Microbiology for Nursing
Final Review

1. Matching lecture terms

Questions: Environmental control of microbial growth

1. Contrast sterilization and disinfection.
Sterilization kills all microorganisms and viruses, disinfection kills sufficient amount to remove health hazard.

2. Contrast disinfectants and antiseptic.
Disinfectant is used on inanimate objects, antiseptic is a disinfectant that can be used on human tissue.

3. What are porins? What type of bacteria are they found in and how do they affect susceptibility to chemicals?
Porin: protein that forms a channel through the outer layer of gram- bacteria. The channels allow certain chemicals to pass through the layer.

4. How does a waxy layer on cell walls affect susceptibility to chemicals?
Cell walls with a waxy layer on the cell prevent disinfectant penetration.

5. What stage of bacterial growth is the easiest to kill? What stages are the hardest to kill?
The log stage (high growth) is easiest to kill as the bacteria is consuming more.

6. Do chemicals kill fast at low or high temperatures? Why?
Chemicals kill faster at high temperatures because diffusion happens faster.

7. Which kills faster wet heat or dry heat?
Wet heat

8. How do organics affect exposure time for chemicals?
Organic media increases the exposure time required because they can interact with the disinfectant neutralizing it.

9. Explain 3 ways that disinfectants kill bacteria?
A. Change membrane permeability.
B. Denature proteins.
C. Destruction of cell DNA.

10. Explain 5 ways you can change the physical environment to kill bacteria.

A. Heat (boiling, autoclaving, flaming, burning, incineration, hot air, pasteurization).
B. Cooling (refrigeration, freezing).
C. Desiccation.
D. Osmotic pressure (salt sugars).
E. Radiation (Gamma, UV).

11. Explain how an autoclave works.
Uses steam (wet heat) to kill all organisms including spores. 15PSI/121°C/15 Min.

12. Contrast the terms -cidal and -static.
-cidal: Kills bacteria
-static: inhibits growth

13. Contrast broad spectrum and narrow spectrum antibiotics?
Broad: effects all/most types of bacteria (gram+, gram-).
Narrow: effects only one species or group of bacteria.

14. Explain how the therapeutic index (therapeutic ratio) is calculated.
The dose toxic to the host divided by the dose toxic to the bacteria. The higher the index, the less toxic the dose is to the host.

15. Explain how chemotherapeutic agents attack the cell wall of bacteria.
A. Prevent linear synthesis of peptidoglycan.
B. Prevent cross-linnk of peptidoglycan layers
Only effect gram+ bacteria.

16. Explain the difference between prokaryotic and eukaryotic ribosomes and how chemotherapeutic agents block prokaryotic protein synthesis.
Prokaryotic: Ribosome are 70S (50S/30S)
Eukaryotic: Ribosomes are 80S (60S/40S)
Some agents affect the 30S subunit which keeps the M-RNA codon from matching the proper T-RNA anticodon, others affect the 50S subunit preventing the peptide bonds from occurring between the amino acids.

17. Explain how chemotherapeutic agents kill microorganisms by affecting cell membranes.
A. React with phospholipids changing membrane permeability, often toxic to host cells.
B. React with sterols in membranes to change permeability, very effective against fungal infections.

18. Explain how nucleic acid synthesis is blocked by chemotherapeutic agents.

Competitively inhibit enzymes used for nucleic acid synthesis.
A. Prevent formation of purines (adenine, guanine) and pyrimidines (thymine and cytosine) for DNA
B. Inhibit the synthesis of folic acids (humans get their folic acid from diet), inhibiting the bacteria from being able to synthesis of nitrogenous bases.

19. List 4 things to consider when choosing an antimicrobial drug.
A. Suspected pathogen
B. Antibiotics effect on pathogen and half life.
C. Side effects and drug interactions
D. Host age and weight
E. Site of infection – blood brain barrier
F. Immune system function
G. Kidney function

20. Explain why we look for differences in host and pathogen metabolism to look for chemicals to treat pathogens
Each antimicrobial affects a specific set of characteristics (gram+, gram-, etc.), so if we know the characteristics of the pathogen, we can identify the antimicrobial that is most effective against that pathogen.

21. Why and how are microorganisms becoming resistant to antimicrobial chemicals?
Mostly through natural selection. The over use of antibiotics is causing organisms to become more resistant to the antibiotics that are already in our environment.