

Topic Page: [Blood](#)

Definition: **blood** from *Stedman's Medical Dictionary for the Health Professions and Nursing*

(blŭd) The fluid and its suspended formed elements that are circulated through the heart, arteries, capillaries, and veins; the means by which oxygen and nutritive materials are transported to the tissues, and carbon dioxide and various metabolic products are removed for excretion. The blood consists of a pale yellow or gray-yellow fluid, plasma, in which red blood cells (erythrocytes), white blood cells (leukocytes), and platelets are suspended. see also arterial blood, venous blood. **Etymology:** [A.S. *blōd*]

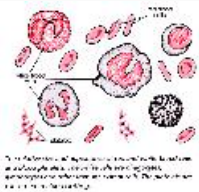


Image from: [blood in The Royal Society of Medicine Health Encyclopedia](#)

Summary Article: **blood**

From *The Columbia Encyclopedia*

fluid pumped by the heart that circulates throughout the body via the arteries, veins, and capillaries (see circulatory system; heart). An adult male of average size normally has about 6 quarts (5.6 liters) of blood. The blood carries oxygen and nutrients to the body tissues and removes carbon dioxide and other wastes. The colorless fluid of the blood, or plasma, carries the red and white blood cells, platelets, waste products, and various other cells and substances.

Erythrocytes (Red Blood Cells)

The erythrocytes, or red blood cells, make up the largest population of blood cells, numbering from 4.5 million to 6 million per cubic millimeter of blood. They carry out the exchange of oxygen and carbon dioxide between the lungs and the body tissues. To effectively combine with oxygen, the erythrocytes must contain a normal amount of the red protein pigment hemoglobin, the amount of which in turn depends on the iron level in the body. A deficiency of iron and therefore of hemoglobin leads to anemia and poor oxygenation of the body tissues.

Erythrocytes are constantly developing from stem cells, the undifferentiated, self-regenerating cells that give rise to both erythrocytes and leukocytes in the bone marrow. In the fetus, red blood cells are produced in the spleen. As they mature, the erythrocytes lose their nuclei, become disk-shaped, and begin to produce hemoglobin. After circulating for about 120 days, the erythrocytes wear out and undergo destruction by the spleen. Although all red blood cells are essentially similar, certain structures on their surfaces vary from person to person. These serve as the basis for the classification into blood groups. There are four major blood groups, whose compatibility or incompatibility is an important consideration in successful blood transfusion.

Leukocytes (White Blood Cells)

The leukocytes, or white blood cells, defend the body against infecting organisms and foreign agents, both in the tissues and in the bloodstream itself (see immunity). Human blood contains about 5,000 to 10,000 leukocytes per cubic millimeter; the number increases in the presence of infection. An extraordinary and prolonged proliferation of leukocytes is known as leukemia. This overproduction suppresses the production of normal blood cells. Conversely, a sharp decrease in the number of leukocytes (leukopenia) strips the blood of its defense against infection and is an equally serious condition. A dramatic fall in levels of certain white blood cells occurs in persons with AIDS. Leukocytes as well as erythrocytes are formed from stem cells in the bone marrow. They have nuclei and are

classified into two groups: granulocytes and agranulocytes.

Granulocytes

The granulocytes form in the bone marrow and account for about 70% of all white blood cells. Granulocytes include three types of cells: neutrophils, eosinophils, and basophils. Neutrophils constitute the vast majority of granulocytes. They travel about by ameboid movement and can surround and destroy bacteria and other foreign particles. The eosinophils, ordinarily about 2% of the granulocyte count, increase in number in the presence of allergic disorders and parasitic infestations. The basophils account for about 1% of the granulocytes. They release chemicals such as histamine and play a role in the inflammatory response to infection.

Agranulocytes

The agranulocytes include the monocytes and the lymphocytes. Monocytes are derived from the phagocytic cells that line many vascular and lymph channels, called the reticuloendothelial system. Monocytes ordinarily number 4% to 8% of the white cells. They move to areas of infection, where they are transformed into macrophages, large phagocytic cells that trap and destroy organisms left behind by the granulocytes and lymphocytes. In certain diseases of long duration (tuberculosis, malaria, and typhoid) the monocytes act as the main instrument of defense.

Lymphocytes, under normal conditions, make up about 20% to 35% of all white cells, but proliferate rapidly in the face of infection. There are two basic types of lymphocytes: the B lymphocytes and the T lymphocytes. B lymphocytes tend to migrate into the connective tissue, where they develop into plasma cells that produce highly specific antibodies against foreign antigens. Other B lymphocytes act as memory cells, ready for subsequent infection by the same organism. Some T lymphocytes kill invading cells directly; others interact with other immune system cells, regulating the immune response.

Other Constituents of Blood

The blood also contains platelets, or thrombocytes, and at least 15 other factors active in blood clotting. Platelets are tiny plate-shaped cytoplasmic bags of blood-clotting chemicals produced by megakaryocytes; if their production is hindered, as by AIDS or chemotherapy, there is an increased risk of bleeding. Also circulating in the plasma are the hormones that the endocrine glands secrete directly into the bloodstream. In addition, essential salts (such as those of sodium and potassium), essential plasma proteins (albumin, globulins, and fibrinogen), and metabolic wastes (such as urea) circulate in the plasma.

Serum, a straw-colored liquid, essentially composed of plasma without fibrinogen, makes up the liquid component of blood that separates from the clot. Serum is separated from whole blood by centrifuging and can serve various medical uses. Normal human serum is sometimes used to treat shock and the loss of fluid resulting from severe burns.

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