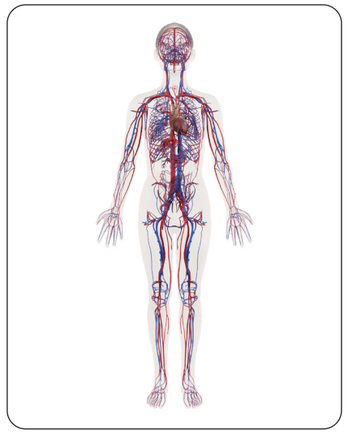
# Circulatory System

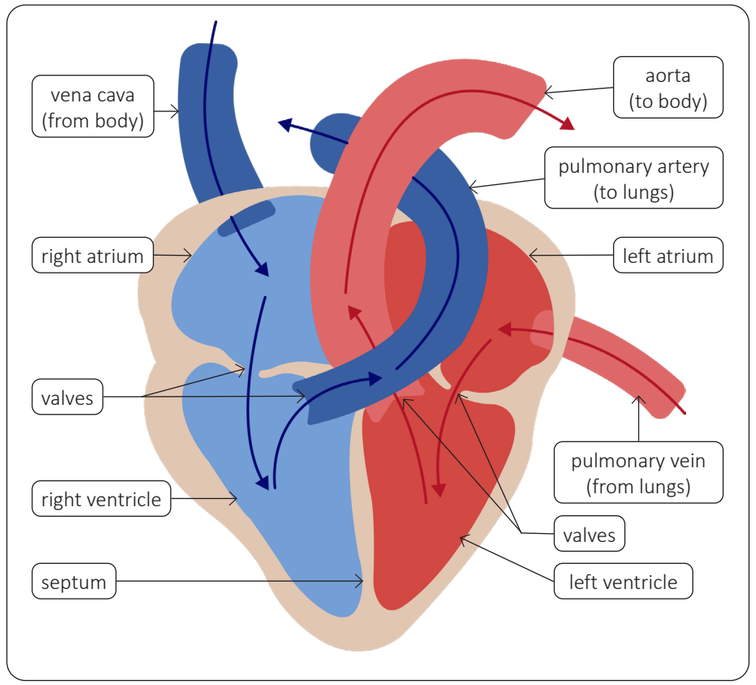
## Circulatory system

The circulatory system is the system that moves blood around the body. It has three parts:

- the heart
- blood vessels
- blood



## Heart




The heart is a muscular organ that acts as a pump. It pumps blood around the body through the blood vessels. Deoxygenated blood enters the right atrium through the vena cava. It passes through a valve and into the right ventricle. From there, it is pumped through a valve into the pulmonary artery. The pulmonary artery carries the blood to the lungs, where it absorbs oxygen. The pulmonary veins carry the oxygenated blood back from the lungs to the left atrium. It passes through a valve to the left ventricle and is pumped out through a valve into the aorta. Then the blood travels to the rest of the body.

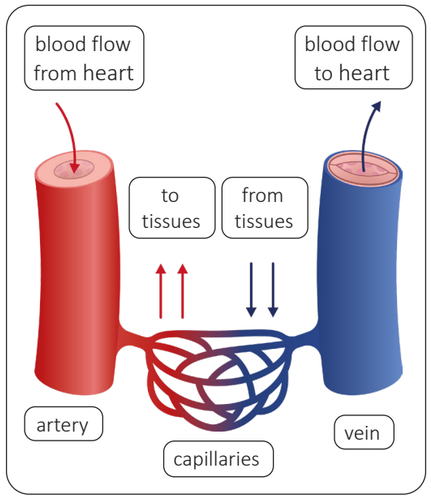
## Blood vessels

There are three types of blood vessels.

