Your Lungs and COPD

A guide to how your lungs work and how COPD affects your lungs

Your lungs are organs that process every breath you take. They provide oxygen (O_2) to the blood and then your body and they get rid of carbon dioxide (CO_2, waste) from your blood. Breathing is controlled by your brain. For healthy people, breathing is automatic and spontaneous.

A healthy person breathes about 12 to 16 times per minute and takes in about a pint of air per breath. When the lungs are diseased, breathing can be very difficult.

Your Lungs and How They Work

Your doctor may have told you that you have a condition called COPD. COPD stands for Chronic Obstructive Pulmonary Disease. This term is used for lung diseases that obstruct the free flow of air in and out of your lungs. These include:

- Emphysema.
- Asthma.
- Chronic bronchitis.

Some people have more than one of these diseases at the same time. COPD cannot be cured, but it can be treated. You can learn to take charge of your illness and manage it through proper treatment with breathing retraining, exercise, nutrition, weight control and medications.

Your Lungs

- Provide oxygen (O_2) to your blood and then to your body.
- Remove carbon dioxide (CO_2/waste) from your blood.
- Function automatically, breathing is spontaneous and controlled by your brain (medulla).

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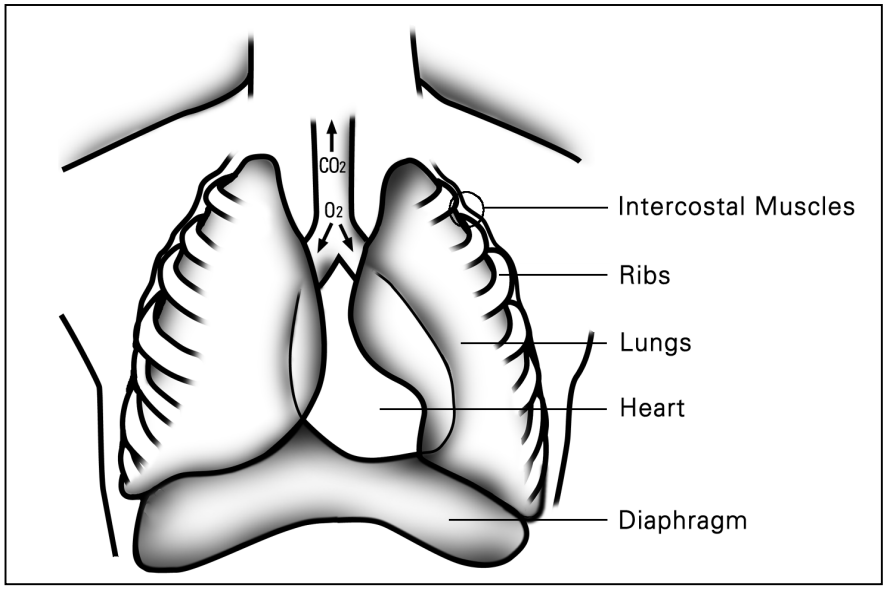


Location of the diaphragm.

Your Breathing Muscles

Your lungs don't have muscle tissue in them. The muscles around your lungs contract and expand to pull air in and out of your lungs.

Your diaphragm:

- Is a large dome-shaped muscle that separates your thorax (chest). from your abdominal (stomach) cavity.
- Is the main muscle for breathing in.
- Lies below your lungs and is the largest breathing muscle.
- Does 75% of the work of breathing.

Your external intercostal muscles:

- Lie in-between your ribs.
- Raise and expand your rib cage making room for your lungs to expand.

Muscles that help breathing in:

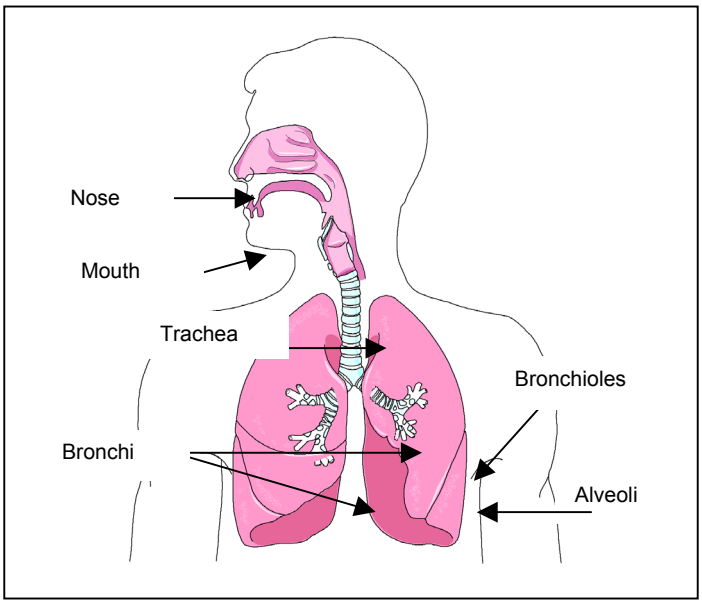
- Are in your neck, shoulders, and between your ribs.
- Are used with exercise, coughing, sneezing, asthma, and emphysema.
- Have to do more work when your diaphragm is weak.

