Human Body

Open your eyes to a world of discovery.
Contents

4-5
Everyone looks different...

6-7
...but we are all alike inside

8-9
Babies and belly buttons

10-11
Life in a bag

12-13
A bag of bones

14-15
Hairy stuff

16-17
Move that body

18-19
Pump that blood!

20-21
A circular tale

22-23
Puff, puff

24-25
Attack of the bugs

26-27
Let’s talk
Everyone looks different...

Tall, short, plump, thin, blond, dark... Even though we have two eyes, a nose, two arms, and so on, we still all look so different that we can recognize each person we know without getting anyone confused.

Human beings are different in all sorts of ways. It is thought
There are slight differences between the left- and right-hand sides of your face.

Body facts
- The average human body contains enough iron to make a nail 1 in (2.5 cm) long.
- Brown or black skin has more of a pigment called melanin in it than white skin.
- You inherit certain features (such as hair color or body shape) from your parents.

What about twins?
Only identical twins look alike, and that is because they develop at the same time, from one egg that has split into two. Identical twins are always the same sex.

That more than 6,500 languages are spoken throughout the world.

There are slight differences between the left- and right-hand sides of your face.
Building blocks
A number of organs may make up each body system. For example, the stomach, liver, intestines, gallbladder, and pancreas make up your digestive system.

Your body is a collection of systems, each of which has a job to do.
All bodies are made up of organs. Skin is an organ. It is wrapped around a framework of bones and other organs such as the heart, the brain, and the lungs.

What does an organ do?
Organs work to keep you alive, and each does a different job. Organs work together to make up systems, such as the muscular system and the circulatory system.

Made of tissue
Organs are made up of tissue, which is made of groups of similar cells. These magnified cells are from the lungs.

Different cells
Cells are different depending on the organ they are a part of – skin cells, for example, are different from bone cells. Most cells have a nucleus – the control center.

A TALL STORY
The tallest man ever recorded, Robert Wadlow, grew to 8’11” (272 cm). He was born in the US in 1918, and died in 1940. He was known as the Gentle Giant. He grew so big because too much growth hormone was released into his body.

Your body has about 50,000 billion cells.

It would take about 200 of your cells to cover a period.
Babies and belly buttons

We all begin life inside our mother as a tiny egg. This develops after it is joined, or fertilized, by a sperm from the father. Most babies spend about 40 weeks growing in their mother’s tummy.

Baby facts

- At just eight weeks, the fetus can be recognized as human – although it is shorter than your little finger.
- Fingernails begin to form when the fetus is about ten weeks old.
- A fetus can get hiccups.

A race to the egg

Millions of sperm swim toward the mother’s egg to fertilize it, though only about one hundred get near it. Just one sperm fertilizes it.

Legs here, arms there...

After the egg has been fertilized, it begins to divide, becoming a ball of cells. It is full of instructions for what the baby will look like.

They can hear you!

A baby can hear noises from around its mother’s tummy – it can hear you talking or laughing, and it will recognize your voice.
How does it breathe?
The fetus cannot eat or breathe until birth, so it gets food and oxygen from its mother through a special cord. At birth this cord is cut, and shrivels away to leave the belly button.
Life in a bag

Your skin is a fabulous bag for your body. It’s stretchy and waterproof. It helps to control your body’s temperature, and it protects you from germs.

In most places, your skin is about \( \frac{1}{16} \) in (2mm) thick.

A unique print

Everybody has a unique set of fingerprints, but there are three main types: arch, loop, and whorl.

Skin facts

- About 50,000 tiny flakes of dead skin drop off your body every minute!
- Millions of microscopic dust mites live in your bed, gobbling up the skin flakes that fall off you.
What’s underneath?
Skin contains sweat glands, hair follicles, nerve endings, and tiny blood vessels called capillaries. Underneath, there’s a layer of fat.

My feet are wrinkly!
Spend a long time swimming and the thicker skin on your feet and hands will begin to wrinkle because water has soaked into it. The extra water makes it pucker up.

What’s a bruise?
Bruises are caused by damage to the tiny blood capillaries that run just under the skin’s surface. If broken by a heavy knock, they bleed into the surrounding area.

