

Asthma Today



ATS 2015
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More than 26 million people in the United States—about 8 percent of the population—have asthma, an increase of 5 million people since 2001. U.S. government agencies estimate that asthma costs the nation \$56 billion every year in medical costs, lost school days and workdays, and early deaths.

With this resource, you will learn:

- The definition of asthma
- The history of asthma
- Asthma triggers
- How asthma is diagnosed
- Treatments for asthma
- New research on asthma
- Opportunities to learn more

Public and private institutions have invested billions of dollars on research to expand what we know about the causes of asthma and best treatments for those who have the disease. The best of this research is presented annually at the **American Thoracic Society (ATS) International Conference**. *Asthma Today*, part of the ATS Patient Information Series, puts the latest research about asthma presented at the 2015 conference in the

FACTS & FIGURES



1 in 12

About 1 in 12 people in the United States (more than 26 million) have asthma, and the numbers are increasing every year.



12 Million

About 1 in 2 people (about 12 million in the United States) with asthma had an asthma attack in 2013, but many asthma attacks could have been prevented.



\$56 Billion

Asthma cost the U.S. about \$56 billion in medical costs, lost school and work days, and early deaths in 2013.

Asthma is a lifelong disease that causes wheezing, breathlessness, chest tightness, and coughing. It can limit a person's quality of life, but we do know that most people with asthma can control their symptoms and prevent asthma attacks by avoiding asthma triggers and correctly using prescribed medicines, such as inhaled corticosteroids.

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context of our evolving knowledge of this common but complex disease.

Health care experts around the world agree that asthma is a respiratory disease in which the airways of the lungs become inflamed and narrower, and produce extra mucus. It is a chronic disease, so it usually lasts for your lifetime, and it cannot be cured. However, asthma can be controlled with medicine and changes in lifestyle. The most common symptoms of asthma are coughing, shortness of breath, chest tightness, and wheezing.

THE HISTORY OF ASTHMA

The earliest recorded reference to respiratory problems is from ancient China in 2600 BC. This health problem was first called “asthma” in 400 BC by the Greeks because the word means “short of breath.” Despite this long history, little was known about asthma until fairly recently. Some people, for instance, thought it was a psychosomatic illness, meaning it was thought to be a mental illness, not a physical problem.

The knowledge of asthma began to grow in the first half of the 1900s, but it was only in the 1960s that health care experts recognized asthma as an inflammatory disease, which means it causes swelling of the airways. In people with asthma, a combination of environmental triggers and genetic factors cause the lungs’ airways to become inflamed.

In the 1980s, researchers learned more about how the body reacts to environmental triggers, and that knowledge has expanded greatly in the last three decades.

ASTHMA TRIGGERS

There are many factors that can inflame a person’s airways. These asthma triggers vary from person to person, but the common

ones are allergies, respiratory infections, tobacco smoke, air pollution, cold air, pets, cockroaches, mold, dust mites, smoke from burning wood, physical exercise, and stress.

Less common triggers that create problems for people with asthma include medicines, such as some anti-inflammatory drugs and beta-blockers, and sulfites in food and drinks, such as wine.

Your genes also are a factor. If one parent has asthma, a child is 30 percent more likely to have asthma, and if both parents have asthma, a child is 70 percent more likely to have asthma. Also, if your family members have a tendency to develop allergies, you may be more likely to have allergies, and your airways are more likely to be inflamed by allergens. About half of all Americans are sensitive to at

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TYPES OF ASTHMA

Asthma is considered a single disease in which the airways are inflamed and narrowed. However, there are several types of asthma that reflect the triggers and the patient’s genetic makeup that can cause an asthma attack. Treatments may vary depending of the type of asthma you have.

Exercise-Induced Asthma

Exercise often causes asthma symptoms, and the trigger is believed to be rapid breathing and airway cooling associated with vigorous exercise. Sports linked to exercise-induced asthma involve continuous play, such as basketball, soccer, and long-distance running, and sports that take place in cold, dry air, such as hockey or skiing. Treatment and monitoring can allow people with exercise-induced asthma to participate in the physical activity or exercise of their choice.

