

COPD Today



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More than 12 million people in the United States have been diagnosed with COPD—chronic obstructive pulmonary disease—and another 12 million people may have it and not know it. Those who have this debilitating disease often are short of breath and cough frequently. These symptoms can worsen at times, causing flare-ups (exacerbations) that can be serious. Many people mistakenly think these symptoms are just signs of aging. Smokers and former smokers have the highest risk of developing COPD.

With this resource, you will learn about:

- COPD Symptoms
- COPD Diagnosis
- COPD Treatments
- Patients with COPD and Asthma
- The Latest COPD Research
- Opportunities to Learn More

Private and public institutions are investing billions of dollars to learn more about the causes of COPD and to develop better treatments. Each year, the best of this research is presented at the American Thoracic Society (ATS) International Conference. *COPD Today*, which is part of the ATS Patient Information series, presents information about the symptoms and treatments for COPD used by health care professionals today, as well as new

FACTS & FIGURES

12 Million
VS. 24 Million

12 Million vs. 24 Million

Only half of the 24 million Americans who probably have COPD have had the condition diagnosed by a doctor.

80%

Smoking Is the Key

Of those diagnosed as having COPD, 80 percent smoke, or used to smoke. Female smokers are 13 times more likely to die of COPD than non-smokers, and male smokers are 12 times more likely to die of COPD than non-smokers.

65 Million



Around the World

It is estimated that more than 65 million people around the world have COPD and that 90 percent of COPD deaths occur in low- and middle-income countries.

Source: U.S. Centers for Disease Control and Prevention

Supported by a generous grant from SUNOVION.



research presented at the ATS 2016 International Conference that could affect treatments in the near future.

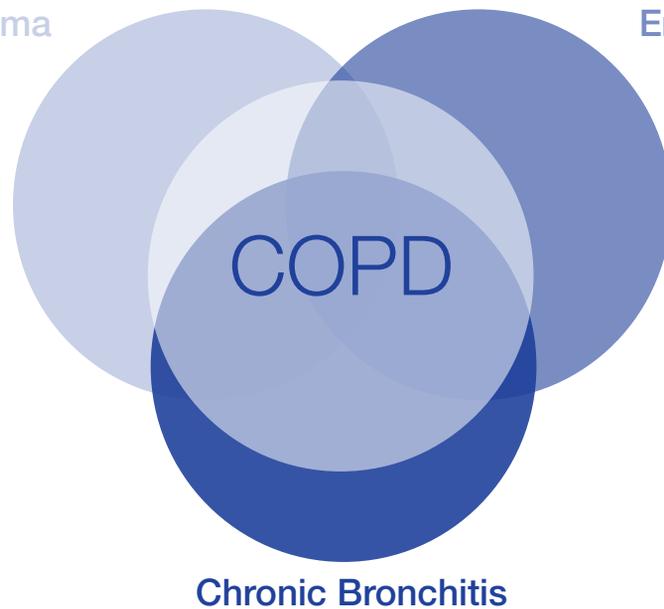
It is important not to ignore shortness of breath and coughing because they may be warning signs of COPD, not aging. If you have COPD, you have an increased risk of developing other medical conditions, known as comorbidities, such as heart disease and lung cancer.

COPD is a chronic disease, which means it lasts for your lifetime, and currently there is no cure. However, it can be treated with medicine and changes in lifestyle that can help control symptoms and stabilize your health.

COPD can be confused with asthma. However, they are different medical conditions that have some similar symptoms. This area of overlap between the two diseases also will be discussed in *COPD Today*.

Asthma

Emphysema



Chronic Bronchitis

COPD SYMPTOMS

COPD symptoms often are not recognized until a patient has significant lung damage. The most obvious symptom is a daily cough that produces sputum—a mixture of saliva and mucus—that can be clear, white, yellow, or green. Other signs and symptoms of COPD:

- Shortness of breath, also called “dyspnea,” especially during physical activities
- An overnight build-up of mucus that causes you to have to clear your throat in the morning
- Wheezing
- Chest tightness
- Recurring respiratory infections
- Loss of energy
- A blue hue around the lips and fingernail beds
- Unintended weight loss

Those with COPD usually have exacerbations, which are periods of several days where symptoms grow worse. Exacerbations are often linked to an infection from a virus or bacteria, such as a cold.

