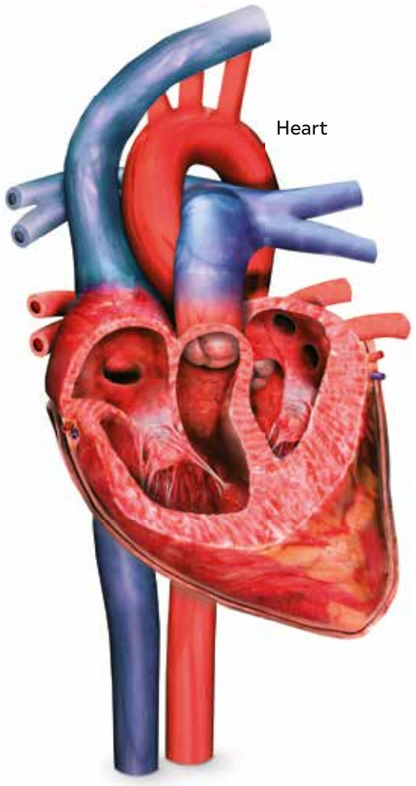


Chromosome



Adult teeth



Heart

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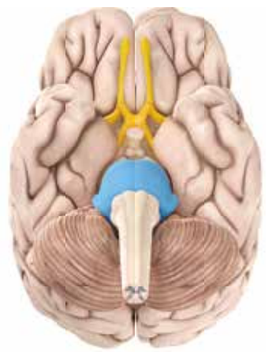
19th-century clamping forceps



Cross-section of the skin



Balanced diet



Brain from below

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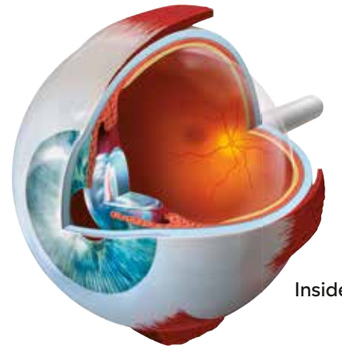
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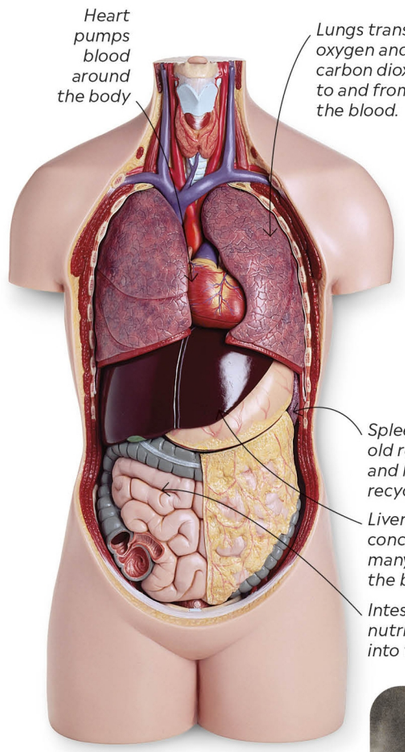
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The **blood**

An average adult has 5 litres (9 pints) of blood coursing around the body. Each drop of blood consists of millions of cells floating in liquid plasma. Red blood cells deliver essential oxygen to the body's tissues, while defence cells fight off infections. Blood also distributes heat to keep the body at a steady 37°C (98.6°F) – the ideal temperature for cells to function.



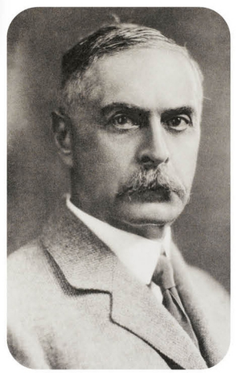
Three main roles

Blood transports a range of substances, including oxygen, nutrients, and waste products from cells. It also protects the body by carrying white blood cells and forming blood clots. And it controls body temperature by distributing heat produced by organs around the body.