Skin alert...cure that cut!
Cut yourself and a lot of activity in the surrounding skin causes the blood to clot. The resulting scab stops dirt and germs from getting in.

Sweat it off
You sweat to keep cool – but did you know that in a fingernail-sized patch of skin there are between 100 and 600 sweat glands?
A bag of bones

Bones protect your internal organs from damage and act as a frame to hold you up. They are linked together by muscles and tendons to make up your skeleton.

Bony hands
More than a quarter of your bones are in your hands. An adult has 27 bones in each hand.

Extra bones
A baby’s skeleton is largely cartilage, the stuff that holds your nose out and makes it bendy.
It’s broken!
If you break a bone, an X-ray shows the doctor what is going on beneath the skin. Bones are living tissue, and will usually mend, with rest and support, in about 6–8 weeks.

Joints
A joint is the place where two bones meet. This is a hip joint, which is a ball-and-socket joint. It gives lots of movement.

<table>
<thead>
<tr>
<th>Bone facts</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Compared to a steel bar of the same weight, a bone is far stronger.</td>
</tr>
<tr>
<td>- You have the same number of neck bones as a giraffe.</td>
</tr>
<tr>
<td>- Bones need calcium from foods like milk and cheese to make them hard.</td>
</tr>
</tbody>
</table>

Hidden support
If you cut through a femur, or thigh bone, you’d see that the inside is a spongy honeycomb. This makes it strong, but light.
Hairy stuff

Your hair and nails are made of the same thing. It’s called keratin, and most of it is dead. In fact, your hair and nails are only alive at the roots. That’s why it doesn’t hurt to cut your hair or trim your nails.

A hairy tale

Hair grows over most of your body. The thickest is on your head, where you have between 100,000 and 150,000 hairs!
Are you right-handed?
If so, the nails on this hand will grow faster than those on the left. This is controlled by the brain.

Head lice
Head lice love to cling to hair, suck our blood, and lay their eggs. Get rid of them with special shampoo.

A female head louse will lay 50–150 eggs.

Scratchy head?
If your head itches, you may have head lice. You can see their eggs as tiny white spots in the hair above your ear.

Fingernails grow four times faster than toenails.

Like hair, your nails are made of millions of overlapping plates of keratin.
Move that body

Step forward and you’ll use about 200 muscles. You have at least 600 muscles, and they are responsible for every movement you make, from jumping to blinking to breathing.

A closer look

A muscle is made up of bundles of tiny fibers. Each fiber is incredibly thin – much thinner than a hair.

Bend your arm

Try tensing the muscle in your upper arm, your biceps. Can you feel it getting harder?

Muscle Mouse

The word “muscle” comes from the ancient Romans, who thought that muscle movements under the skin looked just like a mouse running around. Their word for mouse was musculus.
All joined up
Many muscles are joined to the ends of the bones they control by stringy cords called tendons.

How do they work?
Muscles can only pull, so they work in pairs. In your arm, the biceps pulls by contracting to bend the arm and the triceps pulls to straighten it.

Make a face!
Your face is full of muscles. Incredibly, you use 17 of these muscles to smile. However, you use about 40 muscles to frown!

Muscle facts
- Your muscles make up 40 percent of your body’s weight.
- Help your muscles grow big and strong by eating lots of protein. That means lots of eggs, meat, cheese, and beans.
- Muscles can contract to one-third of their size.
Can you feel your heart beat? This amazing muscle never gets tired, even though it opens and closes about 100,000 times a day, every day, throughout your life.

A one-way system
Your heart beats to push blood around your body. Four valves ensure that the blood always goes the same way.

Where is it?
Your heart is protected by your rib cage. It is slightly to the left of your chest.

A heart has four chambers.

Speed up!
Run and your heart beats faster. This gets more oxygen to your muscles.

Held with string
Heart strings are tiny cords that stop the valves from turning inside out when they close.
What is blood?
Blood is made up of a watery liquid called plasma, red cells, white cells, and fragments of cells called platelets.

A tangled web
This is what happens when your blood clots because of a cut. The red cells are caught in a mesh of fibers. They die and stop blood from flowing out.