WHAT IS COPD?

COPD is not a single disease but an umbrella medical term for increasing breathlessness due to airway obstruction. People with obstructive lung diseases find it difficult to exhale, or breathe out. COPD is the third-leading cause of death in the U.S., with 120,000 people dying from it each year, according to the National Institutes of Health (NIH).

About 80 percent of COPD cases are linked to lung damage caused by long-term cigarette smoking. Other causes of lung damage that are linked to COPD are cigar and pipe smoke, secondhand smoke, air pollution, toxic chemicals, and exposure to dust or fumes—all substances that irritate the airways and lungs. But nearly 20 percent of COPD patients have never smoked, and only 25 percent of smokers develop COPD, according to the NIH. This means other factors, including those that are inherited, are linked to the development of COPD.

In people with COPD, airways in the lungs become narrowed. The narrowing of the airways causes the “obstruction,” which is the “O” in COPD.

The narrowed airways limit the flow of air into and out of the lungs. Healthy lungs are emptied of air during breathing, but people with COPD cannot fully empty their lungs. With air trapped in your lungs, more muscle strength and energy is required to breathe, whether you are resting or exercising.

Another danger of COPD is damage to the small air sacs—alveoli—at the end of the airways. These air sacs are in the lungs and responsible for the exchange of oxygen and carbon dioxide that occurs as part of the normal breathing process. As air sacs are damaged or destroyed, the body is gradually deprived of oxygen.

TYPES OF COPD

There are two main types of COPD—emphysema and chronic bronchitis. Most people with COPD have a combination of the two conditions.

Emphysema is a disease that usually occurs in heavy smokers over many years. An early symptom is shortness of breath during light physical activity, but the production of mucus during coughing is minor. Lying down can make symptoms worse. As emphysema grows worse, breathing becomes more difficult and patients often become very thin as their bodies expend more energy just to breathe. A small percentage of people can get emphysema without smoking because of the genetic disorder alpha-1 antitrypsin deficiency, known simply as Alpha-1 or AAT Deficiency.

Chronic bronchitis also occurs most often in smokers, but its main symptom is coughing with excessive mucus, also known as sputum. Shortness of breath occurs, but it usually improves during rest. Lying down

WHO WILL TREAT YOU IF YOU HAVE COPD?

If you cough a lot and have trouble breathing, and you wonder if you have COPD, what should you do next? The first step should be to consult your primary care provider.

A primary care provider can start the process of determining if you have COPD or another lung problem by examining you and giving you a spirometry test. For a spirometry test, you will breathe into a tube connected to a spirometer, which measures how much air your lungs can hold and how fast you can exhale the air from your lungs. Your provider may also use a pulse oximeter to measure your oxygen saturation levels, known as “sats.”

If you have COPD, you can continue to be treated by your primary care provider, or you may be referred to a pulmonologist. Pulmonologists are doctors who diagnose and treat diseases of the respiratory system, including the airways and lungs. A pulmonologist may do specialized tests, such as measuring your lung volumes, that may help them learn more about your lung capacity and prescribe the best treatment for your condition.

You also may be referred to a smoking cessation program or a pulmonary rehabilitation program, where you will learn about COPD, how to manage your symptoms, and exercise under supervision by health care practitioners. A team of caregivers in a pulmonary rehabilitation program may include physical therapists, exercise specialists, nurses, and dietitians.

Because being diagnosed with COPD is stressful, you also may be referred to mental health specialists who treat depression and anxiety and also can provide counseling for family members. These mental health specialists can include psychiatrists, psychologists, and social workers.



