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Red Blood Cells vs. White Blood Cells and Their Roles in the Body

by Sarah Carpenter

Blood is essential to keeping everyone alive. It delivers nutrients and oxygen, fights infections, carries hormones and moves waste materials out of our bodies. There are four components to blood: plasma, red blood cells, white blood cells and platelets.

1. **Plasma** is the single largest component of human blood, making up 55% of it. It contains water, salts, antibodies, enzymes and some proteins.
2. **Red blood cells**, also called erythrocytes or RBC, [make up about 45% of blood](#). They contain a protein called hemoglobin that carries oxygen. Blood gets its vibrant red color when hemoglobin picks up oxygen in the lungs.
3. **White blood cells** are also called leukocytes or WBC. These are the cells of the immune system which are involved in protecting the body against foreign invaders and infectious diseases. White blood cells are derived from multipotent cells in the bone marrow called hematopoietic stem cells.
4. **Platelets** that pick up signals if one of your blood vessels gets damaged. They then rush to the site of the damage and form a clot to repair it.

Each component plays a vital role in our overall health. In this article, we'll focus on the relationship between red and white blood cells and what they do for us internally, learn about their production and discover how to maintain healthy levels of each.

Red Blood Cells vs. White Blood Cells

Red blood cells (RBC) deliver oxygen from your lungs to your tissues and organs. White blood cells (WBC) fight infection and are part of your immune system. Platelets help the blood clot when you have a cut or wound. Bone marrow, the spongy material inside your bones, makes new blood cells. Blood cells constantly die, and your body makes new ones. Red blood cells live about 120 days, and platelets live about six days. [Some white blood cells live less than a day](#), but others live much longer.

Every second, [2-3 million RBCs are produced](#) in the bone marrow and released into circulation. RBCs are small enough to squeeze through the smallest blood vessels. They circulate around the body for up to 120 days, at which point the old or damaged RBCs are removed from circulation by specialized cells

(macrophages) in the spleen and liver. In humans, the mature RBC lacks a nucleus, which allows the cell more room to store hemoglobin, the oxygen-binding protein, enabling the RBC to transport more oxygen.

White blood cells come in many different shapes and sizes. Despite their differences in appearance, they all have a role in the immune response. They circulate in the blood until they receive a signal that a part of the body is damaged. In response to these signals, the WBCs leave the blood vessel by squeezing through holes in the blood vessel wall. They migrate to the source of the signal and help begin the healing process.

Impacts on Red and White Blood Cell Production

Red blood cells, most white blood cells and platelets are produced in the bone marrow. Two types of white blood cells, T and B cells, are also produced in the lymph nodes and spleen, and T cells are produced and mature in the thymus gland. Within the bone marrow, all blood cells originate from a single type of unspecialized cell called a stem cell. When a stem cell divides, it first becomes an immature red blood cell, white blood cell or platelet-producing cell. The immature cell then divides, matures further, and becomes a mature RBC, WBC or platelet.

The [rate of blood cell production](#) is controlled by the body's needs. Certain conditions may trigger additional production of blood cells. When the oxygen content of body tissues is low or the number of RBCs decreases, the kidneys produce and release erythropoietin, a hormone that stimulates the bone marrow to produce more red blood cells. The bone marrow produces and releases more white blood cells in response to infections. It produces and releases more platelets in response to bleeding.

Having Too Few or Too Many Red and White Blood Cells

When you don't have enough healthy red blood cells, you have a condition called anemia. This means your blood has lower than normal hemoglobin levels. [Anemia is a common condition](#) in people with cancer. It affects [more than two billion people globally](#), more than 30% of the population. Within the United States, anemia is the most common blood condition. Signs and symptoms include fatigue, shortness of breath, feeling cold, dizziness or weakness, headache, sore tongue, pale skin, dry skin, easily bruised skin, restless leg syndrome or fast heartbeat. Anyone can develop anemia, although the following groups have a higher risk: women, children ages one to two, infants, people over 65 and people on blood thinners. On the contrary, a [high red blood cell count may indicate kidney disease](#), heart disease, heart failure, COPD, pulmonary fibrosis, sleep apnea, nicotine dependence, anabolic steroids or blood doping.

When you have a low white blood cell count, your immune system isn't working as well as it should. Physicians call this immunocompromised. If you're immunocompromised, you have a higher risk of getting an infection. Signs and symptoms of low white blood cell count, also known as leukopenia, include body aches, chills, fever and headaches. Causes of the condition include viral infections that temporarily disrupt the work of bone marrow, certain disorders present at birth, cancer or other diseases that damage bone marrow. On the contrary, when there are too many white blood cells, you may have an infection or inflammation in your body. Less commonly, a high white blood cell count [could indicate certain blood cancers](#) or bone marrow disorders.

How To Maintain Healthy Levels

A red blood cell count measures the number of oxygen-carrying red blood cells in your body. When you have a high or a low blood count, it's a sign that you are sick. If you have a high count: [exercise to improve your heart and lung function](#), eat less red meat and iron-rich foods, avoid iron supplements, keep yourself well hydrated, avoid diuretics, stop smoking and avoid performance-enhancing drugs. If you have a low count: maintain a healthy diet and take a daily vitamin and iron supplement if needed. Exercise regularly to improve heart and lung function, stop smoking, avoid aspirin, which reduces clotting, and take your thyroid medications as prescribed if you have thyroid problems.

While [no specific foods or diet changes are proven](#) to increase the production of white blood cells, you can take care of the ones you have by [practicing good hygiene to prevent infection](#), taking vitamins to boost your immune system, and treating medical conditions where white blood cell disorders are a side effect. Treatment could include taking vitamins and antibiotics, surgery to replace or repair bone marrow, blood transfusions or a stem cell transplant.

Blood is a complex solution made up of many components. Without it, we couldn't survive. While plasma, red and white blood cells and platelets promote different processes within our bodies, their roles are most certainly complementary. For more information on blood health and its impact on sports and exercise, check out our blog.

Sarah Carpenter is a freelance writer whose portfolio spans the industries of health care, higher education and entertainment. Find out more at [her website](#).

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