opening extract from

Insiders Alive: Human Body

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Welcome to the Human Body

The human body is like a complicated machine made up of many bits and pieces. While each of these pieces has a job to do, the most important parts must keep working in order for us to stay alive. We call these our vital organs, and they include the heart, liver and brain. When one or more parts are not working properly, you can become ill. Today, doctors understand a great deal about how our bodies work and are able to cure many illnesses and diseases.

Activity

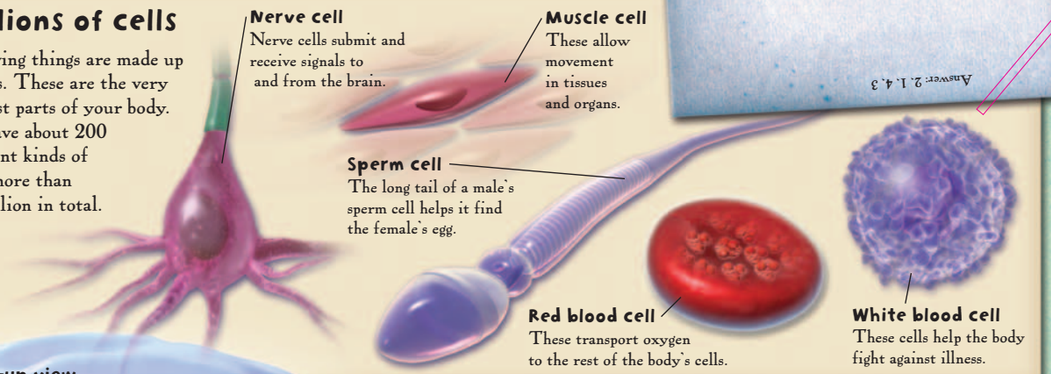
Put these events from the timeline of medical knowledge in order, from the earliest to the latest:

1. Doctors in Arab countries used herbs such as ginger as medicine.
2. Splints and casts were used for healing fractures.
3. Doctors learned how to replace, or "transplant", hearts.
4. Doctors cut up human bodies to find out how they worked inside.

Answer: 2, 1, 4, 3

Trillions of cells

All living things are made up of cells. These are the very smallest parts of your body. You have about 200 different kinds of cell—more than 10 trillion in total.



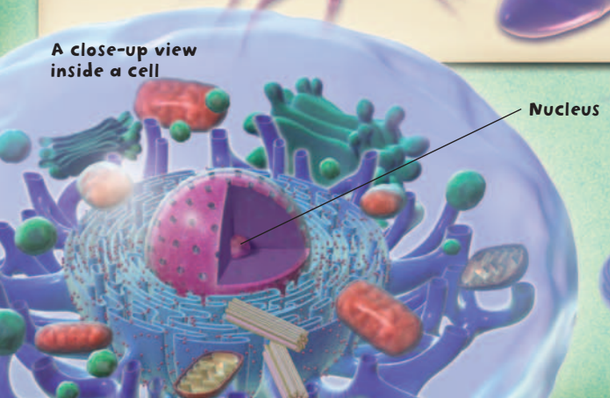
Nerve cell
Nerve cells submit and receive signals to and from the brain.

Muscle cell
These allow movement in tissues and organs.

Sperm cell
The long tail of a male's sperm cell helps it find the female's egg.

Red blood cell
These transport oxygen to the rest of the body's cells.

White blood cell
These cells help the body fight against illness.

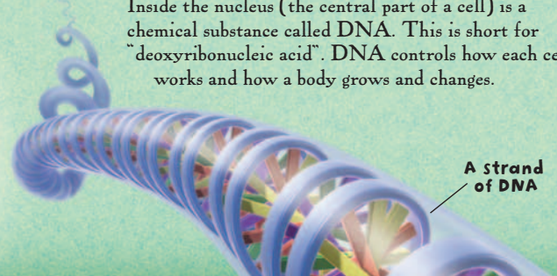


A close-up view inside a cell

Nucleus

DNA

Inside the nucleus (the central part of a cell) is a chemical substance called DNA. This is short for "deoxyribonucleic acid". DNA controls how each cell works and how a body grows and changes.