Heart/blood facts
- At rest, a child’s heart beats about 85 times a minute.
- A drop of blood contains approximately 250 million red cells, 275,000 white cells, and 16 million platelets.
- A blood cell goes around your body and back through your heart more than 1,000 times each day.

Fighting infection
White blood cells and platelets make up less than one percent of blood. They fight germs.

Red blood cells
Red blood cells make up about 44 percent of your blood. Millions are made and destroyed every second.

Plasma makes up about 55 percent of your blood.
A circular tale
Your heart pumps blood around your body through arteries and veins. Arteries carry blood away from the heart. Veins carry blood toward the heart.

A change of color
As blood travels through the lungs, it picks up oxygen. This makes it brighter in color. As it releases oxygen around the body, it grows darker.

Smaller and smaller
Arteries and veins become a branching network of capillaries. The capillary walls are so thin that gases, nutrients, and waste products pass easily through.

Feel the beat
You can feel your heart’s beat as it sends a pulse through the artery in your wrist. Hold your index finger against the inside of your wrist. The regular beat is the surge of pressure that occurs when the heart contracts.

Most to the brain
Your brain needs a constant supply of oxygen-rich blood. It is so important that it gets 20 percent of your body’s blood supply.

A close-up of an artery
This cross-section of an artery is magnified so much that the red blood cells can be seen. Arteries usually have thicker walls than veins.

A ONE-WAY SYSTEM
Almost 400 years ago, an English doctor named William Harvey discovered that blood circulates one way around the body, pumped by the heart. Harvey drew detailed diagrams of arteries and veins to show what he meant and published his results in 1628.

Your fingers and toes are the coolest parts of your body.
Puff, puff

Believe it or not, you take about 23,000 breaths each day. With every breath, you take in oxygen, which you need to stay alive, and you breathe out a gas called carbon dioxide, which your body doesn’t need.

A wind tunnel
Air travels down your windpipe, or trachea, to get to your lungs. In this photograph, you can see the rings of cartilage that hold the trachea open.

Taking out the oxygen
The air tubes (shown red) get smaller and smaller until they end in millions of tiny air sacs called alveoli. Here, oxygen is taken into your blood.
Blowing bubbles
We can only store oxygen for a short time in our lungs. Also, unlike fish, we have no gills to remove oxygen from water. So we cannot stay underwater without an air supply.

Lung facts
- Stethoscopes, which doctors use to check breathing, were invented in 1816.
- You breathe faster during and after exercise to draw more oxygen into your body.
- Your left lung is smaller than your right lung to allow room for your heart.

Why do I get hiccups?
Hiccups happen when the muscle that helps to move air in and out of your lungs, your diaphragm, jerks uncontrollably. Nobody really knows why they happen, but there are lots of suggestions for stopping them. Try breathing into a paper bag...or ask a friend to scare you...or (yummy!) put sugar under your tongue.

There’s water, too
Your breath contains water. If you breathe onto a cold surface, this water condenses into tiny droplets. That means it changes from a vapor into a liquid. The same thing happens on a cold day.
Attack of the bugs

Everywhere you go, you are surrounded by nasty germs, and many of them want to live inside your body. After all, it makes a comfy home. The problem is, they can make you ill.

What are germs?
Germs fall into two main groups: bacteria and viruses. Your body is good at keeping them out, but they are clever at finding ways in.

Beastly bacteria
Bacteria come in lots of funny shapes. Some even have tails! If a cut becomes infected (it will look red and swollen), that’s because bacteria have gotten in.

Vile viruses
Have you had chicken pox? It’s caused by a virus. So is the common cold. Viruses are tiny – far smaller than bacteria.
Outside help
Can you remember having an injection called a vaccination? These are weak or dead germs, or the poisons produced by germs. They won’t harm you, but help your body to fight an illness.

Fighting back
The good news is that your body makes things called white blood cells that can kill germs. The white blood cell pictured above is gobbling up a germ.

Early medicine
Thousands of years ago, people believed that illness was a punishment from the gods. It was not until the 5th century BC, some 2,400 years ago, that the Greek doctor Hippocrates told people that their surroundings, not magic, caused disease. He is known as “the father of medicine.”
There are many ways of “talking,” and not all of them are with your lips. The look on your face and the way you stand tell people a lot about what you are thinking.

