The Duality of the Immune System

- **Humoral Immunity**
  - Also called *antibody-mediated* immunity (AMI)
  - Involves the production of *immunoglobulins* by *B lymphocytes* (B cells)

- **Cell-Mediated Immunity (CMI)**
  - Involves activity of specialized *T lymphocytes* (T cells)
  - Necessary for defense against intracellular pathogens (which antibodies can’t reach)
What are Antigens?

- By definition, antigens are what antibodies bind to!
- Antigens are macromolecules: proteins, polysaccharides
- Antibodies actually recognize **antigenic determinants**, or **epitopes**, of which there may be many on a single antigen

What Are Antibodies?

- **Immunoglobulins**
  - Basic unit has four polypeptides: Two identical **heavy chains** and two identical **light chains**
  - Each chain has a **variable (V)** region; these are what make different antibodies different
- **How antibodies work**
  - An **antigen-binding site** formed from the V regions of a heavy and light chain, has specific affinity for an antigenic determinant
  - The **Fc** region of the antibody is recognized by cells and other molecules involved with host

Antibody Classes

- Difference are due to the heavy chain used
- **IgG**, “serum immunoglobulin”
  - Most abundant immunoglobulin in serum
  - Capable of crossing the placenta
- **IgM** is secreted as a pentamer of the basic unit with a **J chain**
  - Produced early in the immune response
- **IgA**, “secretory immunoglobulin”
  - Secreted as a dimer of the basic unit
  - Prominent in secretions, on mucosal surfaces
- **IgD** may be involved in initiating immune responses; most is cell-associated
- **IgE** molecules bind to mast cells, initiate inflammation when they recognize antigen; may be significant in protection against eukaryotic parasites
There are two main lines of lymphocytes

- **B cells**
  - Are the source of antibody-secreting plasma cells
  - Complete their maturation in bone marrow
- **T cells**
  - Regulate the activities of other cells
  - Complete their maturation in the thymus
Primary and Secondary Immune Responses

- Secondary responses show a higher IgG:IgM
- Greater magnitude of secondary responses is attributable to B memory cells