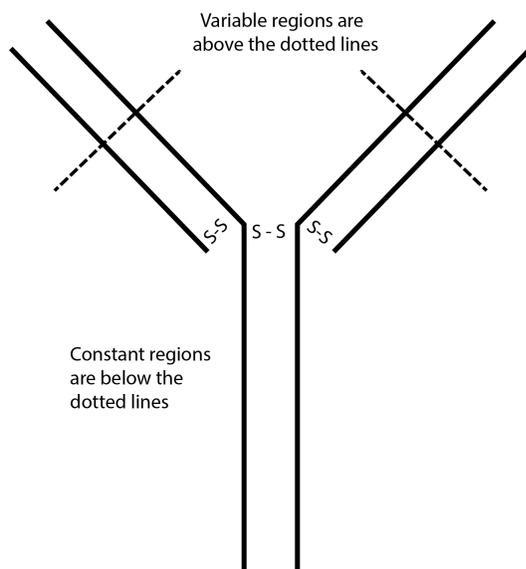


## Adaptive or Acquired Immunity (Specific Immunity Homework Assignment)

Adaptive immunity (acquired immunity) involves **leukocytes** (white blood cells or WBCs) called \_\_\_\_\_ that are produced within the red bone marrow by multipotent or pluripotent stem cells. There are two branches of the adaptive immune system that involve different populations of these cells. Cells that leave the bone marrow and migrate to gut associated lymphoid tissues (GALT – most likely Peyer’s patches), are involved in \_\_\_\_\_ or antibody-mediated immunity. Cells that migrate to the thymus gland before entering lymphoid tissues are called \_\_\_\_\_ and are involved in cellular or cell-mediated immunity. There are many sub-populations within these two cell categories, and additional modification will render them able to respond specifically to foreign agents.

Substances recognized by the body as foreign (not self), and capable of eliciting an immune response are called \_\_\_\_\_. These may be large \_\_\_\_\_, viruses, or cells (bacteria, fungi, protozoa, etc.), but typically have on their surfaces many specific molecular groups called antigenic determinant groups or \_\_\_\_\_. In response to these foreign agents, B-cells give rise to complex globular proteins called \_\_\_\_\_ or antibodies. Actually there are many different sub-populations of B-cells, each of which is capable of producing antibodies against a specific type of antigenic determinant. When these antigens enter the body, the antigen-specific B-cells are stimulated to proliferate (reproduce) to form groups of identical cells called \_\_\_\_\_. These cells then give rise to \_\_\_\_\_ and these produce antibodies in large quantities and release them into the circulation.

Antibodies are \_\_\_\_\_ proteins made up of four or more polypeptide chains connected together by disulfide bonds. In the case of IgG, there are two short polypeptides referred to as \_\_\_\_\_ chains, and two long polypeptides referred to as \_\_\_\_\_ chains.



In this diagram the variable regions have different amino acid sequences and form the \_\_\_\_\_ binding sites of the antibody. The constant regions have the same amino acid sequences in all antibodies grouped within the same \_\_\_\_\_ or class. There are five classes of antibodies, and these are designated as Ig \_\_\_\_\_. Of these five, \_\_\_\_\_ and \_\_\_\_\_ are the most common within the circulation, and can “fix” complement. \_\_\_\_\_ is bound to mucous membranes and in secretions such as tears and saliva, while \_\_\_\_\_ are most commonly associated with allergic reactions (hypersensitivity reactions).

Antibodies help to defend the body against damage caused by antigens in four specific ways including:

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_

**Note – Precipitation and agglutination reactions are less beneficial because they can cause the formation of complexes that block tiny blood and lymphatic vessels as well as kidney tubules.**

T-cells do not produce antibodies, but are able to recognize and bind with specific antigens. They have receptors on their cell surfaces that allow them to respond to antigens when they occur in combination with cell membrane proteins called \_\_\_\_\_ proteins or human leukocyte antigens. T-cells can therefore only respond to specific types of antigens including \_\_\_\_\_.

They cannot respond to viruses or bacteria unless they are attached to eukaryotic cells. There are three categories of T-cells involved in cellular immunity including; 1) \_\_\_\_\_, CD4 lymphocytes that help B-cells respond to antigens and proliferate (they also cause other types of T-cells to proliferate); 2) \_\_\_\_\_, CD8 lymphocytes that kill foreign, infected and tumor cells by releasing cytotoxic substances (cytokines called \_\_\_\_\_ and \_\_\_\_\_); and \_\_\_\_\_, CD4 + CD8 lymphocytes that act to inhibit immune responses once an antigen has been eliminated or overcome (these also help maintain tolerance to “self” antigens and prevent autoimmune disease). All T-cells carry out their functions by releasing high molecular weight substances called \_\_\_\_\_ (formerly known as lymphokines). Some examples of these not listed above include \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_. It is significant that CD4 and CD8 lymphocytes do not respond to the same types of MHC proteins.

Adaptive immunity requires prior exposure to a foreign agent (or to chemical groups very similar to specific epitopes). The first time an antigen is introduced, certain sub-populations of T-cells and B-cells are stimulated to proliferate and antibodies are made. The level of antibody activity (titer) within the circulation increases slowly, reaches a maximum, and then decreases over time. When the same antigen enters the body a second or subsequent time, it will induce a very rapid increase in antibody titer. This is known as an \_\_\_\_\_ response (meaning to recall), and involves cells called \_\_\_\_\_ cells that can sometimes persist within the body throughout the lifetime of the host organism.

Two types of cells other than B-lymphocytes often play a significant role in the initiation of humoral immune responses. These are \_\_\_\_\_ (cells that consume antigens and present epitopes on their membrane surfaces), and \_\_\_\_\_ (cells that recognize antigens in combination with MHC proteins and stimulate cell proliferation). Since the retrovirus known as the \_\_\_\_\_ attacks and kills primarily \_\_\_\_\_ lymphocytes, it effectively cripples both humoral and cell-mediated immune responses.