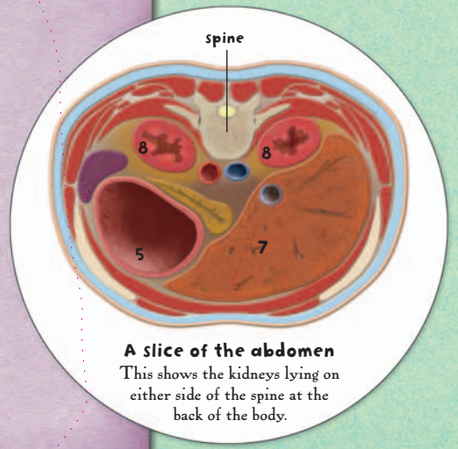


A strand of DNA

Busy organs

Skin covers your body and protects your insides. Your heart pumps blood all around your body. Your lungs allow you to breathe in and out. These are just a few of the important jobs your organs do every day.

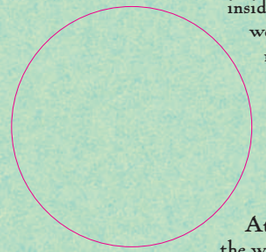
The organs
1. brain
2. lungs
3. skin
4. heart
5. stomach
6. intestines
7. liver
8. kidneys



A slice of the abdomen
This shows the kidneys lying on either side of the spine at the back of the body.

New life

Women have millions of tiny eggs inside them, and men produce sperm cells. When sperm from a man combines with an egg inside a woman, a new baby begins to grow. It stays inside the mother's womb for nine months until it is born.



At three weeks, the little bundle of growing cells is called an "embryo".

At six weeks, the cells inside the womb form organs, such as the liver and brain. The baby is now about the size of a grape.

Turn

At eight weeks, the baby is called a "foetus" and is fed oxygen and nutrients via the umbilical cord. It can move its arms and legs and is about 6 centimetres (2.5 inches) long.

At nine months, the foetus is now a baby. It is ready to be born.

Growing and changing

A person's body will continue to grow until about the age of 20. Then, slowly, as the years go by, the body begins to make fewer new cells. This causes hair to turn grey and skin to become wrinkly. Although they stop growing, human bodies never stop changing.

80 years old

Bones and the Skeleton

Imagine your body with no bones in it. It would be all soft and floppy! You would not be able to sit, stand up or move. Bones are living tissue containing blood vessels, nerves and cells. More than 200 bones support your body, and these bones are a bit like scaffolding. One of the jobs they do is to protect your organs. The hard skull bones in your head, for example, help to keep your brain from being injured. Your bones also perform the very important task of creating new blood cells.

Your skeleton
Here are some of the better-known bones at the front and back of your body.

Cranium
Mandible, or jaw bone
Clavicle, or collarbone
Humerus
Ribcage
Pelvis
Femur, or thigh bone
Patella, or kneecap
Tarsals, or ankle bones
Tibia, or shin bone
Metatarsals, or foot bones
Fibula
Front

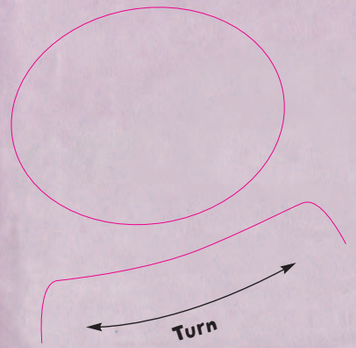
Back
Skull
Scapula, or shoulder blade
Spine

The largest bone

The largest bone in your body is called the femur. This is the bone in your thigh that leads down from your hip to your knee. It can grow as long as 45 centimetres (18 inches).

Femur

All kinds of joints



The reason that you can stand up, sit down, walk and run is because you are able to bend and twist various parts of your body. Your bones are hard and cannot bend, but there are joints in between, which allow your bones to move up and down or from side to side. There are different kinds of joints. The joint in the knee, for example, is called a hinge joint. It acts like the hinge on a door, swinging open and closed.

