



Patient education: Chronic obstructive pulmonary disease (COPD) (Beyond the Basics)

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COPD OVERVIEW

Chronic obstructive pulmonary disease (often called "COPD") is a condition in which the airways in the lungs become inflamed and narrowed and the air sacs become damaged. Smoking cigarettes is the most common cause of COPD. As the lungs become more damaged over time, it becomes increasingly difficult to breathe. When the damage is extensive, it may also become harder for the lungs to get enough oxygen into the blood and to get rid of excess carbon dioxide. These changes all lead to shortness of breath and other symptoms.

The term COPD also includes chronic bronchitis (inflammation of the bronchial tubes, which causes a persistent cough) and emphysema (damage of the air sacs).

This article discusses the causes, symptoms, and diagnosis of COPD. The treatment of COPD is discussed separately. (See "[Patient education: Chronic obstructive pulmonary disease \(COPD\) treatments \(Beyond the Basics\)](#)".)

COPD CAUSES

To understand how COPD develops, it is important to understand how the lungs work. Normally, air that we breathe passes from the nose and mouth through the airways to the tiny air sacs of the lung, called "alveoli." In the air sacs, oxygen passes through the walls of

air sacs into the bloodstream ([figure 1](#)). Carbon dioxide passes in the reverse direction, out of the bloodstream and back into the alveoli, and is then eliminated by breathing out.

COPD is caused by inhaling irritating gases and particles over many years. The most common cause is tobacco smoking, although passive exposure to smoke (ie, secondhand smoke) or breathing in other fumes (eg, indoor unvented fires, air pollution) can also contribute. Genetic susceptibility also likely plays a role, meaning that some people are more likely to suffer lung damage when exposed to irritants such as cigarette smoke.

Over time, inflammation in the airways becomes chronic, and scarring of the airways and lung tissue develops ([figure 2](#)). This lung damage makes it more difficult to breathe in and out and makes it harder for oxygen and carbon dioxide to pass across the walls of the air sacs.

Reasons for airflow blockage — Any disease that interferes with airflow out of the lungs can lead to COPD. Most people with COPD have chronic bronchitis and emphysema, and some also have asthma.

Chronic bronchitis — Chronic bronchitis is the term used to describe people who have a chronic (long-term) cough that produces sputum, which is a result of bronchial inflammation. This condition is frequently seen in people who smoke cigarettes. Chronic bronchitis can scar the airways and reduce airflow.

Emphysema — Emphysema is the term used to describe damage to the air sacs in the lung. This damage can also restrict airflow.

Asthma — Asthma is also a chronic inflammatory disorder of the airways. The triggers for this inflammation include exposure to inhaled allergens, respiratory irritants, and viral infections. The inflammation leads to intermittent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. (See "[Patient education: Asthma treatment in adolescents and adults \(Beyond the Basics\)](#)".)

For people with asthma, treatment is usually successful in reversing inflammation and airway narrowing. In a minority of people with asthma, the chronic inflammation permanently restricts airflow. When this airway narrowing cannot be completely reversed with treatment, the person is said to have COPD.

COPD RISK FACTORS

Smoking cigarettes significantly increases the risk of developing COPD. The majority (80 percent) of people who develop COPD have a history of smoking.

Other risk factors for COPD include an abnormal sensitivity and exaggerated response to inhaled substances (called "airway responsiveness") and environmental exposure (eg, to secondhand smoke, dust or organic materials in the workplace, or air pollution).

COPD can run in families. Genetic risk factors for COPD include severe deficiency of alpha-1 antitrypsin, a protein that protects the lungs. (See '[Testing for alpha-1 antitrypsin deficiency](#)' below.)

COPD SYMPTOMS

At first, COPD usually causes no symptoms or only mild symptoms. As the disease progresses, symptoms usually worsen. The most common symptoms include:

- Coughing and spitting up phlegm (mucus)
- Wheezing (a whistling or squeaking noise as you breathe)
- Shortness of breath, at first with activity and eventually (as the disease progresses) at rest
- Fatigue

Although symptoms get worse gradually as COPD progresses, some people also experience "exacerbations." This is when symptoms flare up more than usual, and may require additional treatment for a few days or weeks. (See "[Patient education: Chronic obstructive pulmonary disease \(COPD\) treatments \(Beyond the Basics\)](#)".)

