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Human respiratory system



The **respiratory system** is the group of tissues and organs in your body that **allow you to breathe**. This system includes your **airways**, your **lungs**, and the **blood vessels** and **muscles** attached to them that work together so you can breathe.

The respiratory system's main function is to **supply oxygen** to all the parts of your body. It does this through breathing: **inhaling** oxygen-rich air and **exhaling** air filled with carbon dioxide, which is a waste gas.

The respiratory system works in the following way: first you breathe air in through your nose and mouth, which wet and warm the air so it won't irritate your lungs. Then the air travels through your voice box, down your windpipe, and through two tubes into your lungs. Cilia, tiny mucus-covered hairs, in your airways trap foreign particles and germs to filter the air that you breathe. You then cough or sneeze the particles out of your body.

Top 10 facts

1. Most **vertebrate** animals (animals with spines) have two lungs.
2. Your **left and right lungs** aren't exactly the same. The lung on the left side of your body is divided into two lobes while the lung on your right side is divided into three. The left lung is also slightly smaller, allowing room for your heart.
3. The highest recorded "**sneeze speed**" is 165 km per hour.
4. The **capillaries** in the lungs would extend 1,600 kilometres if placed end to end.
5. We lose half a litre of water a day through breathing. This is the **water vapour** we see when we breathe onto glass.

6. People who have a large **lung capacity** can send oxygen around their body faster. You can increase you lung capacity with regular exercise.
7. As well as other parts of your body and your general health, **smoking** is bad for your lungs. Smoking can cause lung cancer among other lung-affecting diseases.
8. **You can live with one lung** – it limits your physical ability but doesn't stop you from living a relatively normal life. Many people around the world live with just one lung.
9. The lungs are able to float on water since they contain so many **air sacs**. If you breathe out in a swimming pool, you start to sink as the air sacs are empty.
10. The word "lung" originates from the Old English word "lungen". It means "**light**" (not heavy), probably because people realised that lungs from a slaughtered animal float in water (the heart, liver and other organs sink).

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Did you know?

- **Lungs vary in size** just as people do. Generally adult lungs measure around 25-35cm long, are 10-15cm wide and weigh 0.8-1.2 kg. Your lungs breathe in about 2,000 gallons

of air every day – enough for the 2,400 gallons of blood that go through your heart every day. At night, you inhale and exhale enough air to fill your bedroom!

- **A healthy lung is pink, smooth and shiny.** People who smoke damage their lungs; a damaged lung is black, bumpy and dull.
- Everyone **yawns** at some point, but do you know why? It happens when the brain detects low oxygen levels in lungs and it triggers back the response to the body, so that it can intake large amounts of oxygen by yawning.
- **Red blood cells** are responsible for picking up the oxygen in the lungs and carry oxygen to the body cells. The red blood cells then collect the carbon dioxide (waste gas product) produced by our cells and transport the carbon dioxide back to the lungs which we breathe out when we exhale.
- In 1905, the scientist **J S Haldane** made the important discovery that the urge to breathe is caused by a build-up of carbon dioxide in the blood. As the blood level of carbon dioxide rises, this is detected by a small region in the brain, which triggers quicker breathing.
- The world record for longest time **holding the breath underwater** was 22 min 00 sec by Stig Severinsen (Denmark) at the London School of Diving in London, UK, on 3 May 2012. Stig was allowed to hyperventilate (breathe rapidly) with oxygen prior to the attempt, and did this for 19 minutes and 30 seconds.
- The first species of mammal shown to breathe through its skin, at least for part of its life, is the **Julia Creek dunnart**, a tiny species of Australian marsupial mouse. Scientists discovered that although as an adult this little creature breathes through its lungs like other mammals, when first born it is so small – only 4mm (0.15in) long – that its muscles are too weak to inflate its lungs. So it absorbs oxygen directly through its skin until it leaves its mother's pouch, by which time it is large enough to inflate its lungs.