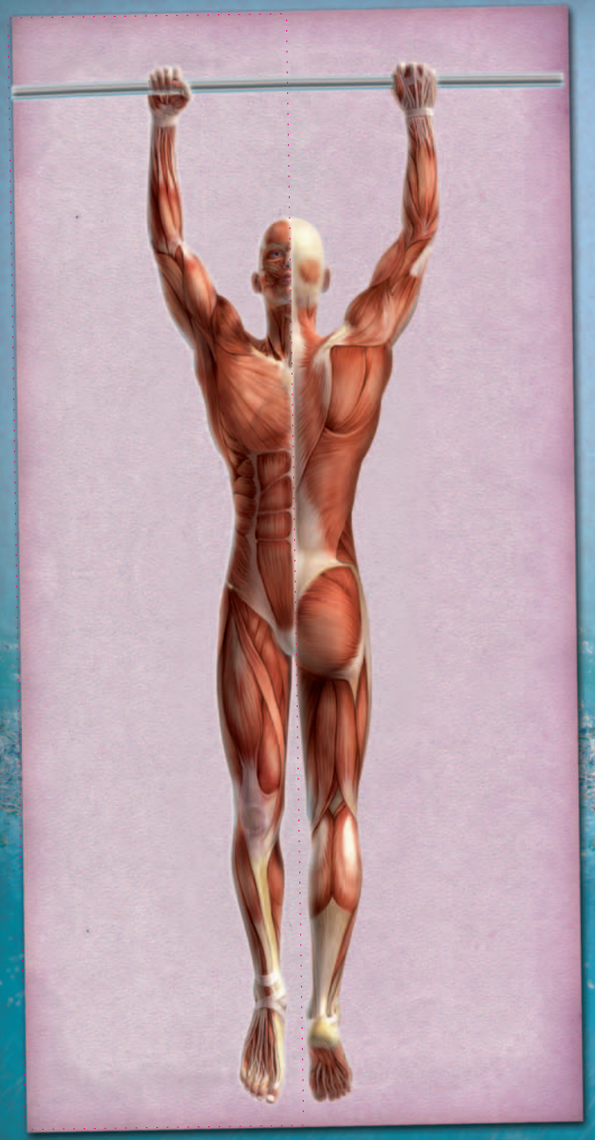
Very useful bones

The bones between your shoulder and fingertips are very important. You use them all when you write, grip or throw a ball. As you can see from the picture, there are many small bones in your wrists and hands.

Metacarpals, or hand bones
Carpals, or wrist bones
Phalanges, or finger bones
Ulna
This is one of two long bones that make up the forearm.
Radius
The shorter of the two bones that make up the forearm.
Humerus
A single long bone in the upper arm. This runs from the elbow to the shoulder.
Scapula
This triangular bone forms part of the shoulder joint. It is also known as the shoulder blade.

The smallest bone

The smallest bone in your body is inside your ear. It is called the stirrup and is one of three bones just behind your eardrum. The other two are called the hammer and the anvil.

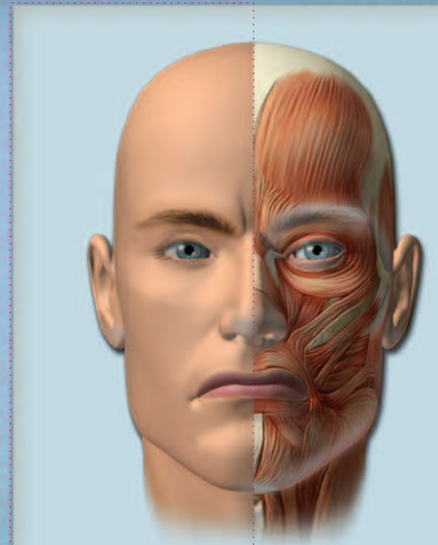


Muscles

There are more than 600 muscles in your body. Every time you move, you use them. When you talk, breathe or run, you need a whole range of muscles. Muscles tighten to become shorter and loosen to become longer. One of the strongest muscles in your body is your tongue, which is also the only muscle that is connected at just one end. There are three types of muscle: smooth muscles, which control many of your organs, such as your intestines; cardiac muscles, which make your heart beat; and skeletal muscles, which are attached to your bones. You can control skeletal muscles to move a part of your body but you cannot control smooth muscles and cardiac muscles. These work by themselves.

When you exercise

Exercise, such as swimming, helps to build up muscles and make you stronger.



Smiling and frowning

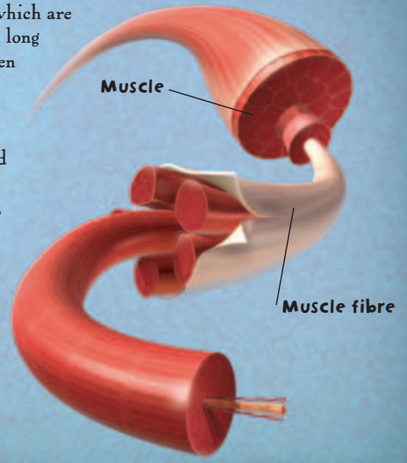
You have about 50 muscles in your face. Levator muscles pull upwards and depressor muscles pull downwards. When you smile, you move 12 of these facial muscles, but when you frown, you use only 11.

