EDUCATION
(BOOKLET 1)

Lungs: How They Work

Allina Health

Lungs: How They Work

First edition

Developed by Allina Health.

Disclaimer

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Your Lungs

Airways

Airways are tubes that do two important things. They carry:

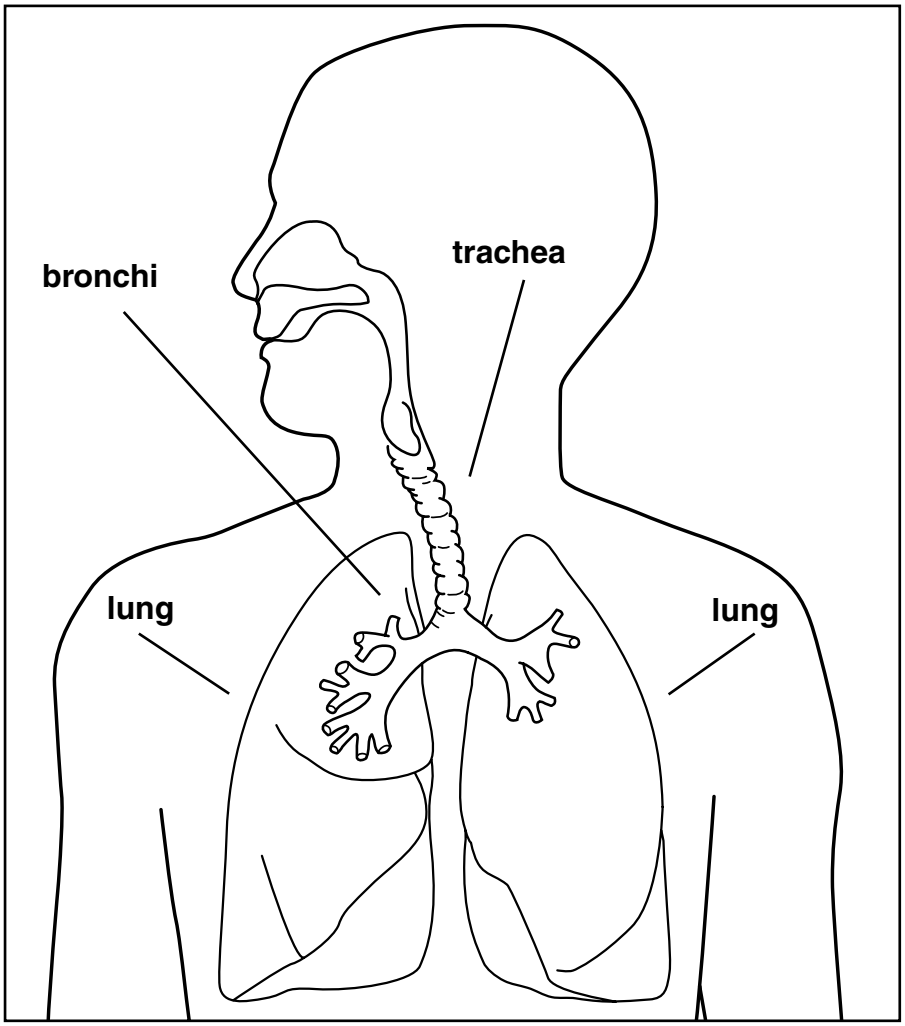
- oxygen-rich air to your lungs
- carbon dioxide (waste) out of your lungs.

You will see the word "airways" often in booklet No. 2 ("Lung Diseases").

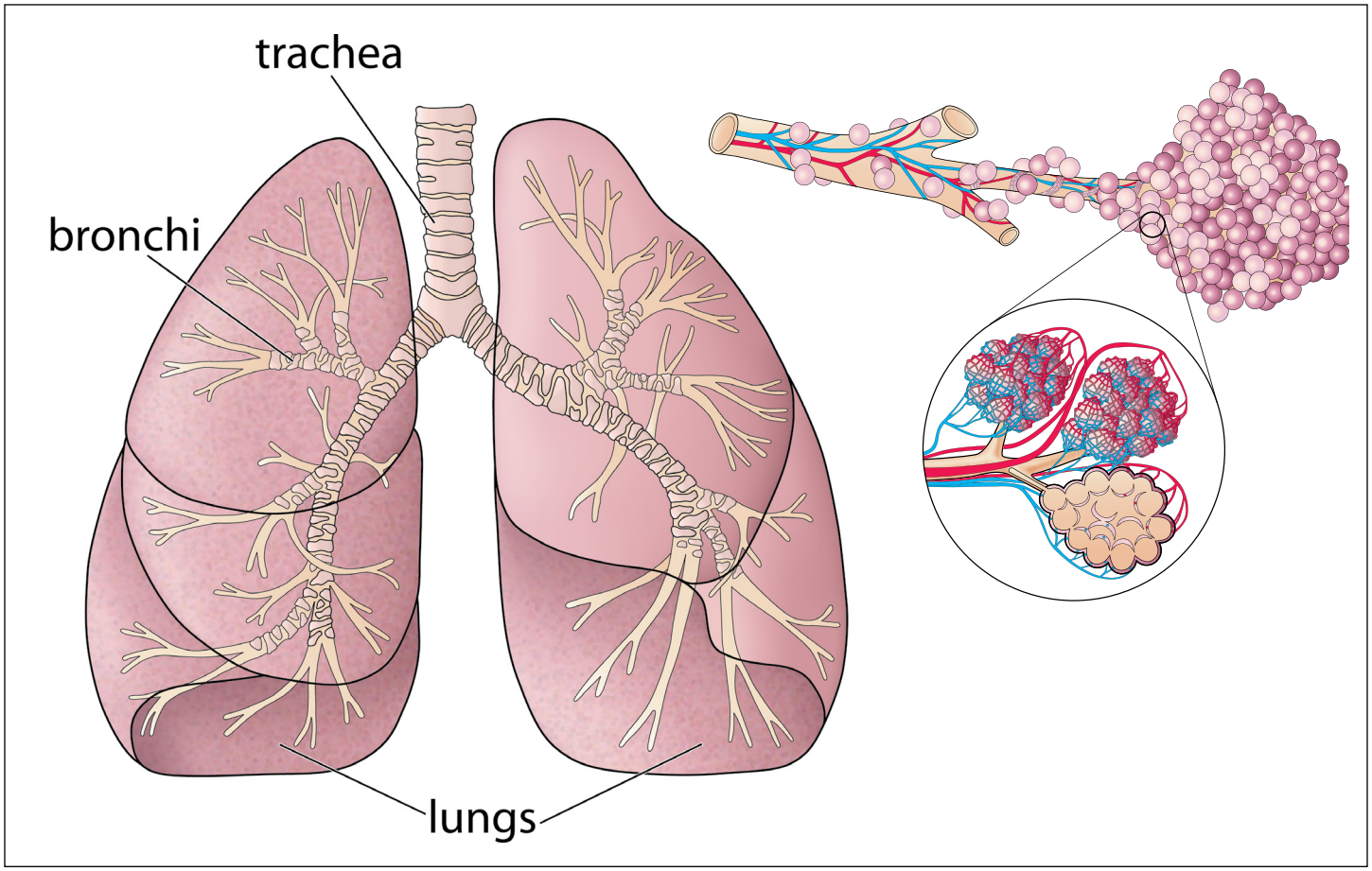
Healthy lungs come as a pair. Lungs do not have muscles but they expand (get bigger) as you breathe in and contract (get smaller) as you breathe out. The air in your lungs is moved in and out by muscles around and below your rib cage.