Nocturnal/Nighttime Asthma

Worsening of asthma at night is common, and is often linked to exposure to allergens in the bedroom, such as dust mites; a delayed allergic response; gastroesophageal reflux (a condition that causes heartburn); a drop in body temperature that cools the airways; medications wearing off, especially in early morning hours; and sleep apnea.

Allergic Asthma

Allergies are known to make asthma symptoms worse. Among the most common allergies are to animals, dust mites, mold, pollen, and foods. You can adjust your lifestyle to avoid these allergens, or be tested to confirm your allergies and get allergy shots or medicines specific to allergic asthma.

Occupational Asthma

Exposure to high concentrations of chemicals or dust in the workplace can trigger an asthma attack. To confirm occupational asthma, you can compare the results of a peak flow test at

work and away from work. A peak flow test measures how hard you can breathe out. If confirmed, you will need to develop a plan to limit your exposure to allergens in addition to taking any medications prescribed.

Steroid-Resistant Asthma

Although corticosteroids are one of the most common treatments for most people with asthma, some people with severe asthma do not respond to steroid treatment. If you are in this category, you will need to work with your doctor to develop an action plan for treatment.

Cough-Induced Asthma

Many people with asthma do not wheeze. Instead, they have a dry, non-productive cough in which they do not expel any mucus. It is common in children and usually worsens while exercising or sleeping. Treatments involve the use of inhalers, and it can take six to eight weeks for symptoms to improve.

least one allergen that could trigger asthma.

A representative of the U.S. National Institute of Environmental Health reported on allergens in the average home during the ATS International Conference. He said that nearly half of the homes taking part in a recent study had at least six detectable allergens. Three out of four homes had at least one allergen. The study also found that if a person is sensitive

to one allergen, that person is likely to be sensitive to several similar allergens, which are called clusters. For example, if you are allergic to cats, you're probably allergic to dogs, too.

Also during the conference, a researcher from the University of Tennessee Health Science Center reported on her research showing that newborns exposed to particles in the air, known scientifically as particulate

matter, often have long-term problems from those exposures, such as airway inflammation, decreased lung growth and development of the immune system.

DIAGNOSIS OF ASTHMA

Diagnosing asthma is difficult because there is not one definitive medical test for it, and its symptoms can cause it to be confused with another lung disease—chronic obstructive pulmonary disease, or COPD. Asthma is a respiratory disease marked by spasms in the airways of the lungs. It is most often recognized in children, although about 30 percent of people are not diagnosed with asthma until they are adults. In contrast, COPD is a general medical term for people who have chronic bronchitis (brong-KII-tis), emphysema (em-fuh-SEE-muh), or a combination of the two, and it usually is not diagnosed until age 40 or later.

If you suspect you have asthma, you will need to have a complete physical exam and a doctor or health care professional will need to ask several questions as part of your complete medical history:

- Do you cough a lot, especially at night?
- Are your breathing problems worse after physical activity or at certain times of year?
- Do you have chest tightness, wheezing, or a cough that lasts more than 10 days?
- Do you have family members who have asthma, allergies, or other breathing problems?

Your physical exam is likely to include a breathing test, called spirometry (spa-ROM-i-tree), that will assess the health of your lungs by measuring how much air you exhale after taking a deep breath, and how quickly you exhale. A second common test uses a peak flow meter to measure how hard you can breathe out.

Other tests used to diagnose asthma include:

- **Methacholine challenge:** If your airways constrict after inhaling methacholine (meth-a-KOH-leen), you most likely have asthma. You can learn more about this test by reading another ATS Patient Information Series flier, “**Lung Function Studies: Methacholine or Challenge Test.**”

COMMON ASTHMA TRIGGERS

Many factors can cause an asthma attack. If you have asthma, you need to be aware of your triggers and avoid them.

Tobacco Smoke

No one with asthma should smoke or be exposed to secondhand smoke.

Smoking risks for those with asthma are particularly high. Secondhand smoke is smoke created by a smoker and inhaled by a second person, and it is a major cause of asthma attacks.



Dust Mites

Dust mites are tiny bugs that are in almost every home, and there are several types of dust mites. They are common in bedding and in older mattresses and pillows, so use mattress covers and pillow covers to create a barrier between dust mites and yourself. Don't use down-filled pillows, quilts, or comforters. Remove stuffed animals and clutter from your bedroom.



