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Chapter 2. Nature of Antigens and the Major Histocompatibility Complex

Multiple Choice

1. An antigenic determinant is also called:
A. an immunogen.
B. an epitope.
C. an antibody.
D. a polysaccharide.

ANS: B

2. Which of the following would be the most effective immunogen?
A. One that is genetically foreign and has a single epitope
B. One with a molecular weight of less than 10,000 Da
C. One with multiple epitopes with many specificities
D. One with multiple epitopes with a single repeated specificity

ANS: C

3. A 50-kDa protein from a bacterial cell that has numerous different epitopes would be called:
A. a hapten but not an antigen.
B. a hapten and an antigen.
C. an antigen but not an immunogen.
D. an immunogen and an antigen.

ANS: D

4. Which of the following molecules is the best immunogen?
A. Protein
B. Polysaccharide
C. Nucleic acid
D. Lipid

ANS: A

5. Which of the following is a low-molecular-weight molecule that has one binding site for an antibody?
A. Antigen
B. Hapten

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C. Immunogen
D. Adjuvant

ANS: B

6. Which of the following is NOT a characteristic shared by class I and class II MHC molecules?
A. Expressed co-dominantly
B. Involved in antigen recognition
C. Members of the immunoglobulin superfamily
D. Expressed constitutively on all nucleated cells

ANS: D

7. Antigen recognition by CD4-positive T cells requires:
A. class I MHC molecules.
B. class II MHC molecules.
C. class III MHC molecules.
D. no MHC molecules.

ANS: B

8. Class II molecules bind to what kind of peptides?
A. Native peptides
B. Processed exogenous
C. Processed endogenous
D! Any of the above

ANS: B

9. Each class II MHC molecule has specificity for:
A. any endogenous peptide.
B. related peptides that share a similar peptide sequence.
C. one very specific peptide sequence.
D. native, conformational epitopes.

ANS: B

10. MHC molecules containing beta-2-microglobulin:
A. contain alpha and beta transmembrane polypeptides.
B. participate in the activation of CD4 T cells.
C. are determined by MHC-A, MHC-B, and MHC-C genes.

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D. are determined by MHC-DR genes.

ANS: C

11. The purpose of the invariant chain is to block the peptide-binding site of:
A. antibody molecules.
B. class II MHC molecules.
C. class I MHC molecules.
D. T-cell receptors.

ANS: B

12. Which of the following is a characteristic of MHC-DR, MHC-DP, and MHC-DQ molecules?
A. Antigen receptors on all lymphocytes
B. Antigen receptors on T lymphocytes
C. Surface alloantigens on liver and kidney cells
D. Expressed co-dominantly (maternal and paternal)

ANS: D

13. A processed antigen first encounters and binds to MHC class II molecules in the:
A. nucleus.
B. endoplasmic reticulum.
C. endosomal compartment.
D. membrane surface.

ANS: C

14. A processed antigen first encounters and binds to class I MHC molecules in the:
A. nucleus.
B. endoplasmic reticulum.
C. endosomal compartment.
D. membrane surface.

ANS: B

15. Endogenous peptides binding to MHC-A, MHC-B, or MHC-C molecules on the surface of hepatocytes are critical for the response by:
A. B lymphocytes.
B. T helper cells.
C. cytotoxic T cells.

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D. macrophages.

ANS: C

16. Which of the following is likely to be the most immunogenic?
A. A lipid with a molecular weight of 50,000 Da
B. A polysaccharide with a molecular weight of 40,000 Da
C. A protein with a molecular weight of 45,000 Da
D. A nucleic acid with a molecular weight of 60,000 Da

ANS: C

17. Antigens found in different species that trigger a similar antibody response are called:
A. heterophile antigens.
B. haptens.
C. alloantigens.
D. autoantigens.

ANS: A

18. The term “human leukocyte antigen” is synonymous with:
A. allele.
B. haplotype.
C. major histocompatibility complex.
D. chromosome.

ANS: C

19. The ability to respond to antigen depends on which of the following factors?
A. Age
B. Proper nutrition
C. Genetic predisposition
D! All of the above

ANS: D

20. A macromolecule that is capable of eliciting an immune response in an immunocompetent host is called:
A. an antigen.
B. an antibody.
C. a hapten.
D. an acute-phase reactant.

