

NIH News in Health

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Managing Asthma Learn To Breathe Easier

Most people have little trouble climbing a flight of stairs or taking a brisk walk, but these simple activities can be tough for someone with asthma. Although there's no cure, you can breathe easier by knowing how to keep the condition under control.

Asthma is a common, long-lasting disease that affects the lungs. It can begin in childhood or adulthood. More than 25 million Americans have asthma, including 7 million children. Without proper care, asthma can become serious, even deadly. But most people with asthma learn to manage the disease so they have few symptoms or none at all.

Major symptoms of asthma include wheezing (a whistling sound when breathing), shortness of breath, coughing that's worse at night and early morning, and chest tightness. These symptoms arise from reactions that narrow the airways, the tubes that carry air into and out of your lungs. When symptoms flare up, it's called an asthma attack.

The airways of people with asthma are prone to **inflammation**, which causes the airways to swell and narrow. They become extra sensitive to certain substances that are breathed in. These are called "triggers."

Asthma triggers can worsen inflammation and cause the muscles around the airways to tighten, further shrinking air passages and making it

harder to breathe. Cells in the airways might also produce excess mucus (a sticky, thick liquid), making the airways even narrower.

Common asthma triggers include cigarette smoke, air pollution, mold, house dust mites, and furry animal dander. Other asthma triggers include weather changes, exercise, stress, and respiratory infections like common colds.

"Preventing such infections is important," stresses Dr. Stewart Levine, an asthma expert at NIH. "People who have asthma should also obtain a flu shot, as they may be at higher risk for flu-related complications."

Asthma is one of the most common causes of chronic (long-term) illness in children—and some symptoms appear more often in children than in adults. "Children have smaller airways, so if they have asthma, they tend to wheeze more often, particularly during the night," says Dr. Robert Lemanske, Jr., a pediatric asthma expert at the University of Wisconsin.

Some preschool age children frequently wheeze when they get colds but don't go on to develop chronic asthma. "But some kids start wheezing at age 3, and the problem continues," says Lemanske. "These kids also tend to be more allergic."

A doctor will test for asthma by doing a physical exam and asking about your medical history to learn when and how often your symptoms oc-



cur. Your doctor may also ask you to breathe in and blow out into the tube of a spirometer. This device measures how much air you can breathe out and how fast you can do it.

"It's sometimes tough to do a spirometry test on young children," says Dr. Michelle Freemer, an NIH asthma expert. For youngsters, a doctor will do a physical exam and may perform other tests to identify possible asthma triggers.

Whether you're young or older, it's important to know how to manage your asthma. Work with your doctor to develop a written asthma action plan. (For a sample plan, go to www.nhlbi.nih.gov/health/public/lung/asthma/asthma_actplan.htm). Your action plan should spell out the daily treatment

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Definitions

Inflammation

Heat, swelling, and redness caused by the body's protective response to injury or infection.

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plan to help control your asthma. This may include recommendations for medications and for avoiding exposure to your triggers. The action plan should also give specific instructions for what to do when asthma symptoms start and what actions to take if symptoms worsen, including when to seek medical attention, go to the hospital, or call an ambulance.

"Patients with asthma should have an action plan, so they know if they're getting into trouble and what to do about it," Freemer says.

For some patients, Freemer notes that a hand-held device called a peak flow meter can help you moni-

tor your asthma. You blow into the device to measure how strongly your lungs can force air out. If the meter shows that your air flow is lower than normal, you can use your action plan to adjust your treatment.

"There are 2 main types of medicines for managing asthma: quick-relief and long-term controllers," says Levine. Quick-relief medicines—such as short-acting bronchodilator inhalers—are used to relax the muscles in the airways to make it easier to breathe within a few minutes. If exercise is an asthma trigger, doctors may recommend taking this medicine 5 to 15 minutes before exercise or strenuous activity.

Long-term control medicines—such as inhaled corticosteroids—are used every day to help control symptoms and prevent asthma attacks. "Inhaled corticosteroids are recommended as the preferred long-term control medications for most children and adults," says Freemer. "Taken daily, they help reduce inflammation to control the disease."

If young children have trouble taking inhaled medications, there are masks and other devices that can help. Some kids are given a nebulizer, a portable machine that releases medicine in a mist.

