Study Union Practice Exam:

1. A termite requires a specific species of bacteria to degrade the wood it ingests. The bacterium benefits from the termite as the termite provides nutrients and shelter. Which of the following microbial interactions is this an example of?
   a. Ammensalism
   b. Cooperation
   c. Mutualism
   d. Commensalism
   e. Parasitism

2. MHC I can be found on what type of cells?
   a. Red blood cells
   b. All cells surrounded by plasma membranes
   c. All nucleated cells
   d. Only antigen presenting cells
   e. Only nucleated leukocytes

3. Select all of the following examples of physical/mechanical barriers?
   a. Skin
   b. Normal flora
   c. Mucosal membranes
   d. Flushing mechanisms
   e. All of the following are examples of physical/mechanical barriers.

4. Which of the following statements is true regarding LPS?
   a. Considered an exotoxin because it is released when a bacterium is lysed
   b. Found in Gram-positive organisms only
   c. The lipid A portion is the toxic component of LPS.
   d. A and C are correct.
   e. A ad B are correct.

5. Which of the following is not a characteristic of innate immunity?
   a. Non-specific
   b. No memory
   c. Can be separated into humoral and cellular immunity
   d. First line of defense
   e. All of the above are examples of innate immunity.

6. Louis Pasteur’s swan-neck flask experiment disproved what idea?
   a. Infections are the result of supernatural forces
   b. Pathogens are only airborne
   c. Spontaneous generation
   d. Both A and B are correct.
7. Which statement correctly distinguishes affinity and avidity?
   a. Affinity describes the strength of a single antibody-antigen interaction. Avidity describes the strength of the total antibody-antigen interactions.
   b. Affinity describes the likelihood that an antibody will bind to an antigen. Avidity describes the likelihood that an antigen will bind to an antibody.
   c. Avidity describes the strength of a single antibody-antigen interaction. Affinity describes the strength of the total antibody-antigen interactions.
   d. A and B are both correct.
   e. B and C are both correct.

8. Which of the following parts of the human body would you not expect to find bacteria? (select all that apply)
   a. Upper respiratory
   b. Mouth
   c. Lower respiratory
   d. Skin
   e. Internal tissues

9. Which class of immunoglobulin are found on the surface of B cells and act as BCRs? (select all that apply)
   a. IgM
   b. IgD
   c. IgE
   d. IgG
   e. IgA

10. The portion of the antibody that directly binds to antigen is called:
    a. Fc
    b. FAB
    c. Heavy chain only
    d. Light chain only
    e. All of the above are true

11. What two signals are required for the activation of T helper cells? (select all that apply)
    a. MHC I on antigen presenting cells binds to the TCR and coreceptor of the T cell.
    b. CD28 receptor on the T cell binds to the B7 (CD80) on the cell presenting antigen.
    c. B7 (CD80) on the T cell binds to CD28 on the cell presenting antigen.
    d. MHC II on antigen presenting cells binds to the TCR and coreceptor of the T cell.
    e. T helper cells only require one signal for activation.
12. Which of the following is not a direct factor that affects immunity?
   a. Physiology  
   b. Age  
   c. Genetics  
   d. Personal hygiene  
   e. All of the following are direct factors.

13. Which of the following distinguishes Gram-positive and Gram-negative bacteria?
   a. Gram-positive bacteria have a thick peptidoglycan layer. Gram-negative have a thin layer of peptidoglycan.  
   b. Gram-positive bacteria have lipoteichoic acid embedded in their cell walls. Gram-negative bacteria have lipopolysaccharide in their outer membrane.  
   d. Both A and B  
   e. All of the above are correct.

14. Which of the following is not a function of the complement system?
   a. Direct killing of the pathogen by MAC  
   b. Opsonization  
   c. Inflammation  
   d. Chemotaxis  
   e. Antibody production

15. The main purpose of Th2 cells is to
   a. Increase inflammation  
   b. Activate B cells to produce antibodies  
   c. Activate macrophages and increase phagocytosis  
   d. Both A and B are correct.  
   e. Both A and C are correct.