A nebulizer is particularly effective for the elderly or someone experiencing severe breathing problems.

can make symptoms worse, so patients often sleep sitting up. In the late stages of chronic bronchitis, the lack of oxygen causes the skin or mucous membranes to have a blue hue.

COPD DIAGNOSIS

How do you know if you have COPD? First, be aware that some groups of people are more likely to have COPD. According to NIH statistics, current or former smokers, people aged 65-74 years, women, non-Hispanic whites, and those with a history of asthma are more prone to have COPD.

If you have COPD symptoms, you should visit a physician, who can evaluate your symptoms and determine if you should be tested for COPD.

There are five common diagnostic tests:

- Pulmonary function tests are breathing tests to find out how well you move air in and out of your lungs and how well oxygen enters your body. Spirometry is one of the most common breathing tests and can detect COPD even before you have symptoms of the disease. During this test, you will need to blow into a tube connected to a spirometer. Other lung function tests measure how well oxygen in your lungs is absorbed by your blood (diffusion test), and how much air your lungs can hold and

how much of that air they can exhale (lung volume testing).

- Chest X-rays can show the shape and size of your lungs, which may suggest emphysema, and they can rule out other lung issues.
- CT scans can show if you have emphysema and help detect **lung cancer**. [See more at www.thoracic.org/patients/patient-resources/resources/decision-aid-lcs.pdf](http://www.thoracic.org/patients/patient-resources/resources/decision-aid-lcs.pdf).
- Arterial blood gas analysis is a blood test that measures how well the oxygen and carbon dioxide gas exchange in the lungs is working.
- A six-minute walk test is done to determine your exercise tolerance and whether you need supplemental oxygen when you exercise.

COPD TREATMENTS

There is currently no cure for COPD, so treatment is focused on managing symptoms. Several options are available to help you control the symptoms and progression of the disease. These options include pulmonary rehabilitation, inhaled and oral medications, vaccines, supplemental oxygen, and, in some cases, surgery. It is essential to eliminate or reduce exposure to pollutants and irritants linked to COPD, including tobacco smoke.

Smoking Cessation

Studies show that the progression of COPD slows after you stop smoking cigarettes, and most people who stop smoking cough less and produce less mucus. You also should stop other forms of smoking, including cigars and pipes, and protect yourself from second-hand smoke. Most people need help quitting smoking. Your doctor can provide information about **medications and programs** that can help you quit. See more at www.thoracic.org/patients/patient-resources/topic-specific/tobacco-use.php.

Inhaled Medications

Two medicines—bronchodilators and inhaled corticosteroids—are most commonly prescribed to treat COPD. The most effective way to take these medicines is to breathe them in through the mouth so they can travel through your airways to your lungs. This is done using one of two devices—an inhaler or a nebulizer. Inhalers are used most often because they are small and easy to carry. A nebulizer is a device that converts liquid medicine into a fine mist you inhale by breathing through a mouthpiece or mask.

Bronchodilators are used to relax the muscles around your airways, making it easier for you to breathe. There are two types of bronchodilators—short-acting and long-acting.

A short-acting bronchodilator acts quickly in an emergency when you are short of breath and is taken using a “rescue inhaler.” The generic names of some short-acting bronchodilators are albuterol, levalbuterol, and ipratropium.

A long-acting bronchodilator is used every day to keep the airways open and is called a “maintenance medicine.” The generic names of some long-acting bronchodilators are arformoterol tartrate, indacaterol, salmeterol, umeclidinium, tiotropium acilidium, umeclidinium and glycopyrrolate. Two new long-acting bronchodilator inhalers were approved by the Food and Drug Administration (FDA) in early 2016. One combines tiotropium bromide in a soft-mist inhaler, and the other combines glycopyrrolate and formoterol fumarate using a new co-suspension technology.

