

DEFENDING & PROTECTING THE BODY (Immune System & Integumentary System)

IMMUNE SYSTEM (textbook pages B74-B81)

The Immune System defends the body from bacteria, virii (viruses), and other harmful foreign materials or pathogens.

Pathogens – An agent that causes disease. They can enter through your skin, the air you breathe, the food you eat or liquids you drink. (Especially things like viruses and bacteria.)

The body's first line of defense against pathogens:

- **Respiratory System** (sneezing and coughing, cilia and mucus)
- **Digestive System** (saliva, mucus, digestive enzymes, stomach acids)
- **Integumentary System** (skin barrier)

When pathogens get past the first line of defense, the **Immune System** then responds.

White Blood Cells – Specialized cells in the bloodstream that respond to foreign materials in the body. **(They fight the germs that get into your bloodstream and body tissues.)**

White blood cells travel through the Circulatory System and Lymphatic System to an injured or infected area of the body.

The number of white blood cells can **increase** during an Immune System response.

Lymphatic System - This part of the immune system transports pathogen-fighting white blood cells throughout the body, similar to the Circulatory System.

Lymph – The main fluid of the Lymphatic System. Composed of fluids left in tissues by the Circulatory System. Flows through lymph vessels (similar to blood vessels). Lymph helps carry white blood cells around the body.

Unlike the Circulatory System, the Lymphatic System does not circulate its fluids with a pump. The fluids move when the body moves, such as with exercise or when you change position.

Lymph Nodes – Bean-shaped Structures that help filter out pathogens from lymph fluid, plus they store white blood cells and antibodies. Sometimes the lymph nodes get swollen when your body is fighting infection. (You can probably feel the lymph nodes in your neck under your jaw.)

Most symptoms of illness are due to immune system responses.

Two types of Immune System response:

- **Nonspecific Response** - White blood cells attack foreign materials (surround and “eat” or absorb them). The infected tissue might get red, swollen, and warm.

When multiple areas of your body are affected, your whole body temperature rises (you get a fever).

- **Specific Response** - White blood cells produce specific antibodies for a specific pathogen, which kill the pathogen and helps the body “recognize” it if the same pathogen ever invades the body again in the future. (You become “immune” to that particular pathogen.)

Immunity – The body’s resistance to a particular pathogen.

Vaccination – Weakened or dead pathogens that are intentionally introduced into the body so the body will develop an immunity for that disease.

Example: You might get a flu shot for a particular strain of flu virus so that if you actually do come into contact later with a full strength version of that virus your body will already know how to fight it before it makes you sick.

Antibiotics – Medicines that block the growth and reproduction of bacteria.

INTEGUMENTARY SYSTEM (textbook pages B83-B88)

The Integumentary System includes your skin, hair, and nails.

The skin protects the inside of your body from harmful materials outside the body. It also:

- Repels water
- Guards against infection
- Helps maintain homeostasis
- Senses the environment

Main Layers of your Skin:

- **Epidermis** – Tough, protective outer layer (the part you can see)
- **Dermis** – Strong, elastic inner layer
- **Fatty Tissue** – Not technically a layer of skin, but it lies just under the dermis and helps the body with temperature protection and energy storage.

A few structures located in the Dermis layer:

- **Sweat glands** - help maintain the body’s internal temperature
- **Oil glands** - protect the skin by keeping it moist
- **Hair** - shields your head from the sun’s rays; traps heat close to your head to keep you warm
- **Nails/Fingernails & Toenails** - Protect the tips of fingers and toes from injury.
- **Sensory Receptors** - Actually part of the Nervous System; help us sense heat, cold, pain, touch, and pressure

Skin grows from the inside layers (base of the epidermis) and the cells eventually rise to the outer layer. The outermost surface layer of skin is mostly dead cells. (They form a waterproof layer about 30 cells deep.)

Every 2-4 weeks your skin surface is entirely new (old cells fall off and new cells rise to replace them).

Many cells in your hair and nails are dead, too. (Especially the outer layer of cells.)

How can you protect your skin?

- Good nutrition and drink lots of water
- Protect it from the sun’s rays (clothing and sun block lotion) and from weather damage such as cold winds (clothing; moisturizer)
- Clean it. Wash away harmful bacteria so it cannot enter the body.