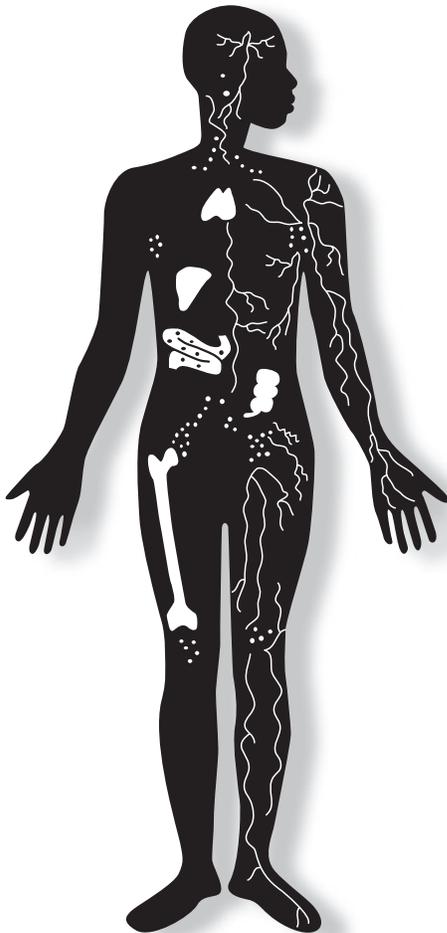


The Immune System

In a Capsule

- ⦿ Your immune system is your body's defence against infections and cancers.
- ⦿ The immune system has many components, including the skin, mucous membranes and white blood cells.
- ⦿ There are many types of white blood cells. Each type plays a different role in fighting infections.
- ⦿ A CD4 cell is a type of white blood cell that is especially important to the immune system. HIV infects and destroys CD4 cells.



The immune system is the body's defence against disease. It protects the body from disease-causing germs, such as bacteria, viruses, fungi and parasites, as well as cancerous cells.

Normally, the immune system can tell the difference between what belongs in your body and what doesn't. It "remembers" previous encounters with disease-causing germs (for example, the virus that caused the measles you had as a child) and knows how to defend against these threats. It also learns how to respond to invaders it hasn't seen before, by developing specific defences against them.

Outside the body

The **skin** is your immune system's first line of defence. It provides a physical barrier that keeps bacteria and viruses from getting inside the body. HIV, for instance, cannot be transmitted through healthy, unbroken skin.

However, HIV and other organisms can be transmitted through the body's **mucous membranes**. These are the wet linings of body cavities and other organs, such as the vagina, rectum and urethra (the "pee hole" in the penis or the vulva). These tissues don't have to be damaged or bleeding to be infected: HIV can infect cells in the lining of the vagina, rectum and penis even if the tissues are healthy.

Inside the body

When disease-causing germs get into the body, the internal part of the immune system comes into play. Its job is to recognize intruders and either destroy them or suppress them so they won't cause harm. The immune system includes white blood cells, lymph nodes and body tissues, such as the tonsils and insides of the intestines. The immune system also includes other components, such as the bone marrow, the thymus, the spleen and the appendix. All of these play different roles in fighting infections.

The **lymphatic system** is especially important in people with HIV. The lymphatic system is made up of vessels that branch out into all parts of the body, similar to the veins, arteries and capillaries that carry blood. Instead of blood, lymphatic vessels carry a clear, watery fluid, called *lymph*, which carries foreign material away from your body's cells. The lymphatic

vessels pass through **lymph nodes** and tissues. Inside these nodes and tissues, cells of the immune system trap, filter and destroy foreign material, including bacteria, viruses and other microbes.

There are 500 to 1,000 lymph nodes and tissues scattered throughout the body. Large groups of lymph nodes are found in the neck, armpits and groin, but the largest concentration is in your abdomen. Sometimes when you have an infection, you can feel what people call “swollen glands” in some of these areas. These swellings are your lymph nodes responding to unwanted germs.

Each lymph node is densely packed with millions of immune cells that identify and destroy the microbes that cause disease. These infection-fighting cells are known as *white blood cells*, or *leukocytes*, and they are the key players in the response of your immune system.

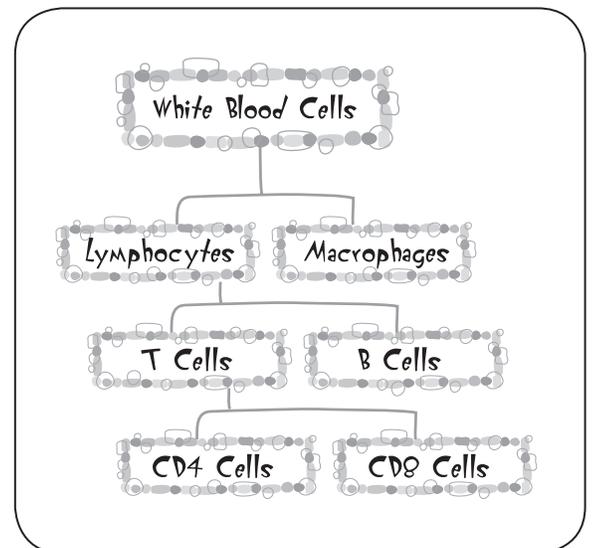
Immune cells

There are many different kinds of white blood cells. Don't worry too much if you can't keep them all apart. Although CD4 cells are very important for HIV-positive people, the other types of white blood cells will rarely come up during your doctor's visits. If you're interested, this list should give you a quick sense of what's what.

Leukocytes are the biggest group, including all types of white blood cells. (*Leuko* means white and *cytes* means cells.)

Lymphocytes are a kind of leukocyte, which include the *T cells*. T cells are identified by molecules, called *receptors*, on their surfaces. T cells with different kinds of receptors carry out different functions.

One particular kind of T cell, the **CD4 cell**, is especially important for people with HIV. CD4 cells are named after a protein called CD4, which they carry on their surface like a fingerprint. CD4 cells lead the attack against infections. They release chemical messengers called *cytokines* that stimulate other immune cells to make antibodies or to destroy infected cells. CD4 cells are sometimes compared to the quarterbacks of a football team or the conductors of an orchestra, because they direct the response of your body's immune system.



A partial lineage of white blood cells.

I used to pretend to coax my CD4 cells down to a cut on my fingertip by rubbing my finger and saying words of encouragement. It was my way of reminding myself that my CD4 cells are still there to help keep me healthy.

—André

CD8 cells are T cells that have a protein called CD8 on their surface. When CD8 cells recognize a specific infection, such as HIV, they can develop into what are often referred to as killer T cells or CTLs (cytotoxic T lymphocytes). These killer T cells seek out and kill other cells that are already infected or cancerous.

B cells are lymphocytes that make and release *antibodies*. An antibody is a type of protein that can lock on to bacteria or viruses. When an antibody locks on to a germ, it acts as a signal for other immune cells to destroy the invader. Each B cell is programmed to make one specific antibody. For example, one B cell will make the antibody that blocks measles viruses, while another makes antibodies to the bacteria that cause pneumonia. Although the immune system produces antibodies against HIV, these antibodies don't protect the body from HIV infection.

Macrophages are immune cells that perform many functions, such as warning the immune system of invading microbes and helping to attack and destroy HIV-infected cells and cancerous cells.

Dendritic cells help alert the rest of the immune system to invading germs and help magnify the immune system's response to germs.

Natural killer cells are lymphocytes that help prevent the spread of infection by killing infected cells. (They kill cancerous cells too.) Natural killer cells also help direct the production of other immune cells. They may contribute substantially to the body's efforts to control HIV.