Outdoor Air Pollution

Air pollution commonly comes from factories and cars. Follow air quality forecasts in newspapers, on radio or television reports, and on the Internet, and plan your activities for when air pollution levels will be low.



Cockroaches

Cockroach droppings often are found in water and food sources, and where food crumbs accumulate. Keep your home clean by sweeping and vacuuming every two or three days and use roach traps or gels to reduce the number of cockroaches.



Pets

Cat allergies are twice as common as dog allergies. Dogs and cats secrete fluids and shed dander containing allergens. If you have a furry pet, vacuum often. If your floors have a hard surface, such as wood or tile, clean them with a damp mop every week. Bathe pets regularly and keep them outside the bedroom.



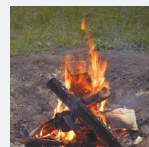
Mold

High humidity can lead to mold. An air conditioner or dehumidifier will help you keep the humidity level low. Use a hygrometer to check humidity levels and keep them below 50 percent. Fix water leaks, which let mold grow behind walls and under floors.



Smoke from Burning Wood

Smoke from burning wood or plants contains harmful gases and small particles, so avoid burning wood in your home.



- **Exhaled nitric oxide test:** When your airways are inflamed, your breath may have high levels of the gas nitric oxide, which may be a sign you have asthma.
- **Allergy testing:** Skin tests and blood tests can be used to determine allergies to pets, dust, mold, and pollen, all of which are asthma triggers, and confirm a diagnosis of allergic asthma.
- **Eosinophil levels:** Eosinophils (ee-oh-SIN-oh-phils) are a type of white blood cell. If you have elevated levels of eosinophils, they can trigger an inflammatory response. Eosinophils can be measured in your blood or your sputum, which is the mucus you discharge when you cough.

ASTHMA MEDICINES

Asthma is a chronic disease that has no cure, but there are two types of treatments to control it—maintenance and rescue medicines. Maintenance medicines are taken regularly to control asthma symptoms. Rescue medicines are used when you need quick relief during an asthma attack.

Most people who have asthma need to take long-term maintenance medicines that reduce airway inflammation and prevent the start of more severe asthma symptoms. These medicines do not give you quick relief when you are having an asthma attack.

The most common maintenance medicines are inhaled corticosteroids (KAWR-tuh-koh-STER-oid). These non-habit-forming drugs are different from illegal muscle-building steroids taken by some athletes. Other long-term medicines to control asthma include leukotriene (LU-koh-tri-EEN) modifiers and long-acting beta agonists (BAY-ta-AG-a-nists). Occasionally, a long-acting anticholinergic (An-tee-KOH-luh-nur-jik) or theophylline (THEE-a-fill-eeen) is used. Other maintenance medicines are shots that can be administered in your physician's office. Certain types of medicines and combinations of medicines for asthma are thought to be more effective, and new medicines are being studied in clinical trials.

When rescue medicines are needed, the most commonly used are the short-acting

beta2 agonists, such as albuterol (al-BYOO-ter-ol), which relax the tight muscles around your airways to open them up so air can flow through them. Another common rescue medicine is ipratropium (IP-ra-TROH-pee-um).

Be sure to follow your doctor's instructions for taking your medicine to keep your asthma under control and to avoid an asthma attack. (See *Asthma Action Plan* on page 5.)

INHALERS AND NEBULIZERS

The most effective way to take asthma 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. It is important to

use your inhaler correctly. Many people do not use their inhalers correctly, so they do not get the full benefit of the medicine. In fact, a study published in the medical journal *Asthma* in 2011 found that only 2 percent of people with severe asthma adhere to their medication schedules and use their inhalers correctly. Be sure to ask your doctor or health care professional to show you how to use an inhaler. For those who have trouble using an inhaler correctly, attaching a spacer or holding chamber can make it easier to use.

