

Biology: Seventh Edition
Unit 7: Animal Form and Function
Chapter 43: The Immune System
Adapted from Notes by: Jessica Liu

- 1) Innate immunity provides broad defenses against infection
 - a. External Defenses
 - i. Intact skin
 - ii. Mucous membranes. Mucus—viscous fluid that traps microbes and other particles
 - iii. Secretions- Acidic environment of skin and stomach destroys many microbes and pathogens
 - *. Lysozyme—enzyme that digests the cell walls of many bacteria; present saliva, tears, and mucous secretions; destroy bacteria as they enter upper respiratory tract and openings around eyes
 - b. Internal Cellular and Chemical Defenses
 - *. Phagocytosis—the ingestion of invading microorganisms by certain types of white blood cells [phagocytes] that produce antimicrobial proteins and help initiate inflammation to limit spread of microbes
 - ii. Phagocytic Cells
 1. Attach to microbes via surface receptors that bind to structures found on microorganisms but not in body cells
 2. Engulf microbes, forming vacuole that fuses with lysosome; toxic forms of oxygen e.g. nitric oxide poison microbes; lysozyme and other enzymes degrade microbial components
 - iii. Antimicrobial Proteins
 1. Complement system—made up of ~30 serum proteins; in the absence of infection, are inactive; substances on surface of microbes trigger activation, leading to lysis of invading cells; help trigger inflammation, play role in acquired defense
 2. Interferon— α and β ; secreted by virus-infected body cells; induce neighboring uninfected cells to produce substances to inhibit viral reproduction; interferon γ ; helps activate macrophages
 - iv. Inflammatory Response
 1. Inflammatory response—triggered by injury or entry of pathogens
 2. Histamine—trigger dilation and increased permeability of nearby capillaries, promoting blood flow and inflammation and swelling [from leaking fluid]
 3. Mast cells—found in connective tissues; cells in which histamine is stored
 4. Inflammation helps deliver antimicrobial proteins and clotting elements to injured area, beginning repair process and blocking spread of microbes to other parts of body
 5. Chemokines—direct migration of phagocytes and signal them to increase production of microbe-killing compounds; secrete by blood vessel endothelial cells at or near site of injury or infection
 - v. Natural Killer Cells
 1. Natural killer (NK) cells—attack virus-infected body cells and cancer cells; surface receptors recognize general features on surface of targets; releases chemicals the lead to death of cell by apoptosis
 2. Apoptosis—programmed cell death
- 2) In acquired immunity, lymphocytes provide specific defenses against infection
 - a. Cytokines—proteins that help activate lymphocytes and other cells of immune system
 - b. Antigen—usually proteins or polysaccharides; recognized by lymphocytes as foreign and elicits response from lymphocytes; dissolved in extracellular fluid, protrude from surface of foreign cells
 - c. Epitope (antigenic determinant)—small, accessible portion of antigen to which lymphocyte binds
 - d. Antigen Recognition by Lymphocytes
 - i. Two main types of lymphocytes: B lymphocyte (B cell); T lymphocyte (T cell)

Chapter 43 The Immune System Study Guide Answers

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