True or false?
It takes more muscles to frown than to smile.

Answer: False. You only use 11 muscles to frown, and 12 to smile.

Bundles of fibres

Muscles contain bundles of fibres, which are shaped like long pipes. When a muscle contracts, the fibres shorten and slide over each other, enabling your body to move.



Smaller kicks
The fast swimmer knows that small kicks with straightened legs are more efficient than large kicks with bent legs.

Hips
Each time the swimmer extends his arm over his head, muscles from his back and sides roll the hips from side to side.

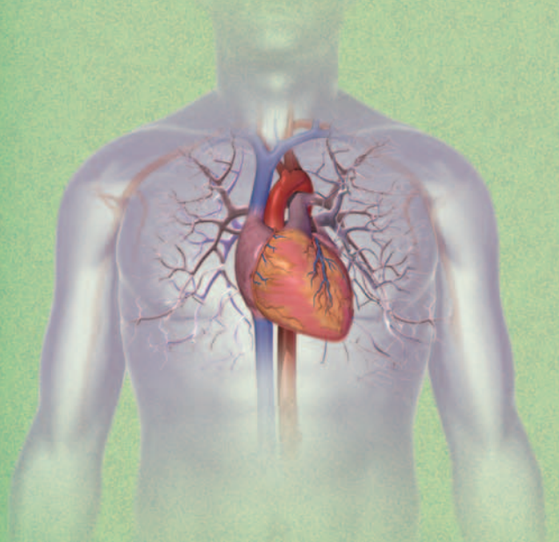
Breathing
The swimmer uses controlled breathing, which helps increase fitness.

Take a breath
The head moves from side to side, allowing the swimmer to take a breath at the surface.

Arms
For the swimmer, the arms are like propellers, helping to push the body along.

The Heart

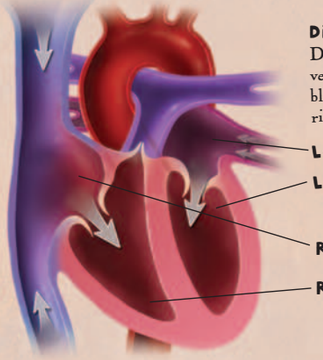
The heart is a very strong muscle that pumps blood around your body. Blood carries oxygen and nutrients to all of your cells to keep them healthy. The heart is almost in the centre of your chest, between your lungs and just behind your breastbone. If you place your fingers on the inside of your wrist, you can feel your pulse—the steady beat of blood pumping through your body. When you exercise, you should be able to feel this pulse quicken. This is because your heart is pumping blood more quickly to give you more energy.



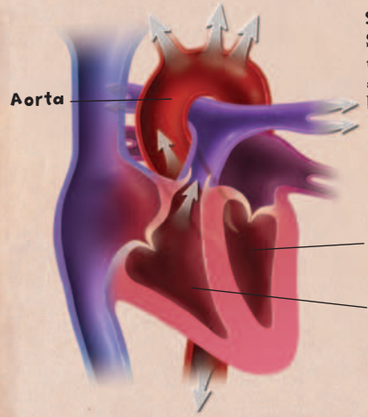
Where is the heart?
This strong muscle is found behind your ribcage to the centre-left of your body.