The most common type of inhaler is a metered-dose inhaler (MDI), which is pressurized so it releases a fixed amount of medicine. It is best to use an MDI that has a dose counter that shows how much medicine is left in it. For MDIs without a dose counter, you will need to know how many puffs your inhaler holds and how many puffs you take each

ASTHMA CLASSIFICATIONS

Asthma is classified based on the severity of symptoms and the results of lung function tests before treatment. These symptoms include difficulty breathing, wheezing, chest tightness, and coughing. Over time, the classification of your asthma may change.

Mild Intermittent Asthma

Asthma is considered mild intermittent if, without treatment, all of the following are true:

- Symptoms occur fewer than two days a week
- Attacks do not interfere with normal activities
- Nighttime symptoms occur fewer than two days a month
- Spirometry and peak flow lung function tests are normal when the person is not having an asthma attack

Mild Persistent Asthma

Asthma is considered mild persistent if, without treatment, any of the following are true:

- Symptoms occur more than two days a week but do not occur every day
- Attacks interfere with daily activities
- Nighttime symptoms occur three to four

times a month

- Spirometry and peak flow lung function tests are normal when the person is not having an asthma attack

Moderate Persistent Asthma

Asthma is considered moderate persistent if, without treatment, any of the following are true:

- Symptoms occur daily; inhaled, short-acting asthma medication is used every day
- Symptoms interfere with daily activities
- Nighttime symptoms occur more than one time a week, but do not happen every day
- Spirometry and peak flow lung function tests are abnormal

Severe Persistent Asthma

Asthma is considered severe persistent if, without treatment, any of these are true:

- Symptoms occur throughout each day
- Symptoms severely limit daily physical activities
- Nighttime symptoms occur often, sometimes every night
- Spirometry and peak flow lung function tests are abnormal



A nebulizer is a device that converts liquid medicine into a fine mist you inhale by breathing through a mouthpiece or mask.

day so that you know 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).”**

A second type of inhaler is a **dry powder inhaler** in which the user inhales medicine saved in the form of a dry powder.

A new type of inhaler that could improve asthma treatments, an extrafine-particle inhaler, was discussed during the ATS International Conference. The lungs contain airways of various sizes. Evidence is growing that a group of people have “small airway asthma,” and disease in these small airways is difficult to detect, so it has been called “the silent zone.” Traditional asthma inhalers contain particles of medicine that are larger than 2 microns. These larger particles of medicine can only reach large and medium airways, not the small airways, especially the airways near the edges of the lung.

However, inhalers using particles smaller than 2 microns can more effectively reach the small airways and airways near the edges of the lung. Preliminary evidence from studies of extrafine-particle inhalers shows that they not only are better at controlling asthma in all patients, they are more cost-effective. More

studies of these extrafine-particle inhalers are needed to confirm that they truly are more effective than coarse-particle inhalers, according to researchers.

Another way to take asthma medicines is with a nebulizer. A nebulizer is a device that converts liquid medicine into a fine mist you inhale by breathing through a mouthpiece or mask.

NEW ASTHMA RESEARCH

The ATS International Conference featured several presentations of research that is promising, but that may be years away from being accepted and used to better treat people with asthma. These presentations included debates that not only highlighted new approaches to diagnosing and treating asthma, but concerns about them, too.

One lecture focused on molecular phenotyping (FEE-noh-type-ing), which breaks down asthma into different categories based on how a person’s genes interact with their environment. The goal is to provide treatment tailored to this gene-environment interaction. This approach is sometimes

ASTHMA ACTION PLAN

Asthma is a chronic disease that requires you to actively monitor and maintain your health. It is wise to work with your health care provider to develop an asthma action plan that is a written, personalized worksheet that shows you the steps to take to prevent your asthma from getting worse.

The plan should have specific instructions for early treatment of asthma symptoms and provide guidance on when to call your health care provider or when to go to the emergency room. You can download an action plan from the U.S. National Institutes of Health at https://www.nhlbi.nih.gov/files/docs/public/lung/asthma_actplan.pdf. Your asthma action plan should include:

- Your name
- Emergency contact information
- Contact information for your health care provider
- Your asthma severity classification

- A list of triggers that may cause an asthma attack
- A list of your medicines

An asthma action plan is divided into three zones—green, yellow, and red.

The green zone is where you want to be daily because you have no asthma symptoms and you feel good. Continue to take your long-term maintenance medicines even if you’re feeling well.

