

## **CHAPTER 43**

### **THE IMMUNE SYSTEM**

#### **Learning objectives:**

##### **Innate Immune Defenses Against Infection**

1. Distinguish between innate and acquired immunity.
2. Explain how hemocytes protect invertebrates against pathogenic microbes, describing the role of antimicrobial peptides.
3. Explain how the physical barrier of skin is reinforced by chemical defenses.
4. Define phagocytosis. Name four types of phagocytic leukocytes.
5. Explain how phagocytic leukocytes recognize microbes.
6. Describe the roles of antimicrobial proteins in innate immunity.
7. Explain how interferons limit cell-to-cell spread of viruses.
8. Describe the inflammation response, including how it is triggered.
9. Describe the factors that influence phagocytosis during the inflammation response.
10. Describe what occurs during the condition known as septic shock.
11. Explain how the action of natural killer cells differs from the action of phagocytes.

##### **How Acquired Immunity Arises**

12. Distinguish between:
  - a. antigens and antibodies
  - b. antigen and epitope
  - c. B lymphocytes and T lymphocytes
  - d. antibodies and B cell receptors
  - e. primary and secondary immune responses
13. Briefly summarize the basic facts of acquired immunity.
14. Explain how B lymphocytes and T lymphocytes recognize specific antigens.
15. Compare the production and functions of class I MHC and class II MHC molecules.
16. Explain how the particular structure of a lymphocyte's antigen binding site forms during development. Explain the role of recombinase in generating the staggering diversity of lymphocytes.
17. Distinguish between the variable (V) and constant (C) regions of an antigen receptor.
18. Explain why the antigen receptors of lymphocytes are tested for self-reactivity during development. Predict the consequences that would occur if such testing did not take place.
19. Describe the mechanism of clonal selection. Distinguish between effector cells and memory cells.
20. Describe the cellular basis for immunological memory.

##### **Acquired Immune System Defenses**

21. Distinguish between
  - a. humoral and cell-mediated response
  - b. active and passive immunity
22. Describe the roles of helper T lymphocytes in both humoral and cell-mediated immunity.
23. Describe the functions of the proteins CD4 and CD8.
24. Explain how a single antigen can provoke a robust humoral response.

25. Describe the production and uses of monoclonal antibodies.
26. Compare the processes of neutralization and opsonization.
27. Describe the variation found in the major histocompatibility complex (MHC) and their role in the rejection of tissue transplants.
28. Explain what is unique about the source of potential immune rejection in bone marrow grafts.

### **Immunity in Health and Disease**

29. Describe an allergic reaction, including the roles of IgE, mast cells, and histamine.
30. Explain what causes anaphylactic shock and how it can be treated.
31. List three autoimmune disorders and describe possible mechanisms of autoimmunity.
32. Explain how general health and stress levels may affect the immune system.
33. Distinguish between inborn and acquired immunodeficiency.
34. Describe some of the mechanisms that pathogens have evolved to thwart the immune response of their hosts.
35. Describe the infectious agent that causes AIDS and explain how it enters a susceptible cell.
36. Explain how HIV is transmitted and describe its current incidence. List strategies that can reduce a person's risk of infection.