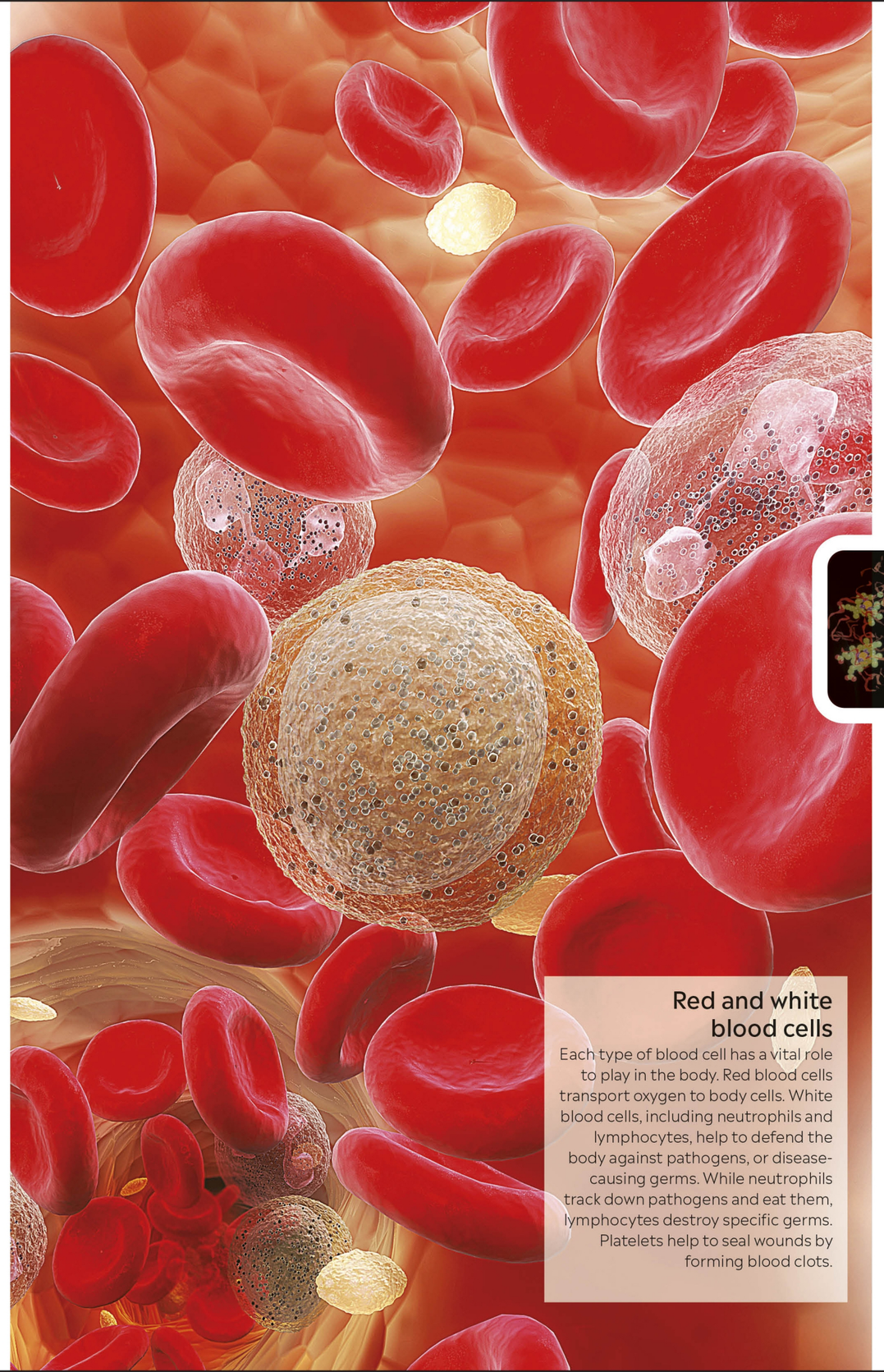
Blood transfusions

Before the discovery of blood groups, the transfusion (transfer) of blood from a donor – usually a healthy person, but here a dog – to a sick patient, often failed, killing the patient.



Blood groups

Austrian-American scientist Karl Landsteiner (1868–1943) found that people belonged to one of four blood groups: A, B, AB, or O. Doctors can now match up blood types to avoid a body rejecting a blood transfusion from the wrong blood group.