Maintenance inhalers containing inhaled

Studies show that the progression of COPD slows after you stop smoking cigarettes, and most people who stop smoking cough less and produce less mucus.

corticosteroids are used to reduce airway inflammation and help people who have frequent exacerbations, and are not usually prescribed alone. The generic names of some versions of this medicine are fluticasone and budesonide, and they can be mixed with bronchodilators, such as the salmeterol/fluticasone, formoterol/budesonide, and formoterol/fluticasone combination inhalers.

Inhalers are convenient, but they must be used correctly to get the full benefit of the medicine. Be sure to ask your doctor or other health care professional to show you how to use an inhaler. For those patients who have trouble using an inhaler correctly, attaching it to a spacer or holding chamber can make it easier to use.

The most common type of inhaler is a

PRECISION MEDICINE: A TREATMENT TAILORED JUST FOR YOU

The most common treatments for COPD are bronchodilators and corticosteroids, which are sometimes mixed together for use in “combination inhalers” that doctors hope will be more effective for a variety of patients. However, this “one size fits all” approach does not work for all patients, and it may one day give way to “precision medicine,” also known as “personalized medicine” or “targeted therapy.”

Precision medicine customizes health care for each patient, starting with medical decisions and moving into treatments and the use of products, including medications, tailored to each patient’s illness and genes.

The promise of this revolutionary treatment approach has been studied for several years, and it is now funded by the U.S. government through the Precision Medicine Initiative.

Research presented during the ATS 2016 International Conference showed that there are different types of COPD—called phenotypes—that react differently to different

medicines. Researchers have discovered that some COPD phenotypes do not respond to treatment with corticosteroids, which are used to quickly reduce airway inflammation, and that those patients might be better treated with bronchodilators.

“Anti-inflammatory therapies have not been effective in treating some patients with COPD. This suggests that other mechanisms may be the driving force behind developing COPD,” says researcher Renat Shaykhiyev, MD, PhD. He presented an educational session at the conference, where he said factors other than airway inflammation might be causing the development of some COPD phenotypes.

Other researchers reported during the conference that blood eosinophil (a type of white blood cell) levels might help identify COPD phenotypes. It will take years to develop and test medicines tailored for use on individuals based on their COPD phenotype, but that approach toward treatment is now more than just a dream.

metered dose inhaler (MDI), which releases a fixed amount of medicine. It is best to use an MDI that has a dose counter that you can look at so you will know how much medicine is left in the inhaler. For MDIs without a dose counter, you will need to know how many puffs your inhaler holds and how many puffs you take each day. This tells you how many days your inhaler will last. You cannot tell how much medicine is left in an inhaler by shaking it. Relying on shaking your inhaler could result in not having medicine at a critical time. You can learn more about MDIs by reading another ATS Patient Information Series flier, [Using Your Metered Dose Inhaler \(MDI\)](http://www.thoracic.org/patients/patient-resources/resources/metered-dose-inhaler-mdi.pdf) at www.thoracic.org/patients/patient-resources/resources/metered-dose-inhaler-mdi.pdf.

Another way to take an inhaled medication is with a nebulizer, a device that converts liquid medicine into a fine mist that is inhaled using a mouthpiece or mask. A nebulizer is particularly effective for the elderly or someone experiencing severe breathing problems. If you do use a nebulizer, make sure you know how to keep



Adding a spacer may make it easier to use an inhaler for controlling COPD.

the components clean to reduce the risk of infection.

Using a small volume nebulizer (SVN) may be a more effective way to inhale medicine compared to an inhaler or nebulizer. Tests have shown that an SVN

delivers more medicine to the lungs than a larger nebulizer, but with greater variability, and a survey released during the ATS 2016 International Conference found that seven in 10 pulmonologists believe SVNs are more effective than inhalers in managing acute exacerbations of COPD. SVNs often are more portable than traditional nebulizers, and some operate without electrical power. Your health care provider can help you decide whether using an SVN might be a good choice for controlling your COPD.

Oral Medications

Other medicines used to treat patients with COPD are oral medications. These include pills such as corticosteroids, a phosphodiesterase-4 (PDE-4) inhibitor, and antibiotics to control infections.