Moving blood

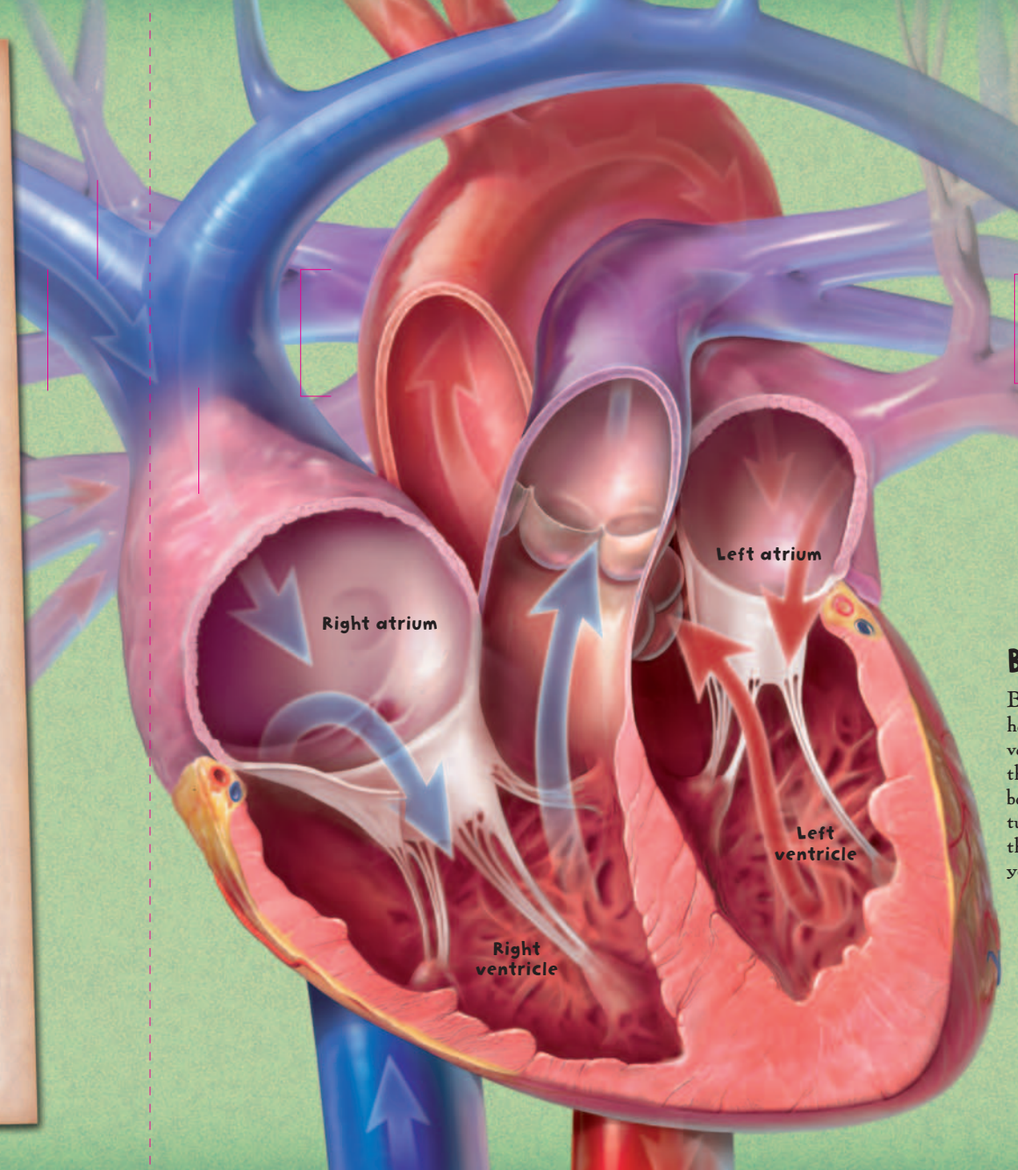
The right side of your heart receives blood from the body and pumps it to the lungs. The left side of your heart does the opposite—it receives blood from the lungs and pumps it out to the body. There are four chambers in the heart—the right and left atria and the right and left ventricles. The main pumping chambers are the ventricles, which have two states—diastole and systole.



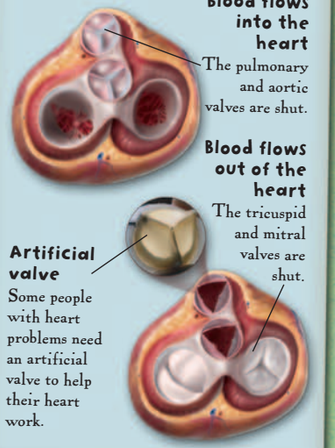
Diastole
During diastole the ventricles fill with blood from the left and right atria.



Systole
Systole occurs when the ventricles get smaller, forcing blood into the arteries, including the aorta.



One-way traffic
There are four valves in your heart. These are like little doors that open only one way. They make sure that blood flows in and out of your heart in the right direction.



Blood flows into the heart
The pulmonary and aortic valves are shut.

Blood flows out of the heart
The tricuspid and mitral valves are shut.

Artificial valve
Some people with heart problems need an artificial valve to help their heart work.

Blood vessels

Blood vessels carry blood to and from your heart and all around your body. Thick-walled vessels called arteries carry blood away from the heart and around your body. Thinner-walled tubes called veins carry the blood back to your heart.