotic classifications

- Narrow vs. Broad Spectrum
- Susceptible organisms
  - Antibacterials
  - Antifungal
  - Antiviral
- Classification by mechanism
- Distinction: Bacteriocidal vs. Bacteriostatic

Resistance

- Relative resistance vs. True Resistance
  - MIC: Minimum inhibitory concentration
- Mechanisms
  - Drug enzymes
  - Cease uptake of drug
  - Change in bacterial receptors
  - Synthesize drug antagonists
- Acquisition
  - Spontaneuos mutation – single resistance
  - Conjugation –multiple drug resistance

Factors that Influence Resistance

- Use of broad vs. narrow spectrum
- Suprainfection
- CDC Twelve step program highlights
  - Immunize
  - IV's out
  - ID consult
  - Contamination vs. infection
  - Colonization vs infection
  - Say no to vanco
  - Stop when infection is gone
  - Isolate the pathogen
  - Break the chain – wash your freaking hands

Selection of Antibiotics

- Considerations
  - Identification of microbe
  - Drug sensitivity of microbe
  - Host factors
- Site of infection
- Immune status
- Empiric therapy

Host Factors

- Host defense (immune system, skin)
- Site of infection
  - BBB, vascularity, heart valves, abcess
- Age
- Pregnancy & Lactation
- Previous Allergic Reaction
- Genetic

Therapy

- Dosage 4-8 x higher than MIC
- Duration of therapy – relapse & resistance
- Combinations
  - Additive
  - Potentiative (synergistic)
  - Antagonistic: bateriocidal + bacteriostatic

Prophylaxis

- Surgery
- Bacterial endocarditis
- Neutropenia
- Other

- Attempted Tx of untreatable infection
  - “Concerned mother syndrome”
  - “Physician wants to appear to be doing something syndrome”
- Tx of fever of unknown origin
- Dosage too low
- Tx in absence of adequate bacteriologic information
- Omission of surgical drainage

Monitoring Antibiotic Therapy

- Fever
- Resolution of S/S
- Serum drug levels
- Cultures