



# How your lungs work

Your lungs are incredible. Every day you take about 25,000 breaths, mostly without thinking.

We've created this information to explain how your lungs work, including how you breathe and how oxygen gets into the bloodstream. We also explain how your lungs protect you and what you can do to protect your lungs.

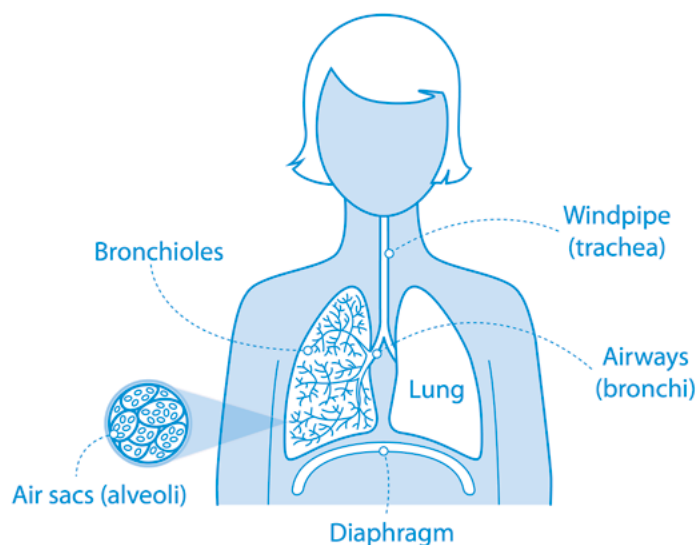
## About your lungs

All day, every day, your lungs work, often without you thinking about it.

How often you breathe in and out every minute depends on your age and what you're doing. If you're resting, an adult will breathe around 12-20 times a minute – that adds up to around 17,000 – 30,000 times a day! The amount of air that moves in and out of your lungs can vary from just a few litres a minute when you're resting, to over 100 litres a minute if you're exercising vigorously.

The lungs absorb oxygen from the air you breathe in and transfer it into your bloodstream so that it can get to every part of your body. As the cells in your body work, they produce a waste gas called carbon dioxide that is released into the bloodstream. Your lungs get rid of this waste gas when you breathe out.

## What are your lungs made up of and how do they work?



Your two lungs fill your chest and sit on either side of your heart. Lungs are made up of areas called lobes – your right lung has three lobes, and your left lung has two. Your left lung is smaller than your right because it shares that side of the chest with your heart.

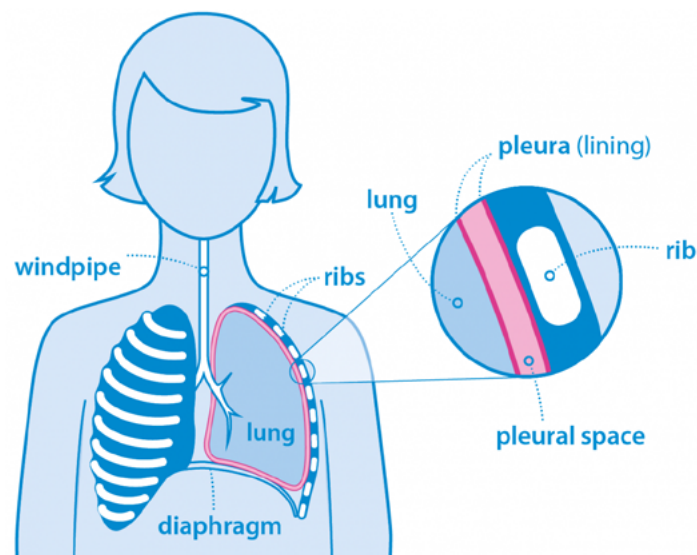
Your windpipe – also called your trachea - carries air into the lungs and out again when you breathe out. The windpipe divides into airways called bronchi. These branch into smaller and smaller airways. The smallest are too narrow to be seen with the naked eye. This is often called the **bronchial tree**. At the end of these airways are tiny air sacs called **alveoli**. This is where gas exchange happens. Under a microscope, the inside of your lungs look like a giant sponge.

There are around 300 million air sacs in your lungs and if they were spread out, they would cover an area roughly the size of a tennis court!

### What is the pleura?

The pleura is a thin, transparent covering, called a membrane, that surrounds your lungs, and lines the inside of your ribcage. It has two layers so the outside of the lungs can slide smoothly against the inside of the chest wall as you breathe.

The space between the two layers is called the **pleural space** and it normally contains a small amount of fluid. This fluid lubricates the two surfaces and lets your lungs and chest wall move and expand as you breathe in and out.



## Why do you breathe?

Every part of your body needs oxygen to survive.

## Why do we breathe?

Everyday functions of the body like digesting your food, moving your muscles or even just thinking, need oxygen. When these processes happen, a gas called carbon dioxide is produced as a waste product. The job of your lungs is to **provide your body with oxygen** and to **get rid of the waste gas, carbon dioxide**.