16. _____ is the only class of immunoglobulin that can cross the placenta and pass natural passive immunity to the fetus.
   a. IgM  
   b. IgG  
   c. IgA  
   d. IgE  
   e. IgD

17. Specific immunity can be characterized by which of the following?
   a. Anamnestic Response  
   b. Specificity  
   c. Diversity  
   d. Production of antibodies  
   e. All of the above are true.
18. Which of the following organisms penetrates the cell and consumes the cytoplasmic contents?
   a. **Bdellovibrio**  
   b. **Vampirococcus**  
   c. **Daptobacter**  
   d. **Myxococcus**  
   e. Both A and D are correct

19. Which statement distinguishes antigens and epitopes
   a. Antigens are structures that bind antibodies. Epitopes are the specific portion of the antigen that the antibody binds to.  
   b. Antigen is produced when antibodies bind to the epitope.  
   c. Epitopes are structures that bind antibodies. Antigens are the specific portion of the epitope that the antibody binds to.  
   d. Epitopes are produced when antibodies bind to the antigen.

20. What are the three domains of life? (select all that apply)
   a. **Monera**  
   b. **Eukarya**  
   c. **Bacteria**  
   d. **Archaea**  
   e. **Protista**

21. The three granulocytes are:
   a. Neutrophils, basophils, mast cells  
   b. Mast cells, Neutrophils, eosinophils  
   c. Basophils, mast cells, monocytes  
   d. Basophils, eosinophils, neutrophils  
   e. Monocytes, mast cells, neutrophils

22. What is the difference between ammensalism and commensalism?
   a. Ammensalism is a relation in which one organism is harmed and the other is not affected. Commensalism is a relationship in which one organism benefits and the other is not affected.  
   b. Ammensalism is obligatory. Commensalism is not obligatory.  
   c. Commensalism is a relation in which one organism is harmed and the other is not affected. Ammensalism is a relationship in which one organism benefits and the other is not affected.  
   d. Commensalism is obligatory. Ammensalism is not obligatory.  
   e. None of the following are correct.
23. Which of the following may result in a weakened immune response and lowered resistance to infection?
   a. Antibiotics that alter the host’s normal flora
   b. Cancer
   c. Microbiology Final (stress and fatigue)
   d. Poor diet
   e. All of the above are correct.

24. Which of the following is a true statement regarding IgM? (select all that apply)
   a. First antibody made in an immune reaction
   b. It exists as a dimer in its soluble form
   c. Low affinity, high avidity
   d. Exists as a monomer when attached to the cell
   e. High affinity, low avidity

25. Which of the following cells would you expect to have MHC II? (select all that apply)
   a. Dendritic cells
   b. Mast cells
   c. Macrophages
   d. B cells
   e. T cells

26. Which of the following is true regarding biofilms?
   a. Microbes communicate in a density-dependent manner.
   b. Biofilms are slime enclosed communities, consisting of bacteria of the same species.
   c. Biofilms serve as protection for microbes.
   d. A and C are both correct.
   e. B and C are both correct.

27. An example of a pathogen associated molecular patterns (PAMPs) is
   a. LPS
   b. Glycolipids in the cell membrane
   c. Peptidoglycan
   d. A and C
   e. A and B

28. Which of the following statements is false?
   a. B and T cells both have memory.
   b. Bacitracin, produced by normal flora, preventing the growth of E. coli is an example of commensalism.
   c. All antigens are immunogens.
   d. Specific immunity increases in effectiveness after the first exposure to a pathogen.
   e. All of the above are true.
29. MHC I binds to the TCR and the ____ coreceptor of a ______ T cell.
   a. CD8+, cytotoxic
   b. CD4+, cytotoxic
   c. CD8+, helper
   d. CD4+, helper
   e. None of the above are correct.

30. What two signals are required for T cell dependent B cell activation? (select all that apply)
   a. Immunoglobulin on the surface of the B cell binds antigen that is specific to a certain epitope of the immunoglobulin. The antigen is then displayed on MHC II.
   b. T\(_h\)2 cell presents antigen on its MHC I and binds to BCRs on the B cell.
   c. T\(_h\)2 cell binds to the B cell’s MHC II presenting the same antigen originally presented by an antigen-presenting cell (APC) during T cell activation.
   d. APC binds to the B cell’s MHC II presenting the same antigen that the APC presents on its own MHC II.
   e. T\(_h\)2 cell presents antigen on its MHC II and binds to BCRs on the B cell.