**Web Links**

For more information about asthma, click the "Links" tab at:

<http://newsinhealth.nih.gov/issue/Jun2014/Feature1>

A small percentage of people with asthma have a hard time controlling their symptoms even when they take their medicines regularly. Their airways become extremely inflamed and particularly sensitive to asthma triggers. They wheeze more, wake more throughout the night, and are at greater risk for breathing failure and trips to urgent care. If your asthma is severe, see a specialist to identify the most appropriate, personalized treatment.

The underlying causes of asthma are still unclear. Researchers believe asthma is caused by a combination of your **genes** and environmental factors. If you have allergies or a parent who has asthma, you're at increased risk for the disease. Obesity and exposure to cigarette smoke may also raise the risk of developing asthma. NIH scientists are continuing to investigate the causes of this disease.

Researchers are also working to develop new approaches to help prevent and treat asthma. Levine's team is studying the effects of house dust mites inside the home. While exposing mice to dust mites, the researchers identified a protein in the lung that blocked the development of asthma. With further research, the finding may eventually lead to new approaches for preventing or controlling asthma symptoms in people.

If you or your loved ones have asthma, identify your triggers and try to avoid them. Monitor your symptoms, and take prescribed medications regularly.

"For most people with asthma, if you take your prescribed medicines and stay away from the triggers, you'll do well," Levine says. Keep your asthma under control so you can keep living life to the fullest. ■

**Wise Choices
Controlling Asthma**

- Get regular checkups for your asthma.
- Make a written asthma action plan with your health care provider and follow it.
- Use asthma medicines exactly as prescribed.
- Identify which triggers make your asthma worse—such as dust mites, mold, air pollution, or secondhand tobacco smoke—and try to avoid them.
- Exercise can trigger asthma attacks in some people, but physical activity is important to your health; ask your doctor about medicines and other options that can help you stay active.

**Definitions****Genes**

Stretches of DNA, a substance you inherit from your parents, that define characteristics such as how likely you are to get certain diseases.

NIH News in Health (ISSN 1556-3898)

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Protect Your Tendons

Preventing the Pain of Tendinitis

You've probably heard of such sports injuries as tennis elbow or jumper's knee. These are just 2 examples of tendinitis, a painful condition caused by overusing and straining the joints in your body.

Tendons are the tough but flexible bands of tissue that connect muscle to bones. You have about 4,000 tendons throughout your body. Tendons make it possible for you to bend your knee, rotate your shoulder, and grasp with your hand.

Tendinitis is inflammation of a tendon. (When you see "itis" at the end of a medical word, it means inflammation.) In tendinitis, the tendon gets inflamed and can rub against bone, making movement painful.

Tendinitis is usually caused by repeated motion, stress, or injury to certain muscles or joints. A sports or job-related injury is a common way to get tendinitis, but the condition can happen to anyone. Your risk for tendinitis also increases with age. "Tendons lose health as we get older and become less able to handle the load," says Dr. Evan Flatow, an **orthopedist** at Mount Sinai Roosevelt Hospital in New York.

Any activity that requires repetitive wrist turning or hand gripping, jumping or bending, pulling, pushing, or lifting can irritate the tendons. Some of the most common places to get the condition are in the shoulders, elbows, hands, wrists, knees, and ankles. Gardeners, carpenters, musicians, and other people whose work regularly places stress around the same tendons are at increased risk for developing tendinitis.

If treated early, tendinitis is usually a short-term condition. But it can come back if the tendon is aggravated over and over again. If tendinitis keeps affecting the same area over time, the tendon can weaken and tear or break.

If you have pain or swelling—and especially if you can't move a joint at all—contact a primary care doctor or an orthopedist. They can perform tests to pinpoint the exact areas of inflammation. You may also get an MRI scan or X-ray to check for a tear in the tendon or rule out other conditions, such as arthritis.

The first step in treating tendinitis is to reduce pain and swelling. Be sure to rest the swollen tendon so it can heal. "We have to break the cycle of inflammation to allow therapy to work," Flatow says. A doctor may prescribe medicines that relieve inflammation (such as aspirin or ibuprofen), give steroid injections, or give you a splint or brace. Then gentle exercises can help strengthen the tendon.