Look through the gallery below and see if you can spot the following:

- The lungs
- Inhalation (breathing in)
- Exhalation (breathing out)
- A diagram of the respiratory system
- An inhaler for asthma
- The parts of the lungs
- Lungs X-rayed

Gallery



About

The job of your respiratory system is very simple: **to bring oxygen into your body, and remove the carbon dioxide from your body.** Your body needs oxygen to survive. Oxygen is used by your cells as they perform all their different jobs to keep you alive and functioning. As your body uses oxygen, your cells produce another gas known as carbon dioxide. Too much carbon dioxide can be toxic, even deadly. For this reason, it is important that your body has a way to get rid of it.

The main organs in your respiratory system are your **lungs**. Your lungs are, in their simplest form, nothing more than air sacs. As you breathe in (**inhale**), you fill these sacs with fresh oxygen-rich air. Your heart pumps blood into the walls of your lungs where it absorbs oxygen and releases carbon dioxide. As you breathe out (**exhale**), you release the carbon dioxide-rich air into the space around you. With each breath you take, you are taking oxygen in, and putting carbon dioxide out. When air is breathed in, it passes down the **trachea**. This divides into two airways called main **bronchi**, which go to the two lungs. Each splits into smaller bronchi, which then split into **bronchioles**. These finish in groups of tiny air sacs called **alveoli**. From your lungs, blood returns back into your heart where it is pumped out to the rest of your body, carrying oxygen along with it.

Your lungs are protected by your **rib cage**, which is made up of 12 sets of ribs. These ribs are connected to your spine in your back and go around your lungs to keep them safe. Beneath the lungs is the **diaphragm**, which is a dome-shaped muscle that works with your lungs to allow you to and exhale air. As you breathe in, your diaphragm contracts and flattens out. This allows it to move down, so your lungs have more room to grow larger as they fill up with air. Your **rib muscles** also lift the ribs up and outward to give the lungs more space.

If your body cannot breathe, your cells will not get the oxygen they need. If this happens, your cells will quickly begin to die. Within only a few minutes from the time that you are not able to get breath, your body will die. That is how important breathing is.

Words to know:

Alveoli - (plural of alveolus) a tiny thin-walled air sac found in large numbers in each lung, through which oxygen enters and carbon dioxide leaves the blood

Blood vessels - an artery, vein, or capillary through which blood flows

Bronchi - (plural of bronchus) a tube leading from the windpipe to a lung, which provides for the passage of air

Bronchioles - a narrow tube inside the lungs that branches off the main air passages bronchi

Capillary - an extremely narrow thin-walled blood vessel that connects small arteries with small veins to form a network throughout the body

Carbon dioxide - a heavy, colourless, odourless waste gas.

Cells - The cell is the basic unit of life. Some organisms are made up of a single cell, like bacteria, while others are made up of trillions of cells. Human beings are made up of cells, too.

Diaphragm - a curved muscular membrane in humans and other mammals that separates the abdomen from the area around the lungs

Exhale - to breathe out, or breathe something out

Inflate - to fill something with air or gas to bring it to the proper size, shape, and firmness for use, or to become filled with air or gas

Inhale - to breathe in, or draw a gas, liquid, or solid into the lungs through the nose or mouth

Irritate - to stimulate a body part excessively, causing a painful reaction

Lobes - a rounded part of an organ or part in the body, especially in the lungs, brain, or liver

Lung - a pair of spongy respiratory organs, situated inside the rib cage, that transfer oxygen into the blood and remove carbon dioxide from it

Mammal - a class of warm-blooded vertebrate animals

Mucus - the clear slimy lubricating substance that coats and protects membranes

Organ - a complete and independent part of a plant or animal that has a specific function

Oxygen - a colourless, odourless gas that is essential for plant and animal respiration

Respiratory - relating to or used in breathing

Tissues - organic body material in animals and plants made up of large numbers of cells. The four basic types of tissue are nerve, muscle, epidermal, and connective.

Trachea - (also known as the windpipe) the tube that moves air from the throat to the bronchi.

Vapour - moisture or another type of matter visible in the air as mist, clouds, fumes, or smoke

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