Muscles that help breathing out:

- Are muscles of the abdominal wall.
- Are active with exercise, speech, singing, coughing, or sneezing.
- Are passive during normal quiet breathing, largely due to the elastic rebound of your lungs (like a balloon).

How You Breathe

When you breathe in (inspiration), your chest expands in all directions. Your rib cage expands to create room for your lungs. Your diaphragm flattens to increase space as well. Air leaves the lungs much like air leaves a balloon (expiration).



The respiratory system.

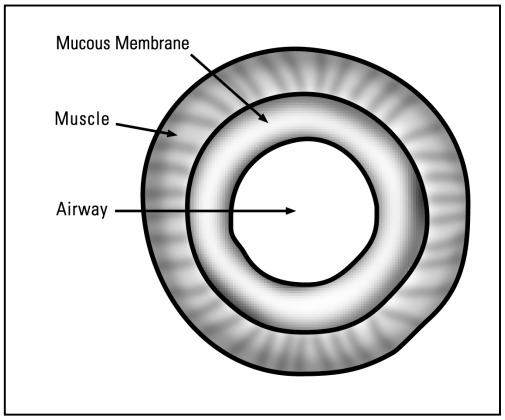
Your Respiratory System

The MAJOR function of your Respiratory System is gas exchange (delivering oxygen to your body and getting rid of carbon dioxide).

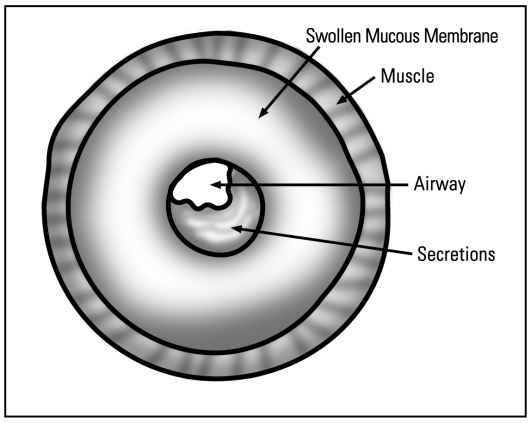
- **Nose:** Your nose filters, warms and humidifies the air you breathe into your lungs.
- **Mouth:** Your mouth is used for talking, eating and other non-respiratory functions. It is better to breathe in through your nose and out through your mouth.
- **Trachea:** Your trachea is also called the windpipe. It connects your upper airway to your lungs.
- **Bronchi:** Your trachea divides into two bronchi, right and left.
- **Bronchioles:** Your bronchioles are tiny branches that divide off from the bronchi.
- **Alveoli:** Each bronchiole ends in a very tiny stretchy air sac called an alveolus. The alveoli are at the end of the bronchiole in bunches and look much like a bunch of grapes. You have about 300 million alveoli. The walls of alveoli are about as thick as a soap bubble before it bursts.

Natural Defenses for Your Respiratory System

- **Sense of smell:** Sometimes warns against polluted air and fumes.
- **Mucous in airways:** Breathing tubes are lined with cells that produce mucous. Sticky mucous traps dust, germs, etc., before they go deeply into your lungs.
- **Cilia:** Tiny hair-like structures attached to mucous cells. Cilia act like a broom always sweeping out mucous, germs and irritants.
- **Coughing, Sneezing, Swallowing Reflexes:** Clear airways of debris.



Normal airway.



Airway with swollen membrane.

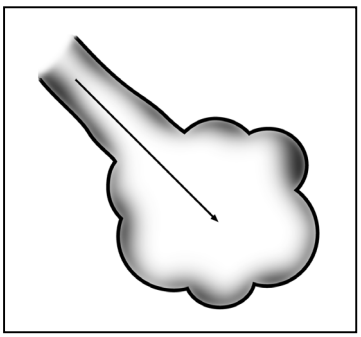
Chronic Bronchitis

Having chronic bronchitis is like having a phlegm-producing cough that doesn't go away. The glands that secrete mucous are enlarged and the number of goblet (mucous-secreting) cells lining the walls of the trachea and larger bronchi is increased. This happens slowly over a period of years by repeated irritation of the bronchi. This irritation is most often caused by smoking, air pollution, frequent colds, and allergies.

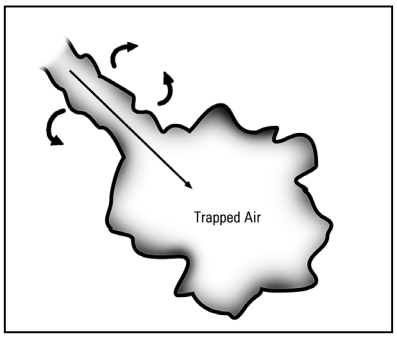
A person is diagnosed with chronic bronchitis when he or she has a mucous-producing cough three months in a row each year for two years in a row.