31. _______ reactions require energy and are therefore _______. We would expect the \(\Delta G\) of this reaction to be __________.
   a. Anabolic, exergonic, -
   b. Catabolic, exergonic, +
   c. Anabolic, endergonic, +
   d. Catabolic, endergonic, -
   e. Anabolic, exergonic, -

32. Which of the following describe the structure of an antibody?
   a. 2 identical heavy chains and 2 identical light chains connected by an ionic bond
   b. 1 heavy chain and 2 identical light chains connected by a disulfide bond
   c. 2 identical heavy chains and 2 identical light chains connected by hydrogen bonding
   d. 2 identical heavy chains and 1 light chain connected by an ionic bond
   e. 2 identical heavy chains and 2 identical light chains connected by a disulfide bond

33. Which of the following enzymes increases a pathogen’s virulence by causing clotting, which forms a protective barrier around the pathogen?
   a. Hyaluronidase
   b. Coagulase
   c. Fibrinolysins
   d. Collagenase
   e. Lipase
34. Autoimmune diseases are the result of
   a. Immune cells mistaking “self” cells as “non-self” cells
   b. Lack of B cell proliferation and antibody production
   c. No innate immunity
   d. A and C are both correct.
   e. All of the above are true.

35. Which of the following statements is true?
   a. Eosinophils play a major role in allergies.
   b. Macrophages circulate in the blood stream for 8 hours, until moving into tissues and mature into monocytes.
   c. The three lymphocytes are B cells, T cells, and NK cells.
   d. B cells are made in the thymus and mature in the bone marrow.
   e. Both a and D are true.

36. Which of the following is a characteristic of the plasma membrane?
   a. Includes integral proteins that span the length of the plasma membrane
   b. Is composed of two layers of phospholipids with the nonpolar heads facing outward and the polar tails facing inwards
   c. Allow small, nonpolar molecules to enter unassisted
   d. A and C are both correct
   e. All of the above are correct.

37. The LD\textsubscript{50} of bacteria A is 60 cells. The LD\textsubscript{50} of bacteria B is 110 cells. Which of the following can we conclude from the information above?
   a. Bacteria A is more virulent.
   b. Bacteria B is more virulent.
   c. Both A and B are equally virulent.
   d. Bacteria B most likely has a flagellum and Bacteria A does not.
   e. Both A and D are correct.

38. Which of the following is not an action of an antibody?
   a. Agglutination
   b. Opsonization
   c. Activation of complement
   d. Neutralization
   e. Respiratory burst
39. Which of the following statements is true regarding the permeability of Gram-negative bacteria membranes?
   a. The LPS in the outer membrane of Gram-negative bacteria creates a permeability barrier.
   b. The outer membrane is more permeable due to the presence of porins.
   c. The inner membrane is more permeable due to integral proteins.
   d. A and b are both correct
   e. A and C are both correct

40. What is an opportunistic pathogen?
   a. A pathogen that may cause illness if it enters a different part of the body it is normally not found in.
   b. A pathogen that normally causes no damage to the host, but may cause illness in immunocompromised individuals
   c. A pathogen that may cause illness if it is present in high enough concentrations
   d. A and B are both correct
   e. All of the following are correct

41. Which of the following is a false statement?
   a. A vehicle is an inanimate object that indirectly transmits pathogens.
   b. Pathogens may produce decoy proteins to “trick” antibodies into binding the decoy proteins and not the pathogen itself.
   c. Transmission of the pathogen to host is enough for infection.
   d. Pathogens that have a greater ability to survive outside of the host are generally more virulent.
   e. Biofilms can increase the virulence of a pathogen.

42. Select all the factors that increase a pathogens virulence.
   a. Toxins
   b. Capsules
   c. Production of coagulase
   d. Flagellum
   e. Ability to grow in cold temperatures

43. The second antibody response is not characterized by which of the following?
   a. Shorter lag phase
   b. More rapid log phase
   c. Increased concentration of antibodies
   d. Antibodies with lower affinities
   e. All of the above are true
44. Cytotoxic T cells utilize ______ to form holes in the infected cell and release ______ to trigger apoptosis.
   a. Perforin, granzymes
   b. Granzymes, lysozyme
   c. Perforin, lysozyme
   d. Lysozyme, granzymes
   e. Granzymes, perforin

45. Which of the following statements is false?
   a. A dendritic cell is a type of antigen-presenting cells.
   b. Phagocytic cells ingest microbes into phagosomes, which combine with lysozyme to form phagolysosome.
   c. A macrophage recognizes PRRs on the pathogen surface during Opsonin-independent recognition.
   d. Ingested pathogens are degraded, and antigen is sent to the endoplasmic reticulum to be combined with the glycoprotein MHC.
   e. All of the above are true.

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