The yellow zone means that you are experiencing asthma symptoms, so you should use your rescue medicine to keep your asthma from getting worse.

The red zone means you are experiencing severe asthma symptoms or an asthma attack. Follow the steps of your asthma action plan and get immediate medical treatment if your symptoms do not improve.



A peak flow test measures how hard you can breathe out. It is a common test used in all types of asthma.

called personalized medicine. Traditionally, the same medicines have been used to treat everyone with asthma. This new approach of categorizing subtypes of asthma looks for biomarkers to identify each subtype. Currently, four subtypes have been identified, ranging from mild to very severe asthma. In theory, corticosteroids may not work best for each subtype. Also, obesity, smoking, or infections

may play a major role in inflaming the airways of a person in one subtype, while those factors may not be as important for a person in a different subtype.

Genomics—the science of genes—is expected to provide clues about each person's subtype so we know how to alter lifestyles and which medicines work best. One such type of medicine is biologics, which is a medicine developed through biological processes using living cells or organisms rather than the chemicals used in traditional medicines. Although expensive, biologics are increasingly being used to treat a variety of medical conditions, such as cancers, cardiovascular disease, diabetes, and autoimmune diseases, such as rheumatoid arthritis and psoriasis. More than 900 biologics are being developed, and 21 of those are being developed to treat patients with asthma and other lung diseases. The first biologics for asthma are most likely to benefit patients with severe asthma and to complement standard therapies at times when a patient's asthma is not well controlled.

To date, only one biologic for asthma, omalizumab (OH-ma-LIZ-oo-mab), has been approved by the U.S. Food and Drug Administration (FDA). It is used for severe, persistent allergic asthma that is not controlled by inhaled corticosteroids. The FDA is considering another biologic, mepolizumab, for approval for maintenance treatment for patients with severe eosinophilic asthma. A

third biologic, lebrikizumab (LEB-rick-is-u-mab), is being studied in clinical trials to reduce airway inflammation.

Another treatment that has created a great deal of discussion is bronchial thermoplasty. As with other medical treatments, bronchial thermoplasty will continue to be studied by researchers as to its benefits, harms, and long-term consequences. In the interim, this treatment is only intended for adult patients with severe asthma within a research environment, such as part of a clinical study or an institutional review board-approved independent systematic registry.

LOOKING AHEAD

Asthma is a disease that affects 300 million people around the world, and experts predict that another 100 million people could be diagnosed with asthma in the next 10 years. Evidence suggests that asthma's growing prevalence is due to increased urbanization and the adoption of a “Western” lifestyle. Despite the gloomy statistics, researchers are making amazing advances in the diagnosis and treatment of all types of asthma.

If you suspect you have asthma, be sure to consult a doctor. If you do have asthma, remember that it is a chronic disease that while it cannot be cured, it can be controlled. The key to control is to follow recommendations from health care professionals concerning your lifestyle and to take all medicines as directed. An Asthma Action Plan can help you do this. Research suggests that many people who struggle to control their asthma are not taking their medicines as prescribed. Shockingly, one study found that only 2 percent of people with severe asthma follow their doctor's orders about when to take their medicines and use their inhalers correctly. The U.S. Centers for Disease Control has a [video](#) demonstrating how to use an inhaler.

To stay informed about the latest recommendations and developments about asthma, you can visit the [American Thoracic Society](#) Web page about asthma, which contains several resources for patients with asthma. Also, mark Oct. 4-10, 2015, on your calendar to take part in [Asthma Week at ATS](#).

LOOK FOR ASTHMA WEEK AT ATS OCTOBER 4-10

To learn more about the latest advances in asthma research and treatments, mark your calendar for October 4-10, 2015, and bookmark [Lung Disease Week at the ATS](#) in your Web browser.

Throughout the week, asthma experts with the American Thoracic Society (ATS) will provide a variety of information for patients developed with an ATS Public Advisory Roundtable partner, the [Asthma and Allergy Foundation of America](#).

The information on the website will include links to asthma information from ATS publications, the ATS International Conference, and ATS educational sessions. Also, tune in for a live webinar presented by an asthma health care professional.