I need it now!
Babies can’t talk, so they cry to let you know that they want something. From early on, they also communicate by eye contact and facial expression.

Making a word
You make sounds as you breathe out over your voice box, or larynx. Your tongue, lips, and teeth change the sounds into words.
What do you think?
Body language can say a lot about the way you feel. Throw your arms in the air and people know you’re excited. Are these children sad?

It is thought that at least 80 percent of communication is through body language.

Sign language
Signing is one way that people who are deaf can communicate. They use their hands to sign words and to spell letters.

Some signed words use one hand, others use two.
Brainpower

Step forward, touch something, talk, drink a glass of milk...everything you do is controlled by your brain. It’s a bit like a computer, but far more complicated – and it only weighs 2.9 lb (1.3 kg)!

Use those senses!
A simple drink requires a lot of brain power. Your eyes and fingers send messages about what you see and touch, while your nose and tongue help you to smell and taste the contents.

Brain facts
- The brain needs oxygen to work properly. In fact, one-fifth of all the oxygen you breathe in goes to the brain.
- The brain is 85% water.
- The spinal cord stops growing when you are about five years old, having reached about 17 in (43 cm).

How does it work?
Your brain contains billions of nerve cells called neurons that carry signals to and from different parts of your body through your central nervous system.
Why’s it so ugly?
Your brain triples in weight between birth and adulthood. As it grows, it wrinkles up to fit your skull, which acts like a protective crash helmet. If you could stretch it out, your brain would cover an ironing board.

Imagined touching your brain.
It would feel like pudding.

It’s split in two
Your brain has two halves, called hemispheres. The “dominant” half (the one in charge) is usually the left. This is where speech, writing, numbers, and problem-solving are usually handled.

A good fit
The top of a human skull is domed to make room for the brain, as shown by this model.

Which part does what?
Different parts of your brain do different things. These heat scans show which part of the brain is working for which activity.
Touch

When you touch something, tiny touch sensors in your skin send a message to your brain.
Links to the brain
Sensory nerves carry signals from your skin to your spinal cord, then to your brain. It’s your body’s branching information system.

Impulses race along some nerves at speeds faster than a racing car.

Your fingertips contain particularly large numbers of nerve endings.

The diving reflex disappears at about three months.

It’s a reflex!
Under water, a baby will close a muscle to keep water out of its lungs. This is a reflex action, meaning the muscles react automatically.

Touch facts
- Different touch sensors detect pressure, pain, vibrations, and hot or cold.
- You have around 3 million pain sensors, most in the skin.
- Your body produces natural painkillers, called endorphins.
Listen up!
Your ear has three parts: the outer ear, which you can see; the middle ear, where there are tiny bones; and the inner ear, which contains a coiled tube of liquid.

A waxy tunnel
The small bits of dust and dirt that get into your ears are caught in your sticky ear wax. This gradually carries them out of your ear.

There are 4,000 wax glands in each ear.

Bones in your ear?
The bones in your middle ear – the malleus (hammer), incus (anvil), and stapes (stirrup) – are the smallest bones in your body.
Why do I get dizzy?
Your ears tell your brain the position of your head. When you spin, your brain finds it difficult to keep up with the messages sent from your ears. So you feel dizzy.

Hairs in your ear?
Tiny hairs in your inner ear pick up movements in the liquid around them. These are sent, as signals, to your brain to “hear.”

These tiny hairs are found in the inner ear, in the cochlea.
They link up to the brain.

Ear facts
- Human beings can tell the difference between more than 1,500 different tones of sound.
- Everybody’s ears are shaped differently.
- The stapes is the smallest bone in your body; it’s shorter than a grain of rice.

A little help
If someone is deaf, it means that they cannot hear. A hearing aid helps partially deaf people to hear by making sounds louder.
Eye, eye

Those soft, squidgy balls in your head – your eyes – are well protected. They nestle in bony eye sockets and can hide behind your eyelids. Through them, your brain receives much of its information about the world.

Take a peek inside
This picture shows the two eyes (yellow) in their eye sockets – separated by the nose. They connect directly to the brain.

What’s your color?
Blue, green, gray, or brown…what color are your eyes? The color of your iris depends on the instructions for eye color that you inherit from your parents.