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ANS: A

21. A bacterial antigen to which the human immune system responds would be classified as:
A. an autoantigen.
B. an alloantigen.
C. a heteroantigen.
D. a holoantigen.

ANS: C

22. Which option best describes a finding of Landsteiner's study of haptens?
A. Similar haptens trigger the same antibody response.
B. Spatial configuration is recognized by antibody.
C. Small chemical changes to a hapten do not affect antibody response.
D. A hapten can react with many different antibodies.

ANS: B

23. Naturally occurring anti-A and anti-B antibodies are thought to be the result of exposure to which of the following?
A. Heterophile antigens
B. Haptens
C. Alloantigens
D. Autoantigens

ANS: A

24. A substance that is too small to stimulate antibody production by itself unless it is attached to a larger carrier molecule is called:
A. an autoantigen.
B. a cross-reacting antigen.
C. a hapten.
D. an alloantigen.

ANS: C

25. A determinant site on an antigen that is produced by the folding of the primary chain is known as a:
A. conformational epitope.
B. linear epitope.
C. hapten.
D. monovalent epitope.

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ANS: A

26. If a person has a reaction to poison ivy, this is caused by:
A. a hapten complexing with a tissue protein.
B. a heterophile antigen.
C. a T-independent antigen.
D. exposure to an adjuvant.

ANS: A

27. Aluminum salt in the hepatitis vaccine functions as:
A. a hapten.
B. an adjuvant.
C. an immunogen.
D. a carrier.

ANS: B

28. In antigen processing, the function of transporters associated with antigen-processing proteins is to:
A. help digest large proteins.
B. bind to MHC class II molecules in the endoplasmic reticulum.
C. transport digested proteins to MHC class I molecules.
D. recognize and digest exogenous protein.

ANS: C

29. A substance used to enhance antibody formation is called:
A. a hapten.
B. an adjuvant.
C. an immunogen.
D. a carrier.

ANS: B

30. MHC class I antigens are recognized by which of the following cells?
A. CD4+ T cells
B. CD8+ T cells
C. B cells
D. Macrophages

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ANS: B

31. Characteristics of MHC class II molecules include which of the following?
A. Interact with CD8+ T cells
B. Have an alpha chain and beta-2 microglobulin
C. Have alpha and beta chains of approximately equal size
D. Combine with antigen made inside the cell

ANS: C

32. If a mother is MHC A3A14/B5B15/Cw3Cw4 and her child is A3A9/B5B27/Cw4Cw7, which of the following men is the most likely candidate for the father?
A. A5A9/B5B27/Cw3Cw7
B. A9A11/B15B21/Cw1Cw4
C. A4A15/B2B27/Cw1Cw5
D. A5A9/B17B27/Cw3Cw5

ANS: A

33. Which option best describes MHC class I antigens?
A. They are recognized by helper T cells.
B. They are found on all nucleated cells.
C. They combine with exogenous antigen.
D. They are coded for on chromosome 9.

ANS: B

34. The antigens that bind MHC class II antigens are first “processed” by:
A. the proteasome.
B. the endoplasmic reticulum.
C. transporters associated with antigen processing.
D. enzymes in the endosome.

ANS: D

35. Characteristics of heterophile antigens include which of the following?
A. Found in unrelated plants or animals but cross-react with the same antibody
B. One's own self-antigens
C. Any antigens used for immunization
D! All of the above

ANS: A

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36. Which of the following must be matched between donor and recipient as closely as possible to avoid rejection of a tissue transplant?
A. Haptens
B. MHC molecules
C. Transporters associated with antigen processing
D. Beta-2 microglobulins

ANS: B

37. All of the following are characteristics of a strong immunogen EXCEPT:
A. it is a large molecule.
B. it is foreign to the host.
C. it is a repeating polymer.
D. it is protein in nature.

ANS: C

38. MHC class I protein is found on:
A. red blood cells.
B. all nucleated cells.
C. B cells and macrophages only.
D. stem cells only.

ANS: B

39. The inheritance of certain MHC antigens can result in which of the following?
A. Increased resistance to certain infectious organisms
B. Predisposition to particular autoimmune diseases
C. Diminished immune responses to particular antigens
D! All of the above

ANS: D

40. T cells are capable of recognizing:
A. conformational epitopes.
B. native (nondegraded) peptides.
C. degraded peptides.
D. haptens.

ANS: C

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