

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

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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

- 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

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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.

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

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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.

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

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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.

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?

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- 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.

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

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

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.

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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