A liquid camera
Your eyes are a bit like tiny video cameras, but filled with fluid. Light enters the eye through a hole in the iris, the pupil, and travels to the retina. Messages are sent to the brain, which tells you what you see.
The pupil is larger (to let in more light) in dim light.

How big are your pupils?
Pupil size changes depending on the light – and on what’s around you. Do you like what you see? Your pupils will often get bigger. Bored? Your pupils will get smaller.

How can you see a lighted candle 1 mile (1.6 km) away?

Your eye can spy a lighted candle 1 mile (1.6 km) away!

Eye facts

- You blink about 9,400 times a day.
- Six muscles hold each eye. They are kept busy, moving about 100,000 times a day!

What is color blindness?

Your retina contains pigments that detect color. If these are not working, you will have difficulty telling some colors apart. This is known as color blindness.

Can you see this number? If not, the pigment that picks up red light may be missing from your retina.
Smelly stuff
Did you know that humans have the ability to tell the difference between about 10,000 smells? This incredible sense helps you to taste and enjoy things.

How do we smell?
Things have a smell because they give off particles called molecules. Sniff something and these travel up to cilia at the top of your nose. Under the microscope, cilia look like tiny hairs.
Cells at the top of your nose produce about 2 pints (1 liter) of mucus a day.

A smell is recognized in an area toward the front of the brain.

The smell receptors then send a message to your brain, which either recognizes the smell or memorizes it if it hasn’t come across it before.

You have 10 million smell receptors.

A path to the brain
The smell receptors then send a message to your brain, which either recognizes the smell or memorizes it if it hasn’t come across it before.

Smell facts
- A bloodhound’s sense of smell is 1,000 times better than a human’s.
- Mucus is a clear fluid. It mixes with things in the air, and they give it a color.
- The mucus in your nose can become green if you have an infection.

Why do flowers make me sneeze?
If you have an allergic reaction to pollen, too much mucus will pour into your nose to try to flush it out. There's so much that you have to sneeze to get rid of it.
Have you ever wondered what your tongue does? It helps you to talk, but it also helps you to move food around your mouth, and, more importantly, to taste it.

**Take a sniff**
Smell plays an important part when you taste a food. That’s why things don’t taste so good if you have a blocked nose.

**Anchored in place**
A flap of skin called the frenulum holds the bottom of your tongue to the floor of your mouth. It stops you from swallowing your tongue.

**Ten thousand taste buds help you**
It helps you to tell the difference between four different flavors.

If your frenulum is short, you will not be able to stick your tongue out very far.
Each taste bud cell is renewed after about 7 days.

Your tongue has touch sensors, to help you feel food.

More than 1 quart (1 liter) of saliva is released into your mouth each day.

Taste facts

Why the bumps?
Your tongue is bumpy so things don’t slip off easily. It is covered in round papillae, some of which contain taste buds.

Tastes on your tongue
When food enters your mouth, pieces dissolve in saliva. Saliva makes food easier to swallow, but it also means the food flavor can be detected by taste buds. Different flavors are detected in different places.

- Area where sour flavors are detected
- The tip of your tongue can tell if something is sweet
- Bitter flavors are picked up toward the back of your mouth
- Area where salty tastes are picked up

Larger, flat-topped papillae contain taste buds.

Smaller papillae help the tongue to “grip” slippery food such as ice cream.
Take a bite
Before their first teeth appear, babies drink milk or eat puréed food. Without teeth, they cannot chew on food to make it easier to swallow. Teeth are very important.

How big are they?
Each of your teeth has a long root, which holds it tightly in your jaw. Inside each tooth are nerves and blood vessels.

A child has 20 milk teeth.
There are 32 adult teeth.
Why do they fall out?
Your milk teeth are your first teeth, but they can’t grow. So they are pushed out between the ages of 6 and 12 to make room for your adult teeth.

Keep on brushing
Bits of food and saliva soon begin to coat your teeth with plaque, which can cause decay and lead to a toothache. Brushing helps to remove plaque.

Why do I need braces?
Sometimes your teeth grow crookedly. Braces help to straighten them, making them sit evenly in your mouth.
Food gives us many things, including the energy to run and jump. Energy is also used to break down or digest the food we eat. The nutrients this releases are passed to our cells through the bloodstream. Cells use nutrients to make more energy.