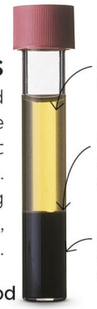


Red and white blood cells

Each type of blood cell has a vital role to play in the body. Red blood cells transport oxygen to body cells. White blood cells, including neutrophils and lymphocytes, help to defend the body against pathogens, or disease-causing germs. While neutrophils track down pathogens and eat them, lymphocytes destroy specific germs. Platelets help to seal wounds by forming blood clots.

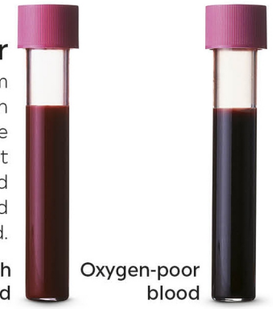
Blood components

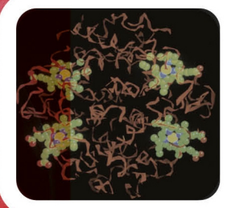
If allowed to settle, blood separates into three parts. The red and white blood cells float in a yellow liquid called plasma. This is mainly water containing more than 100 substances, including blood proteins.



Changing colour

Blood takes its colour from the red blood cells. When they pick up oxygen in the lungs, blood turns bright red. Once they unload oxygen in the tissues, blood turns a darker shade of red.



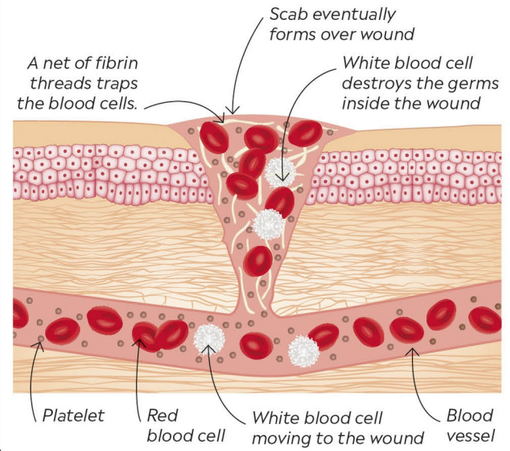


Oxygen carrier

The protein haemoglobin carries oxygen. A molecule of haemoglobin contains four iron atoms (yellow), which bind oxygen in the lungs and release it wherever oxygen is in short supply in the body.

FORMING BLOOD CLOTS

When there is a wound, platelets stick together to briefly form a plug. They also release chemicals that convert a blood protein into threads of fibrin, which trap blood cells to form a clot. White blood cells destroy any invading bacteria. The clot dries out to form a protective scab over the tissues while they repair themselves.





Prehistoric art

First Nations Australian rock art has featured X-ray figures showing the internal anatomy of humans and animals for 4,000 years.

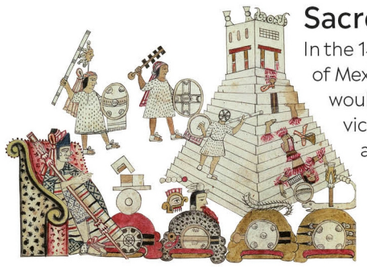
Myth, magic, and **medicine**

Early humans made sculptures and cave paintings of human figures. As civilizations grew, people began to study their own bodies closely, but care for the sick and injured was tied up with myths, superstition, and a belief that gods or demons sent illnesses. Ancient Greek physician Hippocrates (c.460–c.375 BCE) taught that diseases could be identified and treated. In the Roman world, Galen (129–c.216 CE) set out ideas about anatomy and physiology that would last for centuries. In Persia, medical knowledge was developed by physicians such as Ibn Sina (980–1037 CE).

Holes in the head

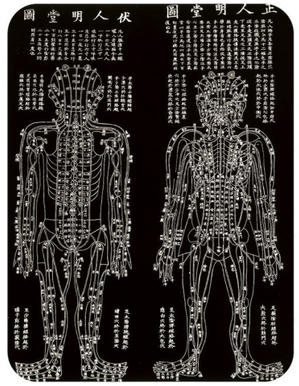
This 4,000-year-old skull from Jericho, West Bank, shows the results of trepanning, or drilling holes in the skull. Modern surgery uses a similar technique, called craniotomy, to release pressure in the brain caused by bleeding.





