

# ADAPTIVE IMMUNITY AND TYPES OF ANTIBODIES

1. **Helper T cells** (AKA CD4 cells): capable of recognizing millions of different peptide sequences.
  - a. activate B cells
  - b. activate cytotoxic T cells
  - c. further stimulate inflammation
2. **Cytotoxic T cells** (AKA CD8 cells)
  - a. Activated CD8 cells destroy pathogens or host cells that have become cancerous; or other WBCs that are autoimmune. They secrete toxic chemicals onto pathogens; and induce apoptosis in host cells.
  - b. memory CD8 cells: remain in the body/circulation for months or years
3. **B cells – once activated, differentiate into plasma cells**, which produce antibodies to the recognized antigen.
  - **Antibody Structure:** 4 protein chains; 2 are “**heavy**” (long protein sequence) and 2 “**light**” (short protein sequence). Shaped like a Y. The arms of the Y are **variable**, depending on which antigen the antibody matches with. This is called the antigen-binding sequence of the antibody. The base of the Y determines the **class** of immunoglobulins.
  - Antibodies stick to the pathogen and target it for phagocytosis by macrophages
  - The most common antibody classes are:
    1. **IgM:** Produced by plasma B cells when they are first exposed to a recognized antigen. Memory cells for this recognized pathogen will make a different class:
  - b. **Memory B cells:** remain in the body/circulation for months or years. They exhibit a “class switch” when stimulated by the antigen, and produce one of the following types of antibodies. The variable region will remain the same, but the base of the Y is different.
    1. **IgA:** Produced by plasma B cells present in all of the mucous membranes. Very plentiful in colostrum, since the newborn hasn’t built up his own IgA production yet.
    2. **IgG:** Memory plasma B cells make this class of antibody to guard the bloodstream from future attacks by the pathogen.
    3. **IgE:** Antibodies that specialize in attacking worm and fungal infections. Because there aren’t many of those in the U.S., plasma B cells that produce IgE antibodies may be “untrained” and activate inappropriately, resulting in allergies.