**An acid bath**

Acid is released in your stomach to break down the food. A constant churning helps turn the food into a mushy soup.

**Taking the nutrients**

The small intestine is lined with fingerlike villi. Blood runs through the villi, where it can pick up goodies from the food and take them to the liver. The liver removes what your body needs.

**Waiting to go**

The rectum is where your feces, or poo, are stored, waiting for you to use the bathroom. This is waste that your body is unable to use.

**From food to poo**

Food gives us many things, including the energy to run and jump. Energy is also used to break down or digest the food we eat. The nutrients this releases are passed to our cells through the bloodstream. Cells use nutrients to make more energy.

**Stomach facts**

- Acid in your stomach could dissolve an iron nail.
- Your stomach can hold about 15 cups of water.
- A thick layer of mucus protects the stomach from its own acid.

**Going down**

After you have chewed your food, it is pushed down a tube called the esophagus and into your stomach.

**Don’t lose the water!**

The remains of your food spend up to two days in the large intestines, which absorb water from it. Strong muscles push it along.

**Half of poo is made up of bacteria**

The broken-down food spends up to 3 hours in the small intestine. Taking the nutrients

The small intestine is lined with fingerlike villi. Blood runs through the villi, where it can pick up goodies from the food and take them to the liver. The liver removes what your body needs.

**Akid bath**

Acid is released in your stomach to break down the food. A constant churning helps turn the food into a mushy soup.

**Stomach facts**

- Acid in your stomach could dissolve an iron nail.
- Your stomach can hold about 15 cups of water.
- A thick layer of mucus protects the stomach from its own acid.

**Waiting to go**

The rectum is where your feces, or poo, are stored, waiting for you to use the bathroom. This is waste that your body is unable to use.

**From food to poo**

Food gives us many things, including the energy to run and jump. Energy is also used to break down or digest the food we eat. The nutrients this releases are passed to our cells through the bloodstream. Cells use nutrients to make more energy.

**Stomach facts**

- Acid in your stomach could dissolve an iron nail.
- Your stomach can hold about 15 cups of water.
- A thick layer of mucus protects the stomach from its own acid.

**Waiting to go**

The rectum is where your feces, or poo, are stored, waiting for you to use the bathroom. This is waste that your body is unable to use.

**Stomach facts**

- Acid in your stomach could dissolve an iron nail.
- Your stomach can hold about 15 cups of water.
- A thick layer of mucus protects the stomach from its own acid.

**Waiting to go**

The rectum is where your feces, or poo, are stored, waiting for you to use the bathroom. This is waste that your body is unable to use.
Sleep tight

After all the activities you do each day, your body needs to rest. Sleep gives your brain a chance to catch up with what you’ve done. Without it, you cannot think properly and your body will begin to slow down.

Why do I yawn?
If you are bored or sleepy, your breathing slows. You yawn to pull more oxygen into your body, helping to keep you awake.

Miss a night’s sleep and you’ll be crabby and clumsy the next day.

A five-year-old needs about ten hours of sleep each night.

You wriggle around a lot when you’re sleeping, changing position about 45 times a night.

WHERE ARE YOU GOING?

Sometimes people walk in their sleep. They may even get dressed, or try to find something to eat. But when they wake up in the morning, they won’t remember anything about it. More children sleepwalk than adults, and more boys than girls. Nobody really knows why people sleepwalk, but it is usually harmless.
Why do I dream?
Dreams bring pictures of things you have seen during the day, but also images that are unrelated to the day’s events. Nobody knows exactly why people dream.

What was that?
Children sometimes have frightening dreams called nightmares, usually about being chased. Remember, nightmares are not real.

It can be noisy!
Snoring happens if a person cannot move air easily through the nose and mouth during sleep. It causes a loud noise.

Sleep facts
- We spend about one-third of our lives asleep.
- Most people have about 4–5 dreams every night – but you won’t remember them all.
- A dream lasts between 5 and 30 minutes.
Alveoli microscopic airbags inside the lungs. These are where oxygen from air breathed in is passed into the blood.