Sacred sacrifice

In the 14th and 15th centuries, the Aztecs of Mexico believed the god Huitzilopochtli would make the Sun rise and bring them victory, if they offered him human and animal sacrifices. The Aztecs might have learned about the inner organs of the body from these rituals.



Chinese channels

Written more than 2,300 years ago, *The Yellow Emperor's Classic of Internal Medicine* explains acupuncture treatments, which focus on the flow of chi, or vital energy, along 12 body channels, or meridians. Needles are inserted into the skin along these meridians to rebalance the body forces known as Yin (cool and female) and Yang (hot and male).

Translated into Latin in the 12th century, *The Canon of Medicine* was the leading medical textbook for the next five centuries.



Medieval treatments

Blood-letting, using a knife or a blood-sucking worm called a leech, was a traditional, if brutal, remedy for all manner of ills in medieval times. Few physicians tried to see if the treatment was of any benefit to the patient.

EYEWITNESS

Claudius Galen

Born in ancient Greece, Claudius Galen became a towering figure in the study of anatomy, physiology, and medicine in Rome. There, he treated gladiators as a young physician, describing their wounds as "windows into the body". Human dissection was banned, so he studied the anatomy of animals instead. His flawed ideas were accepted without question across Europe for 1,500 years.





An illustrated panel invokes God for the completion of the work.

A medical textbook

This is a page from an 18th-century copy of the *Al-Qanun fi al-Tibb* (*The Canon of Medicine*), written by the Persian physician Ibn Sina in c.1025. He built on the knowledge of ancient physicians such as Galen and Hippocrates. The massive book consisted of five volumes covering different topics on health and sickness and the human body's anatomy and function.

Egyptian embalming

Some 5,000 years ago, the Egyptians believed that a dead body remained home to its owner's soul in the afterlife, but only if preserved as a lifelike mummy. Natron, a type of salt, was used to dry out the body to embalm it and stop it rotting.

The brain, regarded as useless, was hooked out through the nostrils and discarded.

The heart, considered the centre of being, was left inside the chest.

Internal organs, removed from an opening in the side, were preserved separately in special jars.

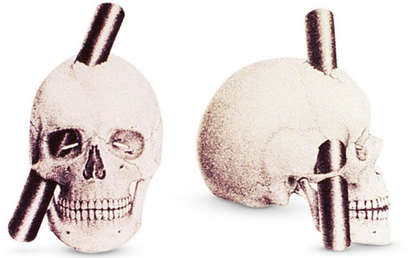
The embalming process dried out the muscles, which shrank and exposed the bones.

Skin became dark and leathery through embalming and age.

Toenails, being made of dead cells, remained intact.

The **brain**

The brain is our most complex organ and our nervous system's control centre. It contains 100 billion neurons (nerve cells), each linked to hundreds or thousands of other neurons, which together form a vast communication network with incredible processing power. Over the past two centuries, scientists have mapped the brain and how it works.