COPD DIAGNOSIS

If your healthcare provider suspects that you might have COPD based on your symptoms and history, he or she can order breathing tests, called pulmonary function tests.

Pulmonary function tests (PFTs) — The test used to diagnose COPD is a type of a pulmonary (lung) function test called spirometry. It assesses how well your lungs are working.

During spirometry, you take a deep breath in and then blow out as hard and as fast as you can into a tube connected to a machine called a spirometer. The spirometer measures how fast and how much air you can blow out of your lungs. People with COPD blow air out more slowly because of inflammation and narrowing of the airways. If the measurement is abnormal, the next step is to repeat the test after you use a bronchodilator. This is a medication you breathe in through an inhaler; it helps to widen the airways. In people with asthma, the test measurements usually return to normal after using a bronchodilator, but in people with COPD, the test measurements may only partially improve.

In some cases, your doctor might have you repeat the test at another time to confirm the diagnosis. Then, over time, spirometry is repeated regularly to monitor your COPD and evaluate how well treatments are working.

In some cases, a health care provider will recommend additional pulmonary function tests. This might be done to check for other lung diseases that may be causing your symptoms, or to guide treatment of COPD in specific cases. Additional tests may include:

- **Measurements of lung volume** – This usually involves sitting in a special booth and breathing through a mouthpiece. The test measures how much air your lungs can hold. People with more advanced COPD may have an increase in lung volume. This is because it is hard to exhale all the air when the airways are narrowed. Also, COPD can cause a type of lung scarring that traps excess air in the lungs.
- **Diffusing capacity test** – This test uses a machine to measure the ability of the lungs to transfer gases like oxygen. This machine usually uses a very small amount of carbon monoxide, which is not enough to cause harm, but which reflects how oxygen is absorbed. In people with emphysema, the ability to transfer gases is typically reduced.
- **Pulse oximetry** – This test measures the amount of oxygen in the blood using a device called a finger oximeter, which clips onto the finger. Oximetry is typically measured at rest, and can also be checked during exercise, such as while you are walking on level ground or climbing stairs. When the oxygen saturation is 88 percent or below at rest, supplemental oxygen is usually prescribed.
- **Arterial blood gas** – An arterial blood gas sample may be obtained to determine if you have problems clearing carbon dioxide from the blood. Arterial blood gas is usually obtained by taking a blood sample from the artery in your wrist.
- **Exercise tests** – There are several types of exercise tests. The simplest is to determine how far you can walk in 6 minutes. In this test, your pulse, difficulty breathing, and blood oximetry are usually measured in addition to the distance walked. Other tests involve monitoring your lung and heart function during more strenuous exercise on a bicycle or treadmill, but these are done less commonly.

Testing for alpha-1 antitrypsin deficiency — Alpha-1 antitrypsin deficiency is a genetic disorder which causes 2 to 3 percent of the cases of emphysema in the United States. All adults who have symptoms of COPD should get blood tests to check for alpha-1 antitrypsin deficiency.

Imaging tests — In certain cases, a health care provider might order an imaging test such as a chest X-ray or computed tomography (CT) scan. In general, a chest X-ray is not needed to diagnose COPD. However, a chest X-ray may be done to exclude other lung diseases.

A CT scan can detect the presence of emphysema. In people with advanced disease, this test may be done to help guide treatment. Many patients with COPD may separately qualify for annual lung cancer screening using a special type of CT scan. (See "[Patient education: Lung cancer screening \(The Basics\)](#)".)

COPD TREATMENT

The first and most important part of any treatment plan for COPD is to **stop smoking**, if you smoke. This is true regardless of how advanced your disease is. Stopping smoking can help slow progression of COPD, no matter how long you have had it. Quitting smoking can be challenging, but your health care provider can help. (See "[Patient education: Quitting smoking \(Beyond the Basics\)](#)".)