Artery part of the network of vessels that carry blood around the body. Arteries carry blood away from the heart.

Blood vessel one of the arteries, veins, and capillaries that carry blood through the body.

Carbon dioxide the waste gas that humans breathe out.

Cartilage tough but flexible material that makes up much of a baby’s skeleton. Smaller amounts are found in an adult’s body.

Cell one of the body’s basic building blocks.

Central nervous system the part of the body’s communication system that consists of the brain and the spinal cord.

Diaphragm the muscle that stretches across the chest just below the lungs and helps a person to breathe.

Digestion the process of breaking down food.

Esophagus the tube that runs between the throat and the stomach.

Feces the solid waste that is produced by digestion.

Germs the microscopic bacteria and viruses that cause sickness.

Intestines the long tubes through which food passes in the process of digestion.

Larynx the part of the throat where speech sounds are made.

Mucus a slippery fluid that is found in areas such as the respiratory and digestive systems.

Muscle a tissue that contracts to cause movement.

Nerve a bundle of fibers through which instructions pass between different areas and cells in the body.

Nutrients the substances in food that are useful to the body (such as proteins, carbohydrates, and vitamins).

Organ one of a number of different parts of the body that each perform a particular job.

Oxygen the gas that humans take from air. Oxygen is needed to release energy from food.

Plasma the part of blood that remains when the red and white cells are removed.

Pore tiny holes in the skin through which the body sweats.

Reflex an automatic action, such as breathing or blinking.

Saliva a fluid released into the mouth that helps begin the breakdown of food and makes it slippery enough to swallow.
Senses  the means by which humans find out about the world around them. The five senses are: hearing, sight, taste, touch, and smell.

Spinal cord  the bundle of nerves that runs inside the backbone.

Sweat  a liquid that contains waste products. It is released through pores in the skin to help the body cool down.

Tendon  a tough cord that links muscle to bone.

Trachea  the tube that runs from the larynx to the lungs.

Umbilical cord  the cord that connects a fetus to its mother through the placenta.

Vaccination  an injection of dead or weak germs, or the toxins produced by germs, that teaches the body to fight that particular germ.

Vein  part of the network of vessels that carry blood around the body. Veins carry blood toward the heart.

Vertebra  one of the bones that make up the backbone.

Villi  Fingerlike projections from the wall of the small intestines through which nutrients are taken into the blood.

Voice box  see larynx.
Acknowledgments

Dorling Kindersley would like to thank: Dorian Spencer Davies and Andrew O’Brien for original artwork, and Sonia Whillock for design assistance.

Picture credits

The publisher would like to thank the following for their kind permission to reproduce their photographs:

Corbis: 14tl, 26cr, 27tr, 31br, 35br, 38l.

Foodpix: 28. Getty Images: 2-3, 4tr, 5tr, 26bl, 27br, 30bl, 33bl, 36, 44-5, 46-7, 48. ImageState: 1, 11br, 17cr, 23tr, 27cla, 30tl, 30tr, 30br, 39tr. Age Fotostock 4-5b.


26tl. Robert Karpa 45tl. Gail Mooney 26cl. Brian Pieters 27cr. Science Photo Library: 6-7t, 7cl, 7br, 8tr, 8ca, 8bl, 8br, 9, 10c, 10-11t, 11tr, 11cr, 11bl, 11r (St. Stephen’s Hospital), 12, 13tc, 13cl, 13r, 14bl, 14br, 15tc, 15cl, 15bl, 16c, 17tl, 18t, 18bl, 18br, 19, 19tc, 19c, 19br (Susumu Nishinaga), 21tc, 22tl, 22tc, 22cl, 22bl, 22-23, 24tl, 24bl, 24-25b, 24-25t, 25tr, 25br, 26br, 31r, 33tl, 34-5, 35tc, 35tr, 36tl, 37cr, 37br, 42tl, 42-43t, 43bl. BSIP/VEM 40tr. Gregory Dimijian 34cla. Pascal Goetgheluck 40. Mehau Kulyk 29tr. Omikron 39c. Geoff Tompkinson 29cl. Wellcome Dept. of Cognitive Neurology 29br. The Wellcome Institute Library, London: 32cr.


For further information, see www.dkimages.com