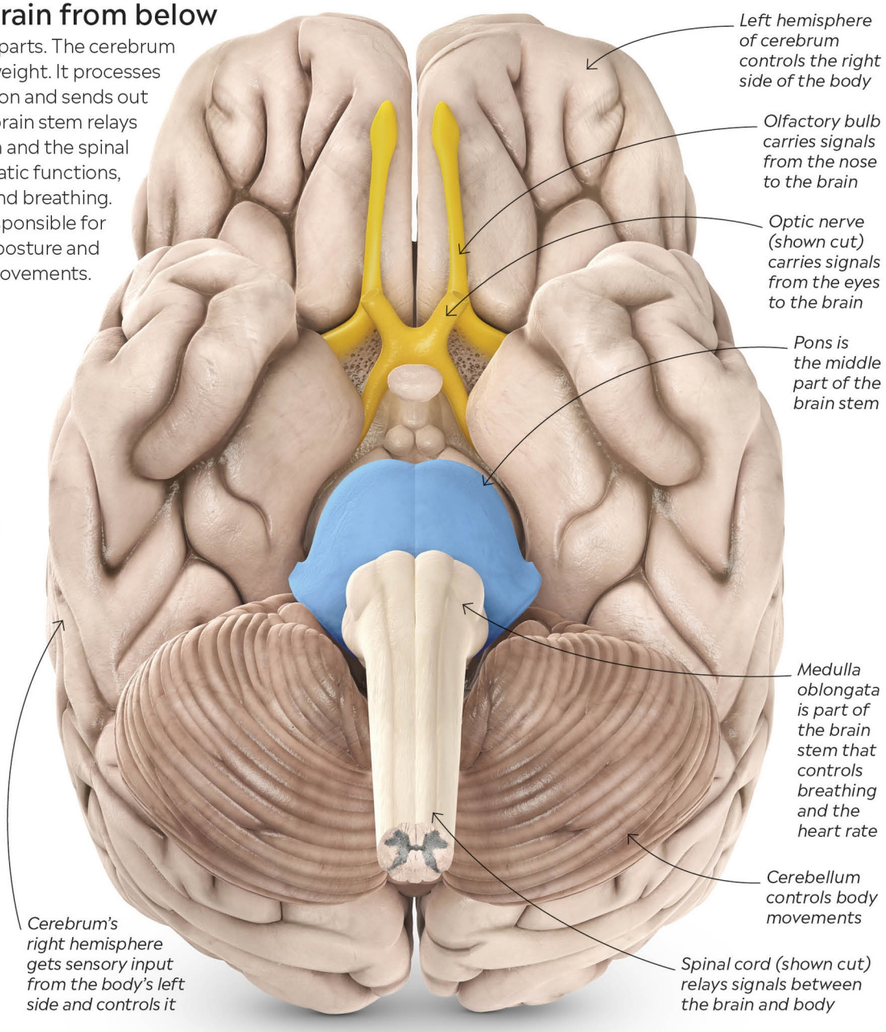


Hole in the head

Phineas Gage worked in a quarry in the USA. In 1848, a gunpowder accident blew a metal rod through the left frontal lobe of his brain. Gage survived, but he changed from contented and polite to moody, and foul-mouthed – living proof that the front of the brain is involved in personality.

The brain from below

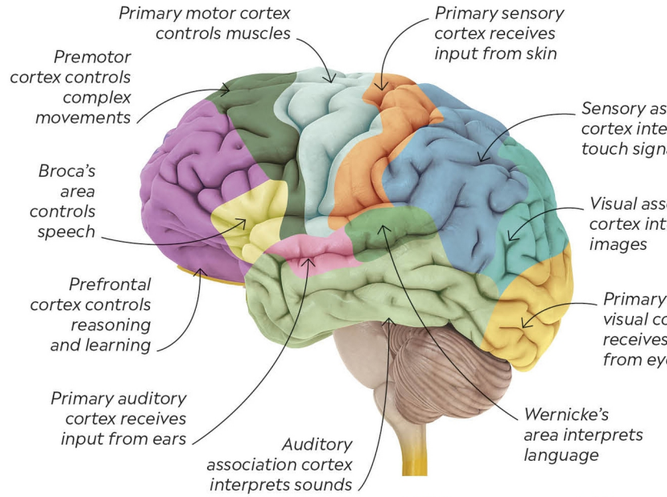
The brain has three main parts. The cerebrum makes up 85 per cent of its weight. It processes and stores incoming information and sends out instructions to the body. The brain stem relays signals between the cerebrum and the spinal cord, and controls automatic functions, such as the heart rate and breathing. The cerebellum is responsible for controlling balance and posture and for coordinating movements.





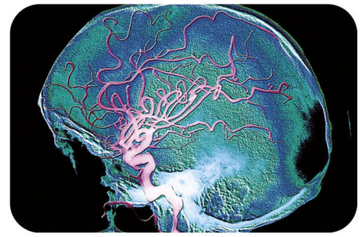
Left and right

The right half of the cerebrum controls the left side of the body, and vice versa. Many parts of the brain work together for most tasks, but the right side tends to handle face recognition and creative abilities, while the left tends to control language and problem solving. Left-handed people, such as guitarist Jimi Hendrix, often excel in the creative arts and music.



