**The blood**

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Blood is a combination of plasma and cells that circulate through the body. It supplies essential substances, such as sugars, oxygen, and hormones, to cells and organs, and removes waste from cells.

[Hematologists](https://www.medicalnewstoday.com/articles/hematology) work to identify and prevent blood and [bone marrow](https://www.medicalnewstoday.com/articles/285666.php) diseases. They also study and treat the immune system, blood clotting, and blood vessels.

Health conditions that affect the blood can be life threatening, but effective treatment is often available. In the United States, blood diseases accounted for [10,066Trusted Source](https://www.nhlbi.nih.gov/files/docs/research/2012_ChartBook_508.pdf) deaths in 2008, mostly different types of anemia.

**Structure**

The main [components](https://www.redcrossblood.org/donate-blood/how-to-donate/types-of-blood-donations/blood-components.html) of blood are:

* plasma
* red blood cells
* white blood cells
* platelets

**Plasma**

Plasma accounts for around [55%](http://www.redcrossblood.org/learn-about-blood/blood-components) of blood fluid in humans. Plasma is 92% water, and the contents of the remaining 8% include:

* glucose
* hormones
* proteins
* mineral salts
* fats
* [vitamins](https://www.medicalnewstoday.com/articles/195878.php)

The remaining 45% of blood mainly consists of red and white blood cells and platelets. Each of these has a vital role to play in keeping the blood functioning effectively.

**Red blood cells, or erythrocytes**

Red blood cells have a slightly indented, flattened disk shape. They transport oxygen to and from the lungs. Hemoglobin is a protein that contains iron and carries oxygen to its destination. The life span of a red blood cell is 4 months, and the body replaces them regularly. The human body produces around [2 millionTrusted Source](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4717490/) blood cells every second.

The expected number of red blood cells in a single drop (microliter) of blood is [4.5–6.2 million](https://uihc.org/health-library/complete-blood-count-guide-patients-cancer) in males and 4.0–5.2 million in females.

[What percentage of red blood cells should people have in their body?](https://www.medicalnewstoday.com/articles/hematocrit-levels)

**White blood cells, or leukocytes**

[White blood cells](https://www.medicalnewstoday.com/articles/327446) make up [less than 1%](http://www.redcrossblood.org/learn-about-blood/blood-components/white-blood-cells-and-granulocytes) of blood content, forming vital defenses against disease and infection. The number of white blood cells in a microliter of blood usually ranges from [3,700–10,500](https://uihc.org/health-library/complete-blood-count-guide-patients-cancer). Higher or lower levels of white blood cells can indicate disease.

[What does it mean if a person has a high white blood cell count?](https://www.medicalnewstoday.com/articles/315133)

**Platelets, or thrombocytes**

Platelets interact with clotting proteins to prevent or stop bleeding. There should be between [150,000 and 400,000](https://uihc.org/health-topics/complete-blood-count-guide-patients-cancer) platelets per microliter of blood.

Bone marrow produces red blood cells, white blood cells, and platelets, and from there they enter the bloodstream. Plasma is mostly water that is absorbed from ingested food and fluid by the intestines. The heart pumps them around the body as blood by way of the blood vessels.

[What does it mean if a person has high or low platelet levels?](https://www.medicalnewstoday.com/articles/322726)

**Functions**

Blood has various functions that are central to survival. They include:

* supplying oxygen to cells and tissues
* providing essential nutrients to cells, such as amino acids, fatty acids, and glucose
* removing waste materials, such as carbon dioxide, urea, and lactic acid
* protecting the body from diseases, infections, and foreign bodies through the action of white blood cells
* regulating body temperature

The platelets in blood enable the clotting, or coagulation, of blood. When bleeding occurs, the platelets group together to create a clot. The clot forms a scab, which stops the bleeding and helps protect the wound from infection.

**Blood groups**

A person’s blood type is [determined](https://www.nhs.uk/conditions/blood-groups/) by the antigens on the red blood cells. Antigens are protein molecules on the surface of these cells.

Antibodies are proteins in plasma that alert the immune system to the presence of potentially harmful foreign substances. The immune system protects the body from the threat of disease or infection.