The treatment of COPD is discussed in detail separately. (See "[Patient education: Chronic obstructive pulmonary disease \(COPD\) treatments \(Beyond the Basics\)](#)".)

WHERE TO GET MORE INFORMATION

Your healthcare provider is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed on our web site (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for healthcare professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

[Patient education: Chronic obstructive pulmonary disease \(COPD\) \(The Basics\)](#)

[Patient education: Shortness of breath \(The Basics\)](#)

[Patient education: Pneumothorax \(collapsed lung\) \(The Basics\)](#)

[Patient education: Cough in adults \(The Basics\)](#)

[Patient education: Chronic bronchitis \(The Basics\)](#)

[Patient education: Atelectasis \(The Basics\)](#)

[Patient education: Chronic pulmonary aspergillosis \(The Basics\)](#)

[Patient education: Breathing tests \(The Basics\)](#)

[Patient education: Medicines for COPD \(The Basics\)](#)

[Patient education: COPD and diet \(The Basics\)](#)

[Patient education: Lowering your risk of COPD \(The Basics\)](#)

[Patient education: COPD exacerbation \(The Basics\)](#)

[Patient education: Lung transplant \(The Basics\)](#)

[Patient education: Pulmonary rehabilitation \(The Basics\)](#)

[Patient education: Oxygen therapy at home \(The Basics\)](#)

[Patient education: Breathing exercises \(The Basics\)](#)

[Patient education: Spirometry \(The Basics\)](#)

[Patient education: How to use a pulse oximeter \(The Basics\)](#)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

[Patient education: Chronic obstructive pulmonary disease \(COPD\) treatments \(Beyond the Basics\)](#)

[Patient education: Quitting smoking \(Beyond the Basics\)](#)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

[Arrhythmias in COPD](#)

[Bullectomy for giant bullae](#)

[Chronic obstructive pulmonary disease: Diagnosis and staging](#)

[Chronic obstructive pulmonary disease: Risk factors and risk reduction](#)

[Delivery of inhaled medication in adults](#)

[Management of infection in exacerbations of chronic obstructive pulmonary disease](#)

[Dynamic hyperinflation in patients with COPD](#)

[Lung volume reduction surgery in COPD](#)

[COPD exacerbations: Management](#)

[Stable COPD: Initial pharmacologic management](#)

[Management of the patient with COPD and heart disease](#)

[Chronic obstructive pulmonary disease: Prognostic factors and comorbid conditions](#)

[Nocturnal ventilatory support in COPD](#)

[Malnutrition in advanced lung disease](#)

[Portable oxygen delivery and oxygen conserving devices](#)

[Pulmonary rehabilitation](#)

[Role of inhaled glucocorticoid therapy in stable COPD](#)

[Role of mucoactive agents and secretion clearance techniques in COPD](#)

The evaluation, diagnosis, and treatment of the adult patient with acute hypercapnic respiratory failure

Clinical manifestations, diagnosis, and natural history of alpha-1 antitrypsin deficiency

Treatment of emphysema from alpha-1 antitrypsin deficiency

Management of refractory chronic obstructive pulmonary disease, section on 'Theophylline, monitored by drug levels'

The following organizations also provide reliable health information.

- National Library of Medicine

(www.nlm.nih.gov/medlineplus/copdchronicobstructivepulmonarydisease.html, available in Spanish)

- National Heart, Lung, and Blood Institute

(www.nhlbi.nih.gov/health/dci/Diseases/Copd/Copd_WhatIs.html)

- COPD Foundation

(www.copdfoundation.org)

- American Lung Association

(<https://www.lung.org/>)

- Alpha-1 Foundation

(www.alpha1.org)

Patient support — There are a number of online forums where patients can find information and support from other people with similar conditions.