**Arteries** carry oxygenated blood from the heart to the body.

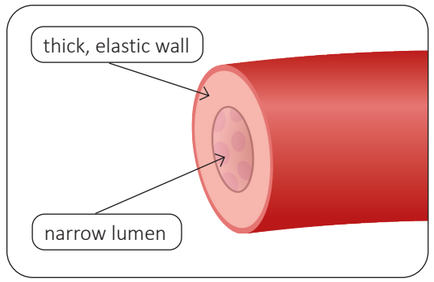
**Capillaries** connect arteries to the veins. They deliver oxygen and other nutrients to the body's tissues and carry deoxygenated blood and waste products to the veins.

**Veins** move blood back to the heart, where it is pumped to the lungs and oxygenated.




### Structure of arteries

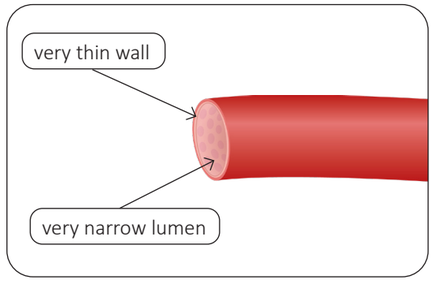
Arteries have thick walls and narrow tubes, called lumen, because the blood is under high pressure as it is pumped from the heart. The arteries are also tough and flexible to withstand this pressure.




artery cross section

### Structure of capillaries

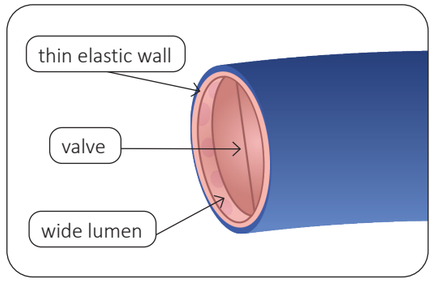
Capillaries are tiny and have very thin walls and narrow lumen so oxygen, other nutrients and waste products can move easily between the blood and the body's tissues.




capillary cross section

### Structure of veins

Veins have thin, elastic walls and wide lumen. The walls do not need to be thick because the blood is not under high pressure. Veins contain valves that prevent the blood from flowing backwards.




vein cross section

## Blood

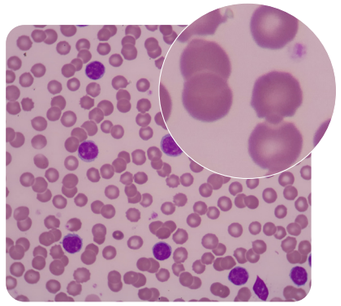
The main function of blood is to transport the things the body needs, such as oxygen, other nutrients, hormones, antibodies and heat, around the body. It also transports carbon dioxide and other waste products for excretion. Blood has four components: plasma, red blood cells, white blood cells and platelets.

### Plasma

Plasma is the yellowish liquid part of blood. It makes up about 55% of blood. It carries red blood cells, white blood cells and platelets around the body. It also helps to distribute heat.

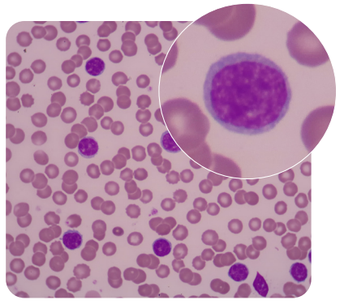
### Red blood cells

Red blood cells make up about 45% of blood. Their main function is to carry oxygen from the lungs to other parts of the body and carry waste carbon dioxide from the body's tissues to the lungs so it can be excreted.



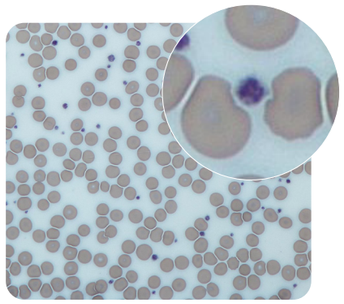
### White blood cells

White blood cells only make up about 1% of blood. The main function of white blood cells is to fight infection and other diseases. They are part of the body's immune system.



### Platelets

Platelets are small cell fragments that make up less than 1% of blood. Their main function is to clump together, or clot, to stop bleeding.





