



# Understanding Asthma

Building Blocks for Better Breathing



Special Edition of  
**Allergy & Asthma Today**



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## Who We Are

Allergy & Asthma Network is the leading nonprofit patient outreach, education and advocacy organization for people with asthma, allergies and related conditions. Our patient-centered network unites individuals, families, healthcare professionals, industry and government decision makers to improve health and quality of life for millions of people affected by the conditions.

An innovator in encouraging family participation in treatment plans, Allergy & Asthma Network specializes in making accurate medical information relevant and understandable to all while promoting standards of care that are proven to work. We believe that integrating prevention with treatment helps reduce emergency healthcare visits, keep children in school and adults at work, and allow participation in sports and other activities of daily life.

## Our Mission

To end needless death and suffering due to asthma, allergies and related conditions through outreach, education, advocacy and research.

Allergy & Asthma Network is a 501(c)(3) organization.

Join Allergy & Asthma Network today, as we work to help patients and families breathe better together.  
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## Your Asthma Journey – Step By Step

When I talk about asthma with patients, I often see confusion spread across their faces.

“Asthma? Me!!! Really?!!” says a newly diagnosed patient.

“Why do my symptoms only flare up at home?” asks a young patient struggling with asthma control.

“My asthma is no big deal – why do I still need my inhaler?” wonders another.

These days, there’s no need for confusion about asthma. Its patterns are predictable, if you know where to look. Asthma care has been revolutionized with medications targeting lungs



to keep you breathing well and devices and management tools to help prevent asthma flares.

This magazine – *Understanding Asthma: Building Blocks For Better Breathing* – presents the journey from what may be a frightening diagnosis to well-managed asthma in

easy-to-understand, medically accurate language.

When you understand what’s happening inside your lungs and how they respond to allergens and irritants – pollen, dust mites or cigarette smoke, for example – you and your healthcare team can decide the best treatment options.

Find out why an Asthma Action Plan is vital, on pages 10-11. Check out how prescription medications help alleviate symptoms, on pages 16-19. Learn how to correctly use your inhaler and nebulizer, on pages 22-26. And read tips on reducing exposures to allergens, irritants and pests from indoor environments, on pages 38-39.

Courtesy of Allergy & Asthma Network, a leading nationwide patient education nonprofit organization first started in 1985, *Understanding Asthma* is intended to supplement the treatment plan and advice from your doctor, and help you overcome any obstacles that may arise.

No more sleepless nights and unscheduled doctor visits. No more sitting on the sidelines of life. Better breathing for you and your family is within your reach.

James Sublett, MD, FAAAAI, FAAP  
Past President, American College of Allergy, Asthma & Immunology  
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**The goal is to prevent and minimize asthma symptoms, with no limitation of daily activity while using the least amount of medication possible.**

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# What Is Asthma?

Understanding What's Going On In Your Lungs

*“My two-year-old daughter coughs all night, then looks, sounds and feels great the next day.”*

*“Brandon always has a runny nose and coughs when he is outside.”*

*“I’m out of breath walking up my stairs. I’m tired, too.”*





*“My husband wheezes when he plays basketball and coughs for about 20 minutes afterward.”*

*“Every winter, I get a cold that settles into my chest and doesn’t leave until the middle of spring.”*

## Do these symptoms point to asthma?

### Possibly.

**A**sthma is a long-term lung disease that causes episodes of coughing, wheezing and shortness of breath. Like all chronic illnesses, asthma cannot be cured, but in most cases it is very manageable.

Most people with asthma experience one or more of the following symptoms:

- **Coughing:** Coughing from asthma is often worse at night or early morning. Sometimes it’s your only symptom. It can be dry or mucus-filled.
- **Wheezing:** This is a whistling or squeaky sound especially when you breathe out. Sometimes wheezing is easily heard; other times you need a stethoscope.
- **Chest tightness:** This can feel like something is squeezing or sitting on your chest.
- **Shortness of breath:** You may feel breathless, like you can’t catch your breath or breathe deeply enough. You may feel as though you are out of shape and constantly tired.