- verywellhealth.com COPD Forum

(<https://www.verywellhealth.com/copd-4014741>)

- COPD360social COPD Foundation online community

(<https://www.copdfoundation.org/COPD360social/Community/Get-Involved.aspx>)

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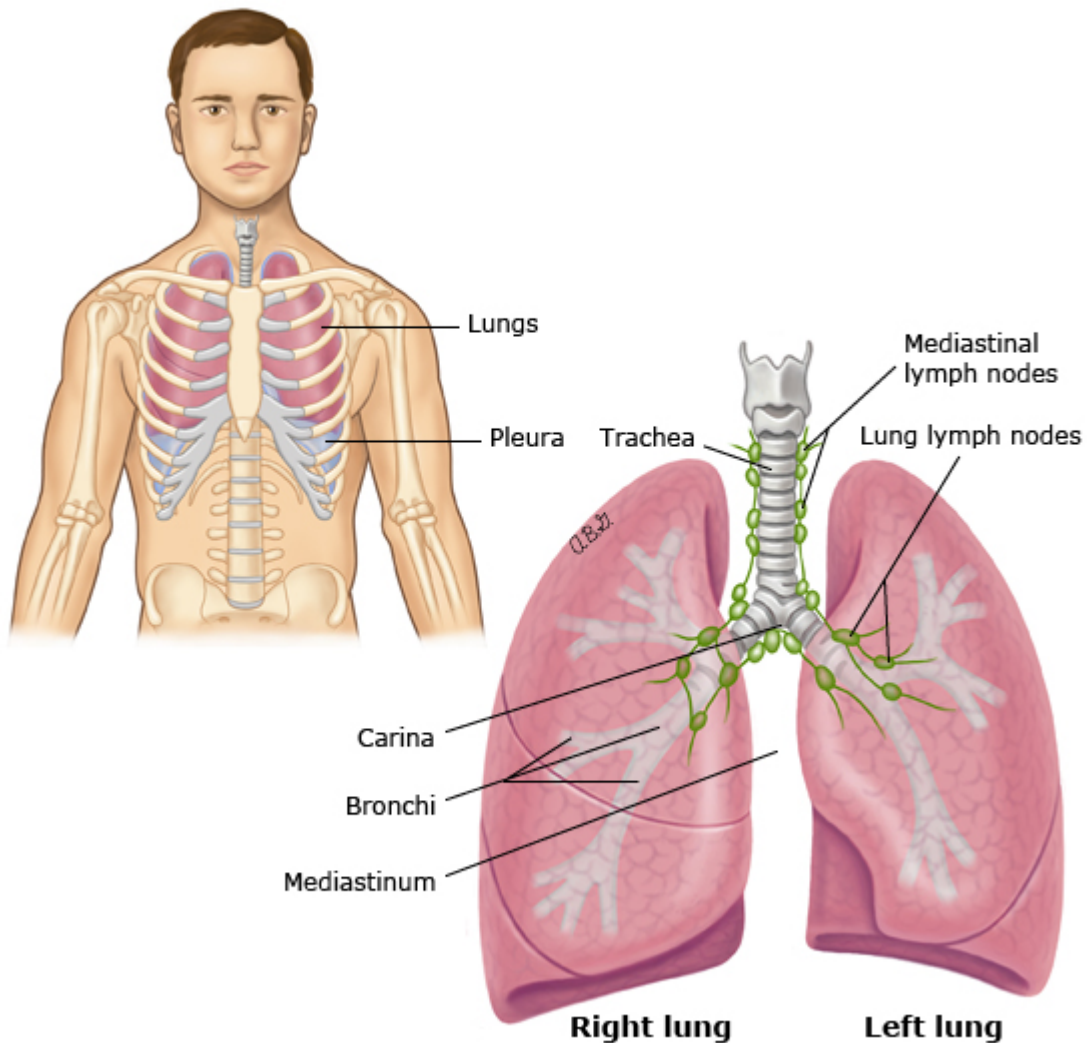
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GRAPHICS