Your brain constantly gets signals from your body which detect the amount of oxygen and carbon dioxide in your blood.

Your brain will send signals to the muscles involved in breathing and adjust your breathing rate depending on how active you are.

When you're active, your breathing can increase up to about 40-60 times a minute to cope with the extra demand. The delivery of oxygen to your muscles also speeds up, so they can do their job efficiently. The increase in your breathing also makes sure there's no build-up of carbon dioxide in your bloodstream.

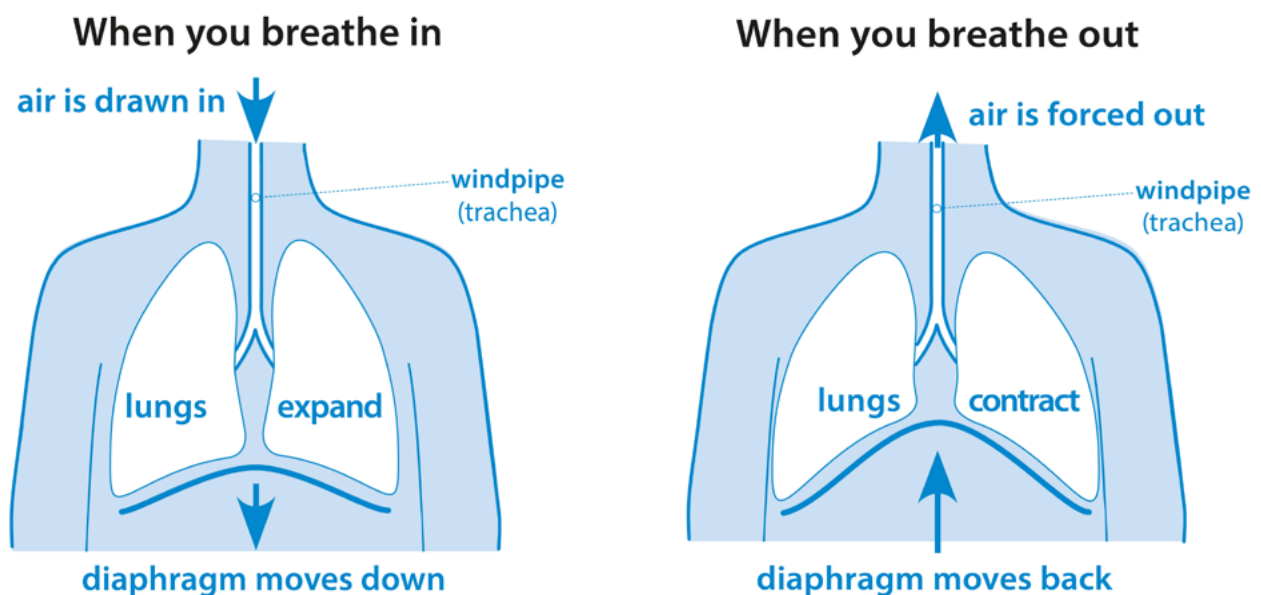
## What muscles do you use to breathe?

Your main breathing muscle is the diaphragm. This divides your chest from your abdomen.

Your diaphragm contracts when you breathe in, pulling the lungs down, stretching and expanding them. It then relaxes back into a dome position when you breathe out, reducing the amount of air in your lungs.

When you exercise, your abdominal muscles are used to push air out of the lungs when you breathe out. This is called forced expiration.

There are also muscles in between the ribs, which keep the ribcage stiff and help with breathing. These are called intercostal muscles.



## Breathing in:

Healthy lung tissue is springy and elastic, so your muscles need to work to expand your chest and draw air into your lungs.

Signals from the respiratory centre in your brain travel down nerves to your diaphragm and other muscles. The diaphragm is pulled flat, pushing out the lower ribcage and abdomen. At the same time, the muscles between your ribs pull your rib cage up and out. This expands the chest and draws air into the lungs.

Air is pulled into your nose or mouth, and into your windpipe. This divides into airways supplying the left and right lungs.

The air passes down the airways, which divide another 15 to 25 times, and finally into thousands of smaller airways until the air reaches the air sacs.

## Breathing out:

At rest, breathing out is mostly a passive process. The muscles you use to breathe in now relax and your elastic lungs push air out. When you exercise and your body needs to move air more quickly, your abdominal muscles provide the main drive for exhaling. The intercostal muscles also help.

The system works so that you breathe in and out comfortably at rest where the least effort is required to move air – and you're probably not conscious of your breathing. When you exercise, you need to move more air. To do this you can take bigger breaths or breathe more quickly – usually both.