If a tendon becomes torn, surgery might be needed to repair the damage. NIH-funded researchers such as Flatow are working to develop new ways to repair and regenerate tendons without surgery.

Regular physical activity helps keep muscles, bones, and tendons strong, and can lower your risk of injury and tendinitis. But be careful not to overdo it so you don't injure yourself.



"Keep joints limber," Flatow advises. "Warm up and stretch before physical activity to prevent sudden injury." Take care of your tendons so they can keep you painlessly bending and flexing your muscles long into old age. ■



Definitions

Orthopedist

A specialist who treats injuries and disorders of the skeleton, including of the muscles and tendons. Also called an orthopedic surgeon.



Web Links

For more information about tendinitis, click the "Links" tab at:
<http://newsinhealth.nih.gov/issue/Jun2014/Feature2>



Wise Choices Preventing Tendinitis

- Exercise regularly to strengthen muscles around the joints.
- Begin new activities or exercise routines slowly and gradually increase the intensity.
- Position your body properly when doing daily tasks.
- Take frequent breaks from repetitive exercises and motions.
- Stop activities that cause pain.
- Use padding, gloves, or grip tape to cushion joints while using tools and sports equipment.



Health Capsules

For links to more information, see these stories online:
<http://newsinhealth.nih.gov/issue/Jun2014/Capsule1>

Patient's Own Cells Help Fight Cancer

An experimental therapy developed at NIH used a patient's own immune system to attack and shrink her tumors. With further research, this type of immunotherapy might be used to treat many common cancers.

The 43-year-old woman has cholangiocarcinoma, a rare and often-deadly cancer that develops in the bile duct (a tube that goes from the liver to the intestine). She was enrolled in an NIH clinical trial for patients with digestive system cancers. Her cancer had spread to her lung and liver. Standard chemotherapy didn't help.

The scientists first removed some of the woman's cancerous lung tissue, which along with tumor cells also had some of the patient's own immune cells. These immune cells had been fighting a losing battle against the tumor.

Analysis showed that the tumor's DNA contained several abnormal regions, or mutations. Some of these mutations created mutant proteins that could trigger an immune response.

The researchers tested the patient's immune cells. A few could specifically recognize and trigger an attack on a particular mutant protein found on the tumor cells. The scientists then grew billions of the anti-tumor immune cells in the lab and infused them back into the patient.

After this treatment, the woman's tumors stopped growing in the lung and liver. When her disease eventually progressed, after about 13 months, she was re-treated with a more purified collection of the immune cells, and her tumors shrank. This regression continued as of the last follow-up exam 6 months later.

The results show that the immune system's response against a mutant protein can be harnessed to fight a hard-to-treat type of cancer.

"The method we have developed provides a blueprint for using immunotherapy to specifically attack ... mutations unique to a patient's individual cancer," says NIH's Dr. Steven Rosenberg, who led the research. He and his colleagues are continuing to assess their experimental immunotherapy in a clinical trial. ■

Videos and Eye Health Resources for Kids

Ever wonder how optical illusions work? Are you curious about color-blindness? Do you have an inquisitive mind? Curiosity is a key ingredient to becoming a scientist.

A series of brief, kid-friendly videos from NIH answers children's questions about becoming a scientist and the variety of jobs researchers can do. The online "Ask a Scientist" videos, at <http://nei.nih.gov/youtube/kids.asp>, use fun animations and graphics to teach children about vision and science.

You can find additional eye-related resources for children at

<http://nei.nih.gov/kids/>. Get details on sports-related eye safety. Link to an animated website that has easy-to-understand information about eye biology and the visual system. Educators can download a printable activity book, a "fun fact" calendar, and other resources targeted to children in elementary or middle school.

If you work with kids or have children of your own, consider adding these resources to your activities, and share them with your colleagues. Let children know: It's never too early to start taking care of your eyes. ■

Featured Website Know Stroke

<http://stroke.nih.gov/>

Trouble walking, weakness on one side, trouble seeing, trouble speaking. Get to know these warning signs of stroke so you can get fast medical attention, which is key to successful recovery. This site has educational videos, brochures, and other materials to help you learn more about stroke.



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