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## Pulse and heart rate

The pulse can be felt each time the arteries expand as blood is pumped through them from the heart. It is especially noticeable where the arteries are close to the skin's surface, such as at the wrist and neck.

Heart rate is measured in beats per minute (bpm). The resting heart rate is the number of times your heart beats per minute when you are at rest. Heart rate increases during exercise.

## Exercise and a healthy heart

When the body exercises, it needs more oxygen and other nutrients, so the heart beats more quickly to pump more blood around the body.

Regular exercise makes the heart stronger so it can pump more blood each time it contracts. As more blood is pumped out with each beat, there is a lower resting heart rate.

## Smoking, alcohol and drugs

Smoking, alcohol and drugs have many negative effects on the human body. For example, they can cause high blood pressure, heart disease, cancer, stroke, bladder problems, fertility problems and respiratory problems. They can also affect mental health, such as causing anxiety and depression.

## Sugar, salt and fat

Some foods, especially processed foods, such as crisps, ready meals and sweets, are high in sugar, salt or saturated fat. Too much of any of these types of foods can have harmful effects on the body.

### Sugar

Sugar is added to many foods and drinks we consume, including sweets, cakes, biscuits, chocolate and some fizzy drinks. Eating too much sugar can cause weight gain and tooth decay. It can also cause the body to retain water and raise blood pressure, which can lead to a heart attack or stroke.

### Salt

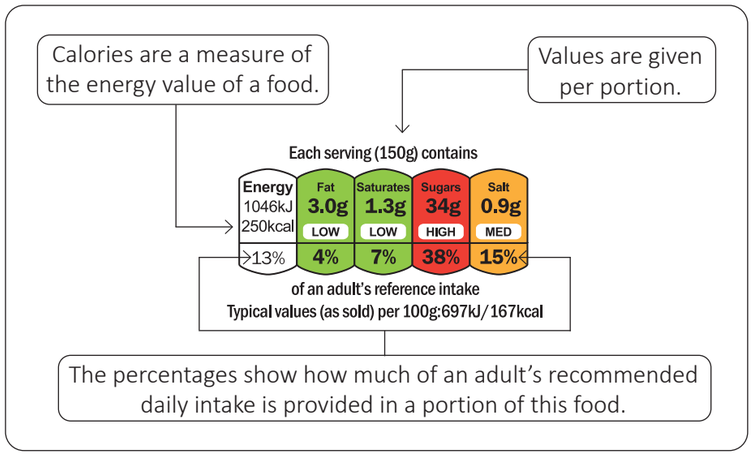
Salt occurs naturally in some foods, including meat and dairy products. It is added to others, including bread, breakfast cereals and ready meals. Too much salt can cause the body to retain water and raise blood pressure. This can lead to an increased risk of heart disease and stroke.

### Fat

There are different types of fat in food, saturated fat and unsaturated fat. Saturated fat is found in butter, cheese, fatty meats and some processed foods. Too much saturated fat can cause weight gain and increase the risk of heart disease.

## Nutrition labels

Nutrition labels on pre-packaged foods tell us what each food contains. Nutrition labels are often displayed using a traffic light system, so consumers can easily see whether the food has high (red), medium (orange) or low (green) amounts of sugar, salt and saturated fat. It also gives other useful information.




## Glossary

| | |
|---|---|
| **antibody** | A protein in the blood produced by white blood cells to fight infection and other types of disease. |
| **excretion** | The process of expelling waste. |
| **hormone** | One of many chemical messengers produced inside the body of an animal or plant that controls growth or other bodily processes. |
| **immune system** | The bodily system that offers protection from infections and other diseases. |
| **oxygenated** | Contains oxygen. |
| **processed food** | Food that has been changed during its preparation. |
| **respiration** | A process where oxygen is absorbed by the body and carbon dioxide is excreted. |
| **valve** | A structure in the body that prevents blood from flowing backwards. |



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