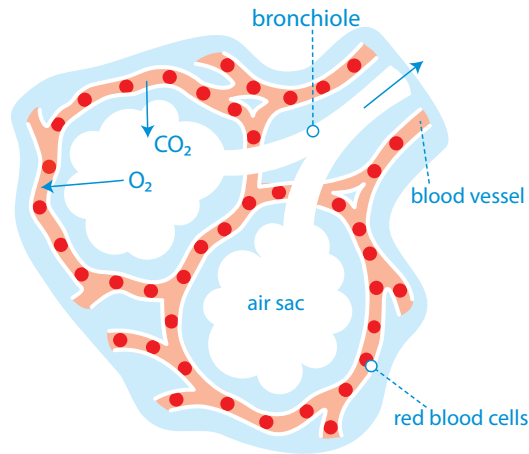
Although breathing is usually automatic, you can control it if you want to - when you talk or sing for example.

## How does oxygen get into the bloodstream?

Inside the air sacs, oxygen moves across paper-thin walls to tiny blood vessels called capillaries and into your blood. A protein called haemoglobin in the red blood cells then carries the oxygen around your body. At the same time, carbon dioxide that is dissolved in the blood comes out of the capillaries back into the air sacs, ready to be breathed out.

Blood with fresh oxygen is carried from your lungs to the left side of your heart, which pumps blood around your body through the arteries.

Blood without oxygen returns through the veins, to the right side of your heart. From there it is pumped to your lungs so that you can breathe out the carbon dioxide and breathe in more oxygen.



## What else do the lungs do?

The lungs are exposed to the air, so they also play an important protective role in your body, linked to your immune system. Each breath of air doesn't only carry oxygen, it also carries germs and other foreign bodies such as pollutants. As a result, your lungs are also designed to prevent unwanted materials from getting into your body.

Mucus (a thick liquid) is produced in the walls of the small airways to help keep your lungs clean and well lubricated. It is moved by tiny hairs called cilia that line your airways. They move back and forth sweeping a thin layer of mucus out of your lungs and into your throat. Unwanted materials stick to the mucus. When it reaches the throat, it's usually swallowed without you realising.

If your mucus builds up or if you have an inflammation, coughing can help to clear it from the airways.

The delicate structure of your lungs is beautifully adapted to breathe and, at the same time, helps protect your body from harm.

## What can damage my lungs?

Your lungs can be damaged if you breathe in cigarette smoke, air pollution (both outside and inside the home) or dusts and fumes in the workplace over a sustained period of time. If your airways get damaged, you can get more breathless over time. Sometimes, the cause of lung damage is unknown.

## How can I protect my lungs?

It can be hard to protect yourself from environmental risks such as air pollution. But you can help protect your lungs by quitting smoking, improving the air quality in your home and doing what you can to reduce your exposure to air pollution.

If in the workplace you're regularly exposed to things that might damage your lungs, like brick dust or sawdust, you must make sure you're wearing the correct respiratory protective equipment (RPE). For example, a protective face mask.

## Stop smoking

If you smoke, stopping smoking is the best thing you can do for your health and your lungs. Your health care professional and pharmacist can help you find ways that make it easier for you. You're around three times as likely to quit with help from support services and medication. We have more information to help you stop smoking for good at [blf.org.uk/support-for-you/smoking](https://blf.org.uk/support-for-you/smoking)

## Try to keep active

Keeping active is one of the best things you can do for your lungs, especially if you have a lung condition.

There's plenty of support and advice for you on how to keep active at [blf.org.uk/support-for-you/keep-active](https://blf.org.uk/support-for-you/keep-active). You can increase everyday activities like walking or gardening. Or you could join an exercise class at your local leisure centre or community hall. You could also speak to a health care professional about a referral to a local pulmonary rehabilitation programme.

To get started, take a look at our online exercise videos at [blf.org.uk/support-for-you/keep-active/exercise-video](https://blf.org.uk/support-for-you/keep-active/exercise-video) and download our free exercise handbook here: [blf.org.uk/support-for-you/keep-active/what-activities-can-i-do#handbook](https://blf.org.uk/support-for-you/keep-active/what-activities-can-i-do#handbook). Help keep yourself motivated by downloading our 12-week activity diary at [blf.org.uk/support-for-you/keep-active/how-to-stay-motivated#12-week-plan](https://blf.org.uk/support-for-you/keep-active/how-to-stay-motivated#12-week-plan)

## Managing breathlessness

How breathless you feel doesn't always match up with results from lung function tests and scans. This is because it's not just lung function that affects how out of breath you feel. Breathlessness is also affected by the way you breathe, your lifestyle and how you think and feel about your breathing.

Read more about breathlessness, including advice on how to manage feeling breathless and the different treatment options available at [blf.org.uk/support-for-you/breathlessness](https://blf.org.uk/support-for-you/breathlessness)

Get in touch with us to find support near you.

Helpline: 03000 030 555

Monday to Friday, 9am-5pm

Ringing our helpline will cost the same as a local call.

[helpline@blf.org.uk](mailto:helpline@blf.org.uk)

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