**Why It Matters**

* Our bodily defense mechanisms fall into two categories
  + Keeping germs \_\_\_\_\_ of the body (the skin’s job)
  + \_\_\_\_\_\_\_ the germs once they get inside the body (job of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* Two deadly diseases that have been entirely or almost entirely eradicated from the world due to vaccinations are:
  + \_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_

**What We Know**

* Structure and Function of the Skin
  + Skin is the first line of defense for the body and is part of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ system.
  + Name four properties of skin:
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Immune and Lymphatic Systems
  + When a foreign invader is detected in the body, the \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_ systems are activated.
  + The defense cells that are mobilized in the blood and lymph vessels are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and include cells called lymphocytes.
  + Lymphocytes are developed in the \_\_\_\_\_\_\_\_\_\_\_\_ which are connected together by lymph vessels that together make up the lymphatic system.
* White Blood Cells
  + The most abundant white blood cell is the \_\_\_\_\_\_\_\_\_\_\_\_ which is active during bacterial infections. They “eat” bacteria and other foreign invaders through a process called \_\_\_\_\_\_\_\_\_\_\_\_.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_ are another type of white blood cell that comes in a B-type and T-type
    - Killer T-cells or cytotoxic T-cells kill/destroy cells infected with viruses or cancer by releasing \_\_\_\_\_\_\_\_\_\_ to prevent the infection of \_\_\_\_\_\_\_\_\_ cells.
    - T-cells are made in the \_\_\_\_\_\_\_\_.
  + B-cells make circulating \_\_\_\_\_\_\_\_\_\_\_\_ \_. The B-type lymphocytes are made in the \_\_\_\_\_\_\_\_\_\_\_\_\_ and mature in the lymph nodes.
    - A B-cell is activated by an \_\_\_\_\_\_\_\_\_ binding to the antibody receptor or by receiving signals from other immune cells.
    - After being activated, B-cells turn into \_\_\_\_\_\_\_\_ B-cells, which stay in the body to respond to repeat infections, and \_\_\_\_\_\_\_\_ cells which secrete antibodies into the blood to inactivate antigens.
* What is an Antibody?
  + Antibodies are Y-shaped \_\_\_\_\_\_\_\_ that are specific to a multitude of potential \_\_\_\_\_\_\_\_\_\_.
  + When antibodies bind to their antigen, like proteins or other substances from bacteria, fungi, or viruses, they \_\_\_\_\_\_\_\_\_\_\_\_ them.
* Invaders!
  + Substances that cause an immune response are called \_\_\_\_\_\_\_\_\_\_.
  + The body recognizes proteins on its own cells but if something is recognized as foreign, then the immune system makes \_\_\_\_\_\_\_\_\_\_\_\_ to attach to and inactivate the foreign bodies.
  + Antibodies can circulate in the \_\_\_\_\_\_\_ or found \_\_\_\_\_\_\_\_\_\_ to other cells.
* Fighting the Invaders!
  + Two approaches the immune system has to attacking an invader are
    - \_\_\_\_\_\_\_\_\_\_\_ or phagocytosis by migrating cells like \_\_\_\_\_\_\_\_\_\_\_ and neutrophils
    - \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* There are two Types of Immunity
  + An organism is born with \_\_\_\_\_\_\_\_ immunity.
    - Name three components of the innate immune system
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - The innate immune system responds \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ immunity is developed after exposure to an antigen.
    - The cells and proteins it produces can change and adapt to fight a given invader more \_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Acquired immunity is \_\_\_\_\_\_\_\_ to act than innate immunity, but is much more \_\_\_\_\_\_\_\_\_\_\_.
    - There are two types of acquired immunity:
      * \_\_\_\_\_\_\_\_ immunity - develops after exposure to an antigen such as following \_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_, and can last for years.
      * \_\_\_\_\_\_\_\_\_ immunity - develops after receiving antibodies or other immune system components from another organism that has active immunity such as through mother’s \_\_\_\_\_\_ or an injection/infusion. This immunity does not last very long.

**How We Know**

* The First Line of Defense: Skin
  + To examine skin under a microscope, certain steps must be completed:
    - The sample must be sliced very \_\_\_\_\_\_ so that it is \_\_\_\_\_\_\_\_\_\_\_\_\_
    - The sample must be placed on a microscope \_\_\_\_\_\_\_.
    - The skin must be \_\_\_\_\_\_\_\_\_ with a dye to make the cell parts visible.
  + What kind of substances are absorbed into the skin?
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The Second Line of Defense: The Immune System
  + In the past some diseases have affected/killed some but \_\_\_\_\_\_\_\_\_\_\_\_.
* Oh no, Zits!
  + What makes some zits white?
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that are attracted to wounds and foreign invaders.
* Studying White Blood Cells
  + The components of blood are separated for studying by an instrument called a \_\_\_\_\_\_\_\_\_\_\_\_.
* Vaccines
  + The goal in vaccine manufacturing is to make the infectious organism \_\_\_\_\_\_ enough so that it won’t cause the disease but \_\_\_\_\_\_\_\_ enough that it will \_\_\_\_\_\_\_\_\_\_ the body’s immune system.
  + Once the immune system is activated by a disease agent, \_\_\_\_\_\_\_\_\_\_\_\_ are produced to fight the disease and are \_\_\_\_\_\_\_\_\_\_ to that particular infectious agent.
  + While the original antibodies eventually go away, the adaptive immune system has a \_\_\_\_\_\_\_\_ to fight off the same disease later on.

**Common Hazards**

* Sunburn
  + The sun radiates \_\_\_\_\_\_\_\_\_\_\_\_\_ light.
  + The skin has a protective pigment called \_\_\_\_\_\_\_ that turns \_\_\_\_\_\_\_ when struck by the sun’s rays.
  + If the sun gives off more rays than the body can handle, then this will cause a \_\_\_\_\_\_\_\_\_.
  + The redness of a sunburn is caused by increased \_\_\_\_\_\_\_\_\_\_\_\_.
    - Damage to cell membranes causes \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_ to be released which causes blood vessels to dilate.
  + The pain and soreness or a sunburn is due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ processes to try to heal the body.
  + Being in the sun too much can cause DNA \_\_\_\_\_\_\_\_\_ and eventually skin \_\_\_\_\_\_\_\_.
    - Skin cancer is the most common cancer in the U.S. and \_\_\_\_\_\_\_\_\_\_\_
  + SPF or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tells how long you will be protected for based on how long you can normally stay in the sun before burning.
    - If you can normally stay in the sun for 10 minutes how long would SPF 15 sunscreen protect you?
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Skin tone corresponds to the amount of \_\_\_\_\_\_\_\_\_ in the skin. Light-skinned people have less melanin and are (more/less) likely to develop melanoma than dark-skinned people.
* HIV/AIDS
  + HIV stands for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - There is currently no vaccine for HIV
  + AIDS stands for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - There is currently no cure for AIDS
  + AIDS is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ caused by HIV.
  + HIV attacks \_\_\_\_\_\_\_\_\_ which causes their numbers to drop and weakens the \_\_\_\_\_\_\_\_ system. If this goes untreated, it can lead to AIDS.
  + What are the three routes HIV can be spread by:
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + It can take \_\_\_\_\_\_\_\_\_\_ for HIV to be detectable by blood test.
  + AIDS doesn’t directly cause death, but \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ diseases like cancer and pneumonia that wouldn’t affect someone with a functioning immune system do.
  + While there is no cure or vaccine for HIV/AIDS at this time, it can be managed with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (ART). This helps prevent the virus from spreading between and destroying T-cells.