

13 The Lymphatic System and Immunity

Chapter Summary

The lymphatic system returns excess tissue fluid to the bloodstream, absorbs fats at the intestinal villi and transports them to the bloodstream, and helps defend the body against disease. The lymphatic system consists of lymphatic vessels, which are structurally similar to veins, and lymphatic organs. The primary lymphatic organs include the red bone marrow, which produces white blood cells and the thymus, which houses maturing T lymphocytes. The spleen, which houses lymphocytes and macrophages, and cleans the blood; and lymph nodes, which house lymphocytes and macrophages, and clean the lymph are secondary lymphatic organs. Immunity is the ability of the body to defend itself against infectious organisms. Specific defenses work against microbes with specific identity markers called antigens. Nonspecific defenses include barriers to entry, the inflammatory reaction natural killer cells, and various protective proteins. The inflammatory reaction occurs as a result of injury and increases capillary diameter and permeability, and marshals phagocytic white blood cells to the site of injury. Protective proteins include the complement system, which destroys bacterial cells by creating holes in their cell walls and plasma membranes; and interferons, which help prepare cells for viral invasion. Specific defense requires the actions of B lymphocytes and T lymphocytes. B lymphocytes provide antibody-mediated immunity by producing antibodies against foreign antigens and T lymphocytes provide cell-mediated immunity by directly attacking cells which bear antigens recognized as foreign to the body. Antibodies produced by B cells bind to specific antigens on the surfaces of microbes, both incapacitating the microbes and marking them for destruction. Active immunity develops after individuals have recovered from a disease or have been immunized by vaccination. Active immunity is the product of B lymphocytes called memory cells, which retain the ability to produce antibodies against specific antigens that have been encountered in the past. Passive immunity occurs when an individual is given antibodies to combat a disease. Passive immunity is short-lived because antibodies are not produced by the individual. Allergies are the result of an overactive immune system, and tissue rejection results from T lymphocytes destroying transplanted tissue. Autoimmune diseases involve immune systems that attack body tissues, and immune deficiencies involve immune systems that are incapable of defending against disease. AIDS is an example of an acquired immune deficiency.

Chapter Outline

- I. Lymphatic System
 - A. Lymphatic Vessels
- II. Organs, tissues, and Cells of the Immune System
 - A. Primary Lymphatic Organs
 - 1. Red Bone Marrow
 - 2. Thymus Gland
 - B. Secondary Lymphatic Organs
 - 1. Spleen
 - 2. Lymph Nodes
 - 3. Lymphatic Nodules
- III. Nonspecific and Specific Defenses
 - A. Nonspecific Defenses
 - 1. Barriers to Entry
 - 2. Inflammatory Reaction

3. Natural Killer Cells
4. Protective Proteins
- B. Specific Defenses
 1. B Cells and Antibody-Mediated Immunity
 2. Structure of IgG
 3. Other Types of Antibodies
 4. T Cells and Cell-Mediated Immunity
 5. Types of T Cells
 6. Cytokines and Immunity
- IV. Induced Immunity
 - A. Active Immunity
 - B. Passive Immunity
 - C. Monoclonal Antibodies
 - D. Immunity Side Effects
 1. Allergies
 - a. Immediate Allergic Response
 - b. Delayed Allergic Response
 2. Tissue Rejection
 - E. Diseases of the Immune System
- V. Effects of Aging
- VI. Homeostasis

Suggested Student Activities

1. Compare blood plasma and lymph in regard to composition and circulation.
2. Discuss the causes of infectious mononucleosis.
3. Discuss anaphylactic shock in severe allergies.
4. Discuss ways to prevent contracting AIDS.
5. Discuss how the HIV virus disables the immune system.

Answers to Objective Questions

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| 1. valves | 6. plasma, memory | 11. passive, active |
| 2. lymphocytes, macrophages | 7. antibody | 12. nonspecific |
| 3. lymph, blood | 8. cell | 13. complement |
| 4. neutrophils, monocytes (macrophages) | 9. vaccines | |
| 5. thymus | 10. histamine | |

Answers to Medical Terminology Reinforcement Exercise

1. meta/stasis - to stand beyond—the transfer of disease from one organ to another
2. allerg/ist - one who specializes in diagnosis and treatment of allergic conditions
3. immuno/suppress/ant - an agent capable of suppressing immune response
Immunosuppressants are administered to patients receiving transplants of human tissue to avoid rejection.
4. immuno/therapy - immunization treatment—treatment with immunopotentiators and immunosuppressants, hyposensitization for allergic disorders, bone marrow transplantation, and thymus implantation
5. spleno/rrhagia - hemorrhage from the spleen
6. lymph/adenopathy - disease of lymph glands
7. lymph/angiography - making a record/X ray of lymph vessels
8. eosinophil/ia - abnormally high numbers of eosinophils in the blood
9. thym/ectomy - removal of the thymus gland
10. lymphopenia - reduction in the number of lymphocytes in the blood
11. agammaglobulinemia - absence or low levels of gamma globulins in the blood
12. pyemia - systemic disease caused by organisms that stimulate pus production
13. tonsillectomy - removal of a tonsil
14. hypersensitivity - increased level of sensitivity

Audiovisual Materials

1. Charts and Posters of Lymphatic System (Concept Media)
2. Filmstrip - Lymphatic System in the Human Body (HD-0368-NU)(Career Aids)