The Immune System


The immune system protects the body from foreign organisms and substances. It has outside and inside defenses. Outside defenses are the eyes, mouth, nose and skin. Inside defenses are bone marrow, the lymphatic system, the spleen, the thymus and white blood cells. We will take a closer look at these defenses.

Outside Defenses

The Eyes make tears to wash away harmful particles and organisms. Tears contain enzymes that break down and destroy bacteria.

The Mouth makes saliva that contains enzymes. Like tears, these enzymes kill bacteria that might enter the body through food and drink.

The Nose is lined with mucous membranes. Mucous traps dust and foreign organisms that enter the body when you inhale.

Mucous flushes away anything that disturbs the mucous membranes. This causes a runny nose. It can also cause a sneeze. Viral infections can also disturb the membranes of the nose. The common cold is the most common virus to cause a runny nose.

The Skin is the outer layer of the body. It is the immune system’s first line of defense. The skin protects the body in many ways.

Skin protects against injury. Its outermost layer, the epidermis, is a shield that stops bacteria, microbes and foreign materials from entering the body.

Glands in the skin produce chemicals that protect from bacteria.

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Important! Each educational unit contains words that are defined in the Know Your Body Glossary. Please remember to include the Glossary when downloading the educational unit(s) in PDF format.
Nerves in the skin notify the brain of sensations that might harm the body.

The skin serves as a sensor to regulate body temperature. The body rises (as with a fever) or lowers its temperature to create an unfriendly environment for foreign bacteria or viruses.

Inside Defenses

Bone Marrow is inside the hollow interior of bones. In adults, the marrow in large bones makes new blood cells.

There are two types of bone marrow. Red marrow is mostly red blood cells, platelets and white blood cells. These cells are discussed in The Cardiovascular System. Yellow marrow is made of fat cells.

Bone marrow makes large numbers of white blood cells. These cells help the body fight disease.

The Lymphatic System is a network of tunnels, similar to capillaries, which move and store white blood cells called lymphocytes.

Lymphocytes circulate in a clear liquid, similar to plasma, called lymph. The lymphatic system picks up fluid from cells and carries it to the veins of the cardiovascular system. Viruses and bacteria are taken to lymph nodes (sometimes called lymph glands) where they are filtered out and destroyed.

The Spleen is in the upper-left side of your abdomen. The spleen removes old, worn-out red cells from the blood. It also filters bacteria out of the blood. The spleen is the largest single organ of the immune system. The body can survive without a spleen but is more likely to suffer from infections.

The Thymus is located in the chest behind the sternum. The thymus creates T-cells. Some T-cells prevent other cells from attacking the body. Diseases caused when the body attacks itself are called autoimmune diseases.

White Blood Cells kill harmful bacteria and viruses. There are three types of white blood cells: lymphocytes, macrophages and neutrophils.
Lymphocytes fight bacterial and viral infections. Two types of lymphocytes are B-cells and T-cells.

Macrophages are the largest cells in the body. Some live in different parts of the body (like the lungs) to keep them clean. Others clean up damaged neutrophils that cleared bacteria from a wound.

Neutrophils search out and kill foreign material in the body such as bacteria and viruses.

Figure 1 shows the organs of the immune system and their locations within the body:

![Organs of the Immune System](http://www.web-books.com/eLibrary/ON/B0/B8/04MB8.html)

**Figure 1.** Organs of the Immune System.

**Keeping the Immune System Healthy**

The best way to protect the immune system is a healthy lifestyle. The immune system works best by following these rules:

- Don't smoke.
- Drink alcohol only in moderation.
- Exercise regularly.
- Maintain a healthy weight.
• Eat a healthy diet high in fruits, vegetables and whole grains and low in saturated fat.
• Keep blood pressure under control.
• Get enough sleep.
• Wash hands to avoid exposure to disease.

Diseases of the Immune System

Below is a list of common diseases of the immune system:

**Addison's Disease** happens when the body attacks the adrenal glands. This prevents the adrenal glands from producing their normal hormones. The body becomes weak and dehydrated, unable to maintain good blood pressure or respond to stress.

AIDS (acquired immune deficiency syndrome) removes the body's ability to fight infection and illness. Symptoms include:

- Fever
- Night sweats
- Swollen glands
- Chills
- Weakness
- Weight loss

**Crohn's disease** is caused by the body attacking its gastrointestinal tract. This causes chronic inflammation. Symptoms include:

- Abdominal (belly) pain
- Fever
- Fatigue
- Loss of appetite
- Pain passing stool
- Persistent, watery diarrhea
- Weight loss
**Diabetes (Type 1),** also called insulin dependent or juvenile-onset diabetes, includes about 10% of diabetes cases in the United States. The cause of type 1 diabetes is unknown. A family history of diabetes, an injury to the pancreas, or the destruction of B-cells may play a role.

**Graves’ disease** causes an overactive thyroid gland (hyperthyroidism). An antibody attacking thyroid gland causes it to produce too much thyroid hormone. Symptoms include:

- weight loss
- increased appetite
- hand tremors
- heat sensitivity
- sweating
- nervousness

**Guillain-Barre Syndrome** causes progressive muscle weakness or paralysis. The body’s immune system attacks its nervous system. It causes inflammation and damages nerves.

**HIV (human immunodeficiency virus)** is the virus that causes AIDS. It kills T-cells. As T-cells die, the body cannot fight off disease. When the number of T-cells grows too low, HIV becomes AIDS.

**Lupus** causes inflammation of the skin, joints, blood cells, and internal organs, especially the kidneys, heart and lungs. Symptoms include:

- muscle pain
- arthritis-like pain in joints
- rash
- fatigue
- sensitivity to light
- hair loss
Multiple Sclerosis affects the central nervous system. The body attacks and destroys the myelin surrounding the nerve fibers. Damage to the myelin hinders transmission of nerve signals and affects muscle control.

Rheumatoid arthritis causes stiffness, pain, loss of movement, inflammation, and the breakdown of joints. It usually affects the hands and wrists. Symptoms include fatigue, fever, lumps under the skin and generally not feeling well.

Scleroderma affects connective tissue. Scleroderma forms scar tissue in the skin and organs of the body. The scar tissue can restrict movement. It can also damage internal organs.

Case Study of Disease of the Immune System

Magic Johnson (see Figure 2), a professional basketball player, was diagnosed with HIV in 1991. After finding out about his illness, he retired from basketball.

Magic may have caught HIV from unsafe sex before he married. Luckily, his family was not infected with HIV. His wife and unborn child both tested negative.

To help others diagnosed with HIV & AIDS, Magic Johnson created the Magic Johnson Foundation. Johnson went public with his illness and is a spokesperson for World AIDS Day.

With medication, Magic Johnson maintains his health and lives HIV positive, but AIDS free.
References