Your lungs exchange oxygen and carbon dioxide (waste) between the air and your bloodstream. This is called gas exchange.

- When you breathe in (inhale), oxygen enters your lungs. Your blood carries the oxygen to all parts of your body.
- Your blood carries the carbon dioxide from your cells to your lungs. You breathe out (exhale) the carbon dioxide.



When you breathe in (inhale), oxygen from the air enters your body. When you breathe out (exhale), carbon dioxide leaves your body.



When you breathe in, your lungs take in oxygen that your body needs. Tiny air sacs (alveoli) at the end of bronchi are filled with air. The blood vessels around them move the oxygen from the air into your bloodstream. The air sacs return to their original shape after you breathe out.

What Happens When You Breathe

Did You Know

Most of your airways have special hair-like projections called cilia that are coated with sticky mucus. They trap germs and other foreign particles that enter your airways when you breathe in air. They sweep the particles toward your nose. You then swallow, cough or sneeze them out of your body.

Here is how oxygen travels deep into your lungs and bloodstream:

- As you breathe in, oxygen (air) enters your body through your nose or mouth.
- The air comes together in the back of your throat. This area is called the pharynx.
- The air then passes through your epiglottis (flap that keeps food and water from going into your larynx (voice box) when you swallow) into your larynx.
- Air continues down a tube called the trachea (windpipe). The trachea divides into your right and left bronchus. The lower ends of each bronchi divide and branch, looking like an upside-down tree, in each lung.

- At the end of the smallest bronchi are millions of tiny hollow air sacs called alveoli. They are very thin and covered with capillaries (small blood vessels).

  When you inhale, air rushes into the alveoli. They expand. The blood takes in the oxygen and releases the carbon dioxide.
- Red blood cells carry the oxygen into the bloodstream. The oxygen-rich blood gets pumped throughout your body.
- Carbon dioxide returns to your lungs through your bloodstream. When the carbon dioxide reaches the alveoli, they deflate and you exhale the carbon dioxide.

Muscles You Use to Breathe

You use 3 different sets of muscles when you breathe:

- **diaphragm**. When you breathe in, your diaphragm flattens and increases the size of your chest cavity. This lets your lungs inflate and oxygen comes into the alveoli. The diaphragm is the most important breathing muscle.
- **muscles between your ribs**. They let your lungs expand during heavy activity. These muscles contract and pull your ribs up and out to increase the size of your chest cavity and expand your lungs.
- **abdominal (stomach) muscles**. These muscles are used when you cough, sneeze and breathe out. They push your diaphragm up, causing the alveoli to be squeezed into a small space. This forces the carbon dioxide out of your lungs.

How Your Body Keeps Dust and Germs out of Your Lungs

A cough or sneeze can travel more than 6 feet. You can keep some particles out of your lungs by wearing a face mask when you are outside or when you are around people who are sick.

Cilia, small hair-like particles, make a beating action that pushes up an uneven blanket of mucus toward the back of your throat. This mucus traps foreign particles or germs.

The cilia force the mucus up to your throat where you either cough it out or swallow it. This helps keep your lungs free of dust and germs that could cause damage or infection.

There are special cells in the alveoli (macrophages) that capture and digest foreign particles or germs that get past the cilia.

Together, the cilia, mucus and macrophages are known as "defense mechanisms."

To Do List

- ❑ Know how your lungs work.
- ❑ Ask your primary care provider to better explain anything that does not make sense to you.
- ❑ Keep all appointments with members of your health care team.

Questions and Notes

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