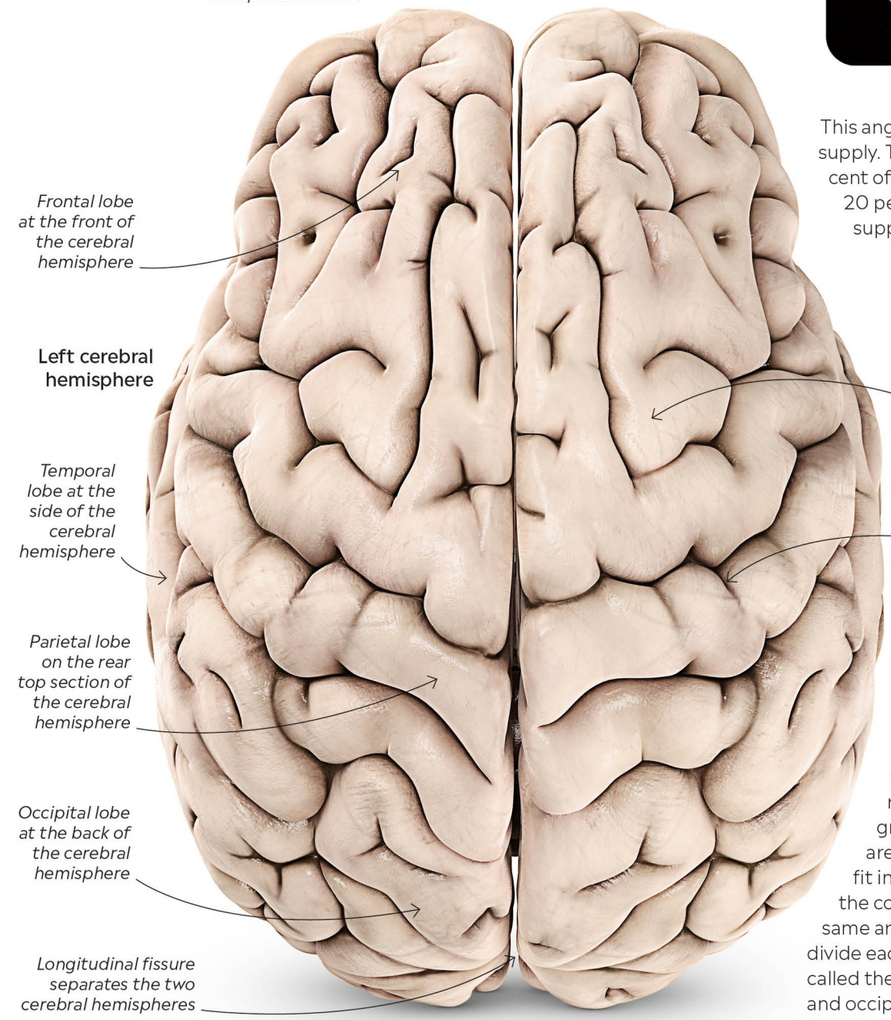
Brain map

Different areas of the cerebral cortex carry out specific tasks, as shown in this map of the left hemisphere. Sensory areas of the cortex deal with input from the sensory detectors. Motor areas of the cortex control the body's movement. Most of the cortex is made up of association areas, which interpret and analyse information used in learning and memory.



Blood supply

This angiogram shows the brain's blood supply. The brain makes up only two per cent of the body's weight, but receives 20 per cent of the body's total blood supply. This delivers the oxygen and glucose (sugar) that the brain requires to function normally.



The brain from above

The surface layer of the cerebrum, called the cerebral cortex, is heavily folded with ridges and grooves. These greatly increase the surface area of cerebral cortex that can fit inside the skull. If laid out flat, the cortex would cover about the same area as a pillow. Deep grooves divide each hemisphere into four areas, called the frontal, temporal, parietal, and occipital lobes.