Emphysema

Emphysema comes from the Greek word meaning "inflation." Emphysema causes your lungs to become over inflated and destroys lung tissue. The air sacs (alveoli) lose their elasticity and stay partly filled with stale oxygen-poor air. This makes them less efficient in the exchange of oxygen and carbon dioxide. To visualize this, think of a balloon filled with air. When the air is let out, the balloon's shape returns. This is the way healthy air sacs behave. With emphysema the alveoli are more like paper bags. When you let the air out of a paper bag that is blown up, only some of the air escapes. Most of the air remains inside. The problem then is getting the old air out so that there will be room for the new air. Constant and increasing stretching occurs until the alveolar (air sac) walls, with their web of capillaries, begin to break down. This change cannot be reversed.



Healthy air sac.



Air sac filled with trapped air.

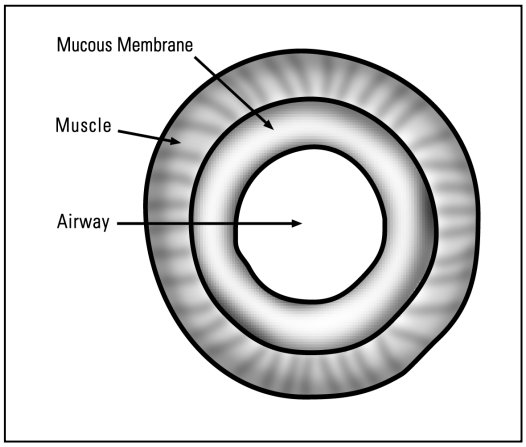
Asthma

Patients with asthma have airways that react far more than they should. The muscles of the bronchi (air tubes) go into spasm (narrow suddenly) when exposed to things like smoke, air pollution, animal dander, pollen, cold air, dust, viral infections, and even exercise.

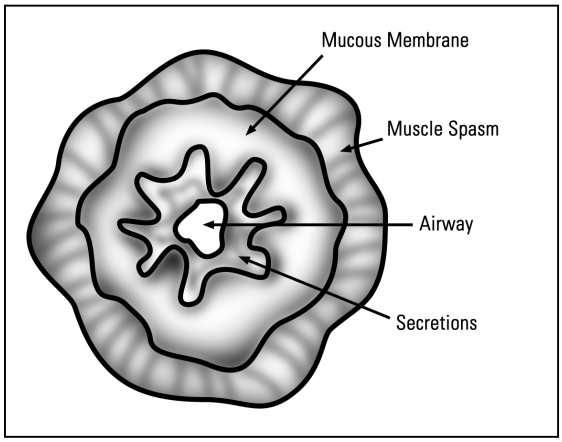
During an asthma episode, the air flowing through the narrowed airways makes a whistling or wheezing sound. Sometimes coughing, dry or mucous producing, is a part of this.

These episodes of wheezing, coughing and/or shortness of breath can be mild or severe. More often they develop slowly over a period of hours. They can be uncomfortable and frightening. If you have asthma, take your medicine as directed and take your medication for these episodes early while they are mild.

Remember: Take your medications for asthma episodes early when your symptoms are mild.



Normal air tube.



Air tube in spasm.

Chronic Obstructive Pulmonary Disease (COPD)

How do you get it?

Factors that contribute to the causes of COPD are:

- Cigarette smoking.
- Air pollution.
- Occupational dust and fumes.
- Recurrent lung infections.
- Heredity.
- Aging.

Each patient's disease is different. Only your doctor knows which treatments and therapies are right for you. Be sure to work with your doctor and ask questions.

What are the symptoms?

Often the first thing a patient notices is **shortness of breath**, especially upon exertion. Other symptoms are:

- Chronic cough.
- Increased mucous.
- Wheezing.
- Undue tiredness.
- Weight loss.
- Loss of appetite.

How do you know you have it?

Your doctor will find out your diagnosis through some or all of these ways:

- Health history and physical exam.
- Chest X-ray.
- Electrocardiogram (EKG).
- Breathing tests.
- Blood tests.

What can be done about it?

One of the key factors involves your partnership with your doctor and others involved in your care. There must be honesty and trust.

- Take medicines as told.
- Do treatments at home.
- Practice proper breathing.
- Eat right.
- QUIT SMOKING.
- Exercise.

The treatment of your COPD consists of some or all of these:

- Learning about your disease.
- Proper breathing techniques.
- Drinking plenty of fluids (good hydration).
- Exercises for your heart and lungs and all of your muscles.
- Bronchial drainage to remove mucous.
- Prevention and treatment.
- Recognize infections early by noticing if there is a change in the color of your mucous (to yellow, green, bloody), an increase in your normal mucous, increase in shortness of breath and/or fever.

Questions?

Call 206-598-3195
206-598-4811

Your questions are important. Call your doctor or health care provider if you have questions or concerns. The UWMC Clinic staff are also available to help at any time.

- ❑ Pulmonary Rehabilitation
  206-598-4811
- ❑ Medical Specialties Center
  206-598-4615

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- Avoid things that may bother you, such as animal hair, dust, tobacco smoke, mold, pollen, feathers, perfumes, scented hand lotion, hairspray
- Proper use of your medicines/inhalers.
- Good nutrition and weight control.
- Using oxygen as prescribed.
- Relaxation techniques and stress control.

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