Microbiology Learning Objectives C20
Antimicrobial Drugs

1. Identify the contributions made by Paul Ehrlich and Alexander Fleming in the field of chemotherapy. (Flemming discovered penicillin // Ehrlich discovered macrophage)

2. What microbe genus produces most of our antibiotics? (Streptomyces, filamentous bacteria common to soil /// produce half of our known antibiotics)

3. What is the problem with the chemotherapy for fungal, protozoan, and helminthic infections? (host and microbes both eukaryotic)

4. Define: spectrum of activity, narrow vs broad spectrum antibiotics, and superinfection. (spectrum refers to range of microbes in which antibiotics can kill // when antibiotic kills one bacteria only to allow another microbe to flourish) (

5. What are the five modes of action of antimicrobial drugs? (inhibit cell wall synthesis – penicillins // inhibit protein synthesis – tetracyclines // inhibit metabolite synthesis – sulfa drugs // injury to plasm membrane – polymyxin B // inhibit nucleic acid replication - quinolones)

6. List the advantages of each of the following over penicillin: semisynthetic penicillins, cephalosporins, and vancomycin.

7. Explain why isoniazid and ethambutal are antimycobacterial agents. What genus of bacteria have mycolic acids in their cell wall?

8. Describe how each of the following inhibits protein sysnthesis: aminoglycosides, tetracyclines, chloramphenicol, macrolides.

9. Describe how rifamycins and quinolones kill bacteria.

10. Describe how sulfa drugs inhibit microbial growth. (many organisms para-aminobenzoic acid-PABA – is intermediate to the formation of folic acid – vitamin functions as coenzyme for synthesis of nucleic acids /// sulfa drugs act as a competitive inhibitor)

11. What is the mode of action of current antifungal drugs? (target the production of sterols in plasma membrane – ergosterol in fugus and cholesterol in animals)

12. What is the mode of action of current antiviral drugs? (reverse transcriptase /// ribavirin – resembles nucleoside guanine and causes high rate of mutation)

13. What is the mode of action of current antiprotozoan and antihelminthic drugs? (with increase popularity of sushi – increase in tapeworm diseases /// several different classes of drugs using different mechanisms /// niclosamide = inhibits ATP production under aerobic conditions // praziquantel = alters permeability of plasm membranes plus muscular spasms)

14. Describe the mechanisms of drug resistance. (new antibiotic introduced in colony – kills most of microbes – however – some survive // those that survive able to make enzymes to resist antibiotics /// these are the resistant microbes)

15. Tetracycline sometimes interferes with the activity of penicillin. Why? Term to describe this interaction? (antagonism // if given together, tetracycline slows down rate of growth // this reduces the effectiveness of penicillin)

16. If you give penicillin and streptomycin together the result is better than giving the antibiotics together. Why? Term used to describe this interaction? (synergism // penicillin damages the cell wall // this makes it easier for streptomycin to enter the cell)

17. Identify three areas of research on new chemotherapeutic agents.