Chapter 43

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- Lymphocyte − A type of attacking white blood cell
- Phagocytic − An engulfing white blood cell
- First and second line of defense in immune system is called the **innate immunity** and is non-specific (gets rid of any foreign agents)
    1. First line of defense is external (skin, mucous membranes, secretions, etc.)
    2. Second line of defense is internal (phagocytic cells, antimicrobial proteins, inflammatory response, natural killer cells)
- Third line of defense is **acquired immunity**, takes longer, and is specific to a foreign agent
    1. Third line of defense is internal (humoral responses [antibodies], cell-mediated response [cytotoxic lymphocytes])
- Invaders are recognized through **antigens** (cellular nametags)
- B cells attack and remember pathogens while circulating in blood and lymph
    1. B cells produce specific antibodies against specific antigens
    2. To types of B cells − Plasma cells (produce antibodies) and Memory cells (circulate body)
- Antibodies − Proteins that bind to a specific antigen
    1. Each antibody is unique and specific
    2. Tag foreign invaders (like handcuffs)
    3. Prevent pathogens from entering host cells
    4. Cause pathogens to clump together

5. Macrophages are non-specific white blood cells that engulf invaders

- B cell immune response usually takes from $10-17$ days
- If an attacker gets past and infects cells, Killer T-cells are released and attack cells that contain invaders
- How T-cells recognize infected cells:

  1. Infected cells digest some pathogens
  2. MHC proteins carry antigens to cell surface
  3. T-cells "scan" antigens to locate infected cells

- T-cells attack, learn, and remember pathogens hiding in infected cells (recognize antigen fragments)
- Types of T-cells:

  1. Helper T-cells – Alert rest of immune system
  2. Cytotoxic T-cells – Attack infected body cells
  3. Memory T-cells – Circulate body

Type	Antigen	Antibody	Donation Status
A	A	B	–
B	B	A	–
AB	A & B	N/A	Recipient
O	N/A	A & B	Donor

- Positive and Negative in blood refers to RH factor (positive means present, negative means not)
- Antigen Presenting Cells (APC) can be infected cells or macrophages. Helper T-cells scan these cells, releasing interleukin to alert rest of system.
- T-cells bind to target cells and secrete **perforin** protein, which causes lysing of cell and apoptosis
- Swelling of injuries:

  1. Inflammation is a response
  2. Injured cells release histamines, while bacteria comes in
  3. Increases blood flow to punctured zone
  4. Brings more white blood cells to fight bacteria
  5. Brings more red blood cells & clotting factors to repair area