Normally, your lungs bring in fresh air and push out used air, but during an asthma flare it is harder to push out the used air and pull in the fresh because:

- the lining of the airway swells;
- your body makes too much mucus which clogs the airway;
- muscles around the airway get tight, making the airway narrow, with less room for air to pass through.

#### MYTH:

Asthma is not serious.

#### TRUTH:

*Asthma is a variable disease often changing from mild to moderate to severe. It is always serious and can be life-threatening – 10 people die of asthma every day.*

Asthma is a two-step process: airway inflammation (quiet asthma) and bronchospasm (noisy asthma).

#### Quiet Asthma

When you have asthma, your airways become easily inflamed and swollen. Since you can’t feel or see what’s going on, we call this airway inflammation the quiet part of asthma. If it is not treated, each time your airways are exposed to your asthma triggers,

the inflammation increases and your symptoms are likely to get worse.

#### Noisy Asthma

When your airways are inflamed, they are very sensitive. Exposure to the slightest irritation triggers bronchospasm – the noisy asthma symptoms of coughing, wheezing and shortness of breath.



# WHAT IS ASTHMA

## What causes asthma?

Anyone of any age, family background, race, sex or general health can develop asthma. Researchers think many genetic and environmental factors play a role, especially during the first years of life when the immune system is developing.

- Family history of asthma or allergies
- Mother’s smoking or exposure to secondhand smoke or air pollution during pregnancy
- Early childhood exposure to secondhand smoke, air pollution or indoor allergens such as dust mites, cockroaches or mold
- Damage to developing lungs due to premature birth or early childhood respiratory illnesses
- For adults, exposure to chemical irritants or industrial dusts in the workplace

## What triggers asthma symptoms?

Asthma is not a one-size-fits-all disease – what sets off symptoms for you or someone in your family may be quite different from what affects others. Common asthma triggers include:

- Indoor allergens: mold, pet dander, dust mites, cockroaches
- Outdoor allergens: pollen, mold
- Irritants such as secondhand smoke, diesel exhaust and air pollution
- Respiratory viruses, such as cold, flu and sinus infections
- Exercise
- Cold air or sudden changes in temperature
- Strong smells
- Strong emotions such as laughing or crying
- Hormonal changes
- Stress



## Is asthma serious?

All asthma is serious. There is no way of telling whether an asthma flare will last seconds, minutes or hours – or when it will turn life-threatening.

No matter what your past diagnosis, how infrequent your symptoms are or how good you’re feeling right now, your asthma can change without warning. It’s important to know what causes your symptoms, what your medications do, and how to respond to breathing emergencies.

**MYTH:**  
Asthma is a childhood condition.

**TRUTH:**  
*Asthma can occur in any person at any age.*

## Will I outgrow asthma?

Asthma is a life-long disease that cannot be “outgrown.” Your immune system changes throughout your life and your asthma symptoms will too.

However, you will always have the potential to experience asthma symptoms and must be aware that they can return at any time.

With correct diagnosis, careful management and appropriate use of medications, you can go years without any problems. However, if you let asthma get out of control, it can cause long-term lung damage.



## Faces of Asthma

“Learn all you can about asthma and allergies. Ask questions. Doctors will give you the help you need if they understand what you are telling them.”

– Lindsay Dreesen

## Most people with asthma should be able to do anything those without asthma can do:

- Be free from troublesome symptoms day and night.
- Have the best possible lung function.
- Participate freely in activities.
- Miss few or no school or work days because of asthma symptoms.
- Have fewer or no urgent care visits or hospital stays for asthma.
- Have few or no side effects from asthma medications.



# Asthma Dictionary

**Anti-IgE:** Medication that binds to IgE antibodies and prevents allergens from triggering allergic reactions.

**Anti-inflammatory:** medication that reduces and prevents airway swelling and inflammation. Usually taken daily.

**