

Study Guide for Exam 3

March 21, 2008

Bio 205 Study Aid – please note that this aid is NOT inclusive. It has been designed as a supplement to help you as you study for exam #3.

Chapter 10: Genetic Engineering

1. Be familiar with applications of manipulating DNA.
2. Be familiar with the enzymes covered in class.
3. Be familiar with the role of restrictions endonucleases, their specificity, and their evolution.
4. Be familiar with the principle of agarose gel electrophoresis.
5. Be familiar with DNA and probe hybridization. How is it that they work?
6. How can we perform PCR? What are its applications?
7. Be familiar with cloning vectors. What are their requirements?
8. What are the benefits of using prokaryotic vs eukaryotic cloning hosts?
9. Be familiar with at least one application of gene therapy.
10. Be familiar with RFLP technique.

Chapter 11: Physical and Chemical Control of Microorganisms

1. Be familiar with terms used to describe anti-microbial effects: sterilization, disinfection, -cidal, etc.
2. What are the general modes of action of physical or chemical control of microorganism growth?
3. Be able to understand the pattern of microbial death caused by anti-microbial treatments. What time would it take to kill 100% of your population? What is relationship to population and time of 100% killing? Worry about the 10% remaining alive?
4. Be familiar with microbial resistance. What organisms are the most resistant vs the least resistant?
5. Be familiar with at least 3 factors that can influence the activity of an antimicrobial agent (type of organism, time of exposure, etc).
6. How do heat, radiation and filtration work to kill or prevent infection? Are there any concerns with these treatment methods? What about boiling water vs pasteurization?
7. What would be more an effective method of control, gamma radiation or UV radiation? Why?
8. Be familiar with chemical methods of microbial control. How soaps, detergents, heavy metals, halogens, alcohols, phenolics, and oxidizing agents act on microorganisms?
9. What would be more effective 100% ethanol or 60%?
10. What are the most commonly used aldehydes?

Chapter 12: Antimicrobial agents and Chemotherapy

1. Be able to provide a definition of antibiotic. What is the difference between an antibiotic and a semi-synthetic or a synthetic chemotherapeutic agent?
2. What does the 'spectrum' of antibiotics refer to and why is the spectrum of activity important?
3. Understand the concept of selective toxicity.

4. You should know at least 3 properties of an "ideal" antibiotic. Do 'ideal' antibiotics exist?
5. You should understand the 5 main modes of action that antimicrobial agents employ to kill microorganisms. In particular those affecting protein synthesis!!!
6. Provide examples of antimicrobial agents and their targets (i.e. penicillin – inhibitor of cell wall synthesis). What type of cells would be more susceptible?
7. Be able to identify the main antibiotics and their mode of action. Know examples given in class of specific antibiotics and their main targets. Are they good at killing a particular type of infectious organism?
8. Understand the rationale for choosing a specific antibiotic.
9. What are the main types of drug resistance? Provide at least one mechanism of drug resistance. Why is there such a huge 'human factor' in antimicrobial resistance? Are these resistance mechanisms linked to the type of microorganism?
10. How would you limit drug resistance?
11. What are some 'new' approaches to limit resistance?
12. What are common side effects of drug-host interactions?
13. How would you treat viral infections? How these agents work?
14. How is antimicrobial resistance measured in the clinical laboratory? What is MIC (not Mick Jagger!)

Chapter 13. Host-Microbe Interactions

1. Define pathogen, virulence, infection, and disease.
2. Know what is meant by normal flora and what parts of the body would be expected to have normal flora and what parts of the body would be expected to be sterile. Why is the normal flora so important in health and disease?
3. Know in what ways the normal flora is desirable and or protective.
4. Know those situations where normal flora can lead to opportunistic infections. Be able to provide examples of opportunistic pathogens.
5. Be familiar with the process of infection from the entry into the host to the presentation of disease (if it happens!).
6. Why do microorganisms need to adhere?
7. You should know the "spreading factors". Compare the effects of leukocidins, hemolysins, coagulases, hyaluronidase, streptokinase and lipase.
8. Be familiar with the virulence mechanisms of several pathogens: toxins, exo- and endo-toxins.
9. Be familiar with how these two types of toxins differ and provide examples.
10. Be familiar with disease classification (infectious vs. non-infectious; communicable vs. non-communicable) and provide examples.
11. Be familiar (provide example) of types of diseases (acute, chronic, latent). Do not forget to become familiar with terms such as bacteremia and septicemia.
12. Be familiar with the stages in the development of a disease based on signs/symptoms: incubation, prodromal, etc. What are signs? What are symptoms? How are they different?
13. Be familiar with how diseases are classified based on the frequency they appear in a population (i.e. endemic) and provide one example. Be familiar with the concepts incidence and prevalence. What do they measure?

14. Know what is meant by the reservoir of infection for a particular pathogen and be able to give specific examples for each of them. Be able to differentiate between human reservoirs and carriers.
15. Be familiar with human, animal, and nonliving reservoirs, and give one example of each.
16. Be familiar with portals of entry and portals of exit. Provide examples.
17. Be familiar with the transmission of a disease: (provide examples and be able to match them)
 - a) Contact (direct, droplet transmission, vertical, vector)
 - b) Indirect (fomites, airborne, waterborne, foodborne)
18. be familiar with a Vector (mechanical and biological) and provide examples of the disease they transmit.
19. You need to know what is meant by a nosocomial infection and why nosocomial infections have become so important in today's society. Specifically, why is it that many more people today die of nosocomial infections due to opportunistic pathogens than die of infectious disease from pathogens.
20. What are the most common agents of nosocomial infections? What are the most common sites in the body for nosocomial infections?