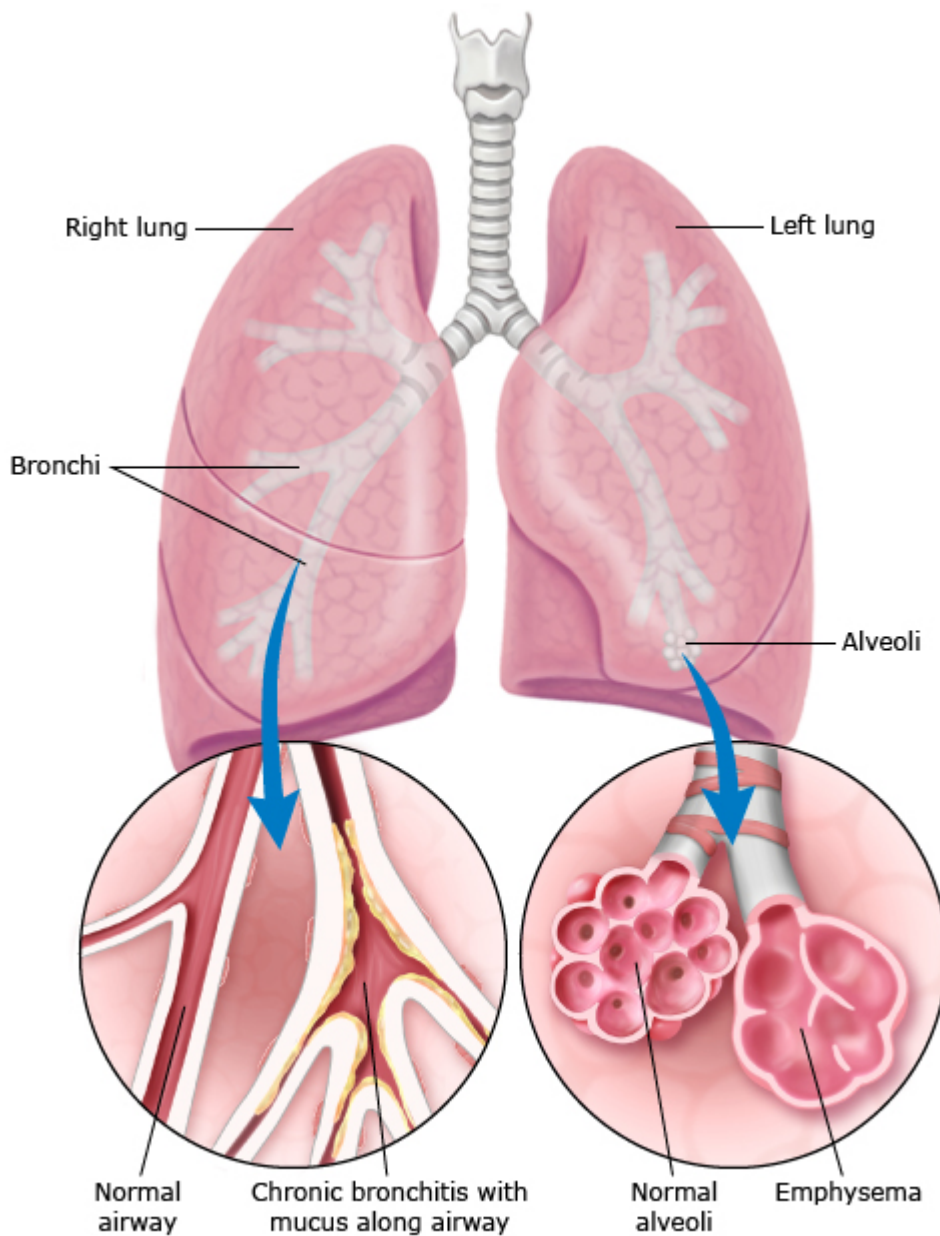
Normal lung anatomy



The lungs sit in the chest, inside the ribcage. They are covered with a thin membrane called the "pleura." The windpipe, or "trachea," branches into 2 smaller airways called the left and right "bronchi." The space between the lungs is called the "mediastinum." Lymph nodes are located within and around the lungs and mediastinum.

Graphic 67527 Version 15.0

Changes to the lungs in COPD



In COPD, the airways ("bronchi") of the lungs become narrow and can be clogged with mucus. The air sacs ("alveoli") that make up the lungs can also become damaged.

Graphic 121872 Version 2.0