Knowing a person’s blood type is essential if they are receiving an organ donation or blood transfusion. Antibodies will attack new blood cells if the blood is the wrong type, leading to life threatening complications. For example, anti-A antibodies will attack cells that have A antigens.

Red blood cells sometimes contain another antigen called RhD. Doctors also note this as part of the blood group. A positive blood group means that RhD is present.

Humans can have one of four main blood groups. Each of these groups can be Rhd-positive or -negative, forming eight main categories.

* **Group A positive or A negative:** A antigens are present on the surfaces of blood cells. Anti-B antibodies are present in the plasma.
* **Group B positive or B negative:** B antigens are present on the surfaces of blood cells. Anti-A antibodies are present in the plasma.
* **Group AB positive or AB negative:** A and B antigens are present on the surfaces of blood cells. There are no antibodies in the plasma.
* **Group O positive and O negative:** There are no antigens on the surfaces of blood cells. Both anti-B and anti-A antibodies are present in the plasma.

People with group O blood can donate to virtually any blood type, and people with group AB+ blood can usually receive blood from any group.

People can talk with their doctor to find out their blood type or find out by donating blood.

Blood groups are important during pregnancy. If a pregnant person has RhD-negative blood, for example, but the fetus inherits RhD-positive blood, treatment will be necessary to [preventTrusted Source](https://www.nhlbi.nih.gov/health-topics/rh-incompatibility) a condition known as hemolytic disease of the newborn.

Learn more about [blood types in general](https://www.medicalnewstoday.com/articles/218285) and [rare blood types](https://www.medicalnewstoday.com/articles/326279).

**Disorders**

Disorders and diseases of the blood can impair the many functions that blood performs.

Some common blood disorders are:

* [**Anemia**](https://www.medicalnewstoday.com/articles/158800)**:** This happens when [low red blood cell or hemoglobin levelsTrusted Source](https://www.nhlbi.nih.gov/health/health-topics/topics/anemia/) mean the cells do not transport oxygen effectively, leading to [fatigue](https://www.medicalnewstoday.com/articles/248002.php), pale skin, and other symptoms.
* [**Blood clotting**](https://www.medicalnewstoday.com/articles/311889)**:** Clotting helps wounds and injuries heal, but blood clots that [form inside](http://www.hematology.org/Patients/Clots/) a blood vessel can create a blockage, which can be life threatening. If clots become dislodged and move through the heart to the lungs, a [pulmonary embolism](https://www.medicalnewstoday.com/articles/153796.php) can form.
* [**Blood cancers**](http://www.hematology.org/Patients/Cancers/)**:** Cancers such as leukemia, [myeloma](https://www.medicalnewstoday.com/articles/161727.php), and [lymphoma](https://www.medicalnewstoday.com/articles/146136.php) occur when blood cells start to divide uncontrollably without dying off at the end of their life cycle.
* [**Hemophilia**](https://www.medicalnewstoday.com/articles/154880)**:** If a person has low levels of clotting factors in the blood, they can [bruise or bleedTrusted Source](https://www.nhlbi.nih.gov/health-topics/bleeding-disorders) very easily. They may bleed for too long after a minor injury or surgery, or during menstruation. It affects around [18,000 peopleTrusted Source](https://www.nhlbi.nih.gov/files/docs/research/2012_ChartBook_508.pdf) in the U.S.
* [**Sickle cell disease**](https://www.medicalnewstoday.com/articles/315801)**:** An inherited trait causes red blood cells to take on a crescent shape. It affects over [100,000Trusted Source](https://www.nhlbi.nih.gov/news/2019/rapid-result-test-track-transform-sickle-cell-disease-screening-millions) people in the U.S., mostly Black Americans. It can severely impact how blood functions and can be life threatening.
* [**Thalassemia**](https://www.medicalnewstoday.com/articles/263489)**:** This is also a type of inherited anemia in which the body produces an unusual form of hemoglobin. It affected around [1,000Trusted Source](https://www.nhlbi.nih.gov/files/docs/research/2012_ChartBook_508.pdf) people in the U.S. in 2008 and is most common in people from around the Mediterranean and parts of Asia.

If symptoms suggest a person may have a blood disorder, they should seek medical advice. A doctor may refer them to a specialist in blood disorders, known as a hematologist.