Oral corticosteroids, such as prednisone, are used to treat people whose COPD has worsened. These are commonly used for several consecutive days. These non-habit-forming corticosteroids are different from the illegal muscle-building steroids taken by some athletes.

Only one PDE-4 inhibitor, roflumilast, is available. It is taken daily to help reduce the risk of exacerbations in patients with severe COPD associated with chronic bronchitis and a history of previous exacerbations.

SOME PATIENTS HAVE SYMPTOMS OF COPD AND ASTHMA

COPD and asthma are separate diseases, but recent research has uncovered more information about patients who have symptoms of both and suffer from ACOS—asthma-COPD overlap syndrome.

Speakers at the ATS 2016 International Conference reported that about 20 percent of people with COPD may have ACOS. Experts have not agreed on a single definition of ACOS, but they have noted that many patients with ACOS are smokers who typically are diagnosed at a younger age and suffer more severe exacerbations than those with COPD alone. Patients with ACOS do appear to respond better to inhaled corticosteroids, a cornerstone of asthma treatment, than patients with COPD alone.

Nonetheless, treatment guidelines provide

little advice on how patients with ACOS should be managed in part because clinical trials of therapies for COPD and asthma have not included patients with ACOS. Researchers say more information is needed about the biology of ACOS to develop new drug treatments. Studies are now looking into whether the genetics of patients with ACOS may be similar to that of patients with asthma and COPD.

“Given that ACOS patients seem to have more symptoms and greater disease severity, yet are younger than those with COPD, we urgently need to develop better, and perhaps targeted, therapies for those with overlap,” says Amir A. Zeki, MD, a researcher at the University of California, Davis, who spoke at the conference. “This will take some time since much more research is needed.”



‘COPD is no different than any other disease. It is best to diagnose and treat early.’

Bartolome R. Celli, MD

Antibiotics are used to treat bacterial respiratory infections that can aggravate COPD symptoms. It is important to take all of your antibiotics until you run out, even if you are feeling better. Antibiotics also may be used to help prevent exacerbations in patients with severe COPD associated with previous exacerbations.

Other Treatments

Other treatment options for COPD include:

- Pulmonary rehabilitation is a structured program that provides education and support, as well as supervised exercise by specially trained health care providers. These programs have been shown to improve quality of life and reduce COPD exacerbations and hospital admissions.
- Vaccines can reduce the risk of getting the flu or pneumonia, both of which can create serious complications for COPD patients. It is also important to avoid people who have colds and to practice good hygiene to avoid infections.
- Supplemental oxygen can help those who do not have enough oxygen in their blood.

Some people with COPD will use oxygen when they are physically active, others while sleeping, and still others will use supplemental oxygen all the time.

- Surgery is an option for some patients with COPD. For patients with severe emphysema, lung volume-reduction surgery removes damaged lung tissue, creating space in your chest for healthy lung tissue to expand. For patients with large “bubbles” in their lungs, which are called bullae, surgical removal of the bullae also creates space in the chest, allowing healthy lung tissue to expand. For very ill patients, another surgical option is a lung transplant in which the damaged lung is replaced with a healthy lung.
- Research about lung treatments includes the use of valves or coils to deflate the damaged parts of the lungs. These options are still in clinical trials and have not been approved by the FDA.
- If you have COPD, it is also important to make sure that other diseases you may have, such as high blood pressure, diabetes, and asthma, are also being treated.

THE PAST AND FUTURE OF COPD

Physicians have been tracking the symptoms of a variety of respiratory diseases, now known as COPD, for about 200 years, but the condition did not have a universally accepted name until 1965. Consequently, the knowledge of its causes and most effective treatments is not as well developed as many other diseases.

When European physicians in the early 1800s first identified chronic bronchitis and emphysema as respiratory diseases now known as COPD, smoking was not common.

Today we know that 80 percent of COPD cases are indeed tied to smoking, but only 25 percent of smokers develop COPD. The majority of researchers theorize that genetic factors make those 25 percent of smokers more likely to develop COPD, but they also have struggled to determine what those genetic factors are.

One of those findings is that “COPD is a disease of accelerated lung aging,” according to Joan B. Soriano, MD, PhD, a physician and researcher from Madrid, Spain.

Bartolome R. Celli, MD, a professor of medicine at Harvard Medical School, said that in some patients COPD may be the result of inadequate lung growth in childhood. “COPD could be a pediatric disease that we diagnose at an older age,” he said, adding that genetic factors at birth might affect the health of internal organs in people who later develop COPD, which is most often diagnosed after age 40

This does not mean, though, that breakthroughs in developing better treatments are just around the corner. Researchers presented other key findings at the ATS 2016 International Conference.

- Current treatment approaches and smoking prevention are working because the death rate from COPD has decreased.
- Patients with COPD often have these factors in common: they smoke or are former smokers, their parents had asthma and smoked, they had asthma as children, and they had childhood respiratory infections.

- There are different types of COPD, known as phenotypes, and they react differently to different medicines.
- Corticosteroids are helpful for some patients, but do not appear to be effective in treating all COPD phenotypes.
- Corticosteroids can be stopped by a doctor when he or she thinks the disease is stable and the patient continues to use long-acting inhaled bronchodilators.
- Blood eosinophil is a type of white blood cell. Measuring blood eosinophil levels may help identify COPD phenotypes, which may lead to treating a subset of patients using “precision medicine.” This approach would target the cause of disease in a particular patient and could be more effective, with fewer side effects.
- Another type of white blood cell is a neutrophil, which helps the body fight infection. Some patients with COPD have neutrophils that do not function normally in their lungs, so they have trouble killing bacteria, increasing their chances of COPD growing worse. However, research shows that using corticosteroids does not help some of these patients,

If you are over age 40 and are a smoker or former smoker who is often short of breath and coughs frequently, you should consult a physician to determine if you have COPD.

so researchers are working to find new treatments to help in these patients.

- The most important factors that affect the health of COPD patients are its symptoms, lung function, exacerbation frequency, and the progression of disease as seen in lung images.
- CT scans of the chest are better than spirometry at detecting early signs of disease.
- COPD exacerbations may be triggered by viruses, bacteria, and pollution that amplify chronic inflammation.

LOOKING AHEAD

COPD is diagnosed in only about half of the 24 million Americans who probably

have it, according to U.S. government agencies that collect health statistics. Beyond the personal toll on those 24 million people and their families, it is estimated that by 2020 the cost of COPD to the U.S. economy will reach \$90 billion.

If you are over age 40 and are a smoker or former smoker who is often short of breath and coughs frequently, you should consult a physician to determine if you have COPD. If you have a family member or friend over age 40 who shows signs of COPD, encourage them to see a doctor.

If you do have COPD, remember that it cannot be cured, but it can be controlled. The key to control is to find out as early as possible if you do have COPD, follow recommendations from health care professionals concerning your lifestyle, and take all medicines as directed. “COPD is no different than any other disease. It is best to diagnose and treat early,” Dr. Celli said.

You also may have access to new treatments in development and help researchers by taking part in clinical trials. For information about some COPD clinical trials, visit the [ATS Clinical Trials web page at www.thoracic.org/about/industry-resources/clinical-trials/](http://www.thoracic.org/about/industry-resources/clinical-trials/).

To stay informed about the latest recommendations and developments about COPD, you can visit the [ATS web page about COPD at www.thoracic.org/patients/patient-resources/topic-specific/copd.php](http://www.thoracic.org/patients/patient-resources/topic-specific/copd.php), which contains several resources for those with the condition. Also, mark Nov. 6-12, 2016, on your calendar to take part in COPD Week at ATS, part of [Lung Disease Week at the ATS www.thoracic.org/patients/lung-disease-week/2016/](http://www.thoracic.org/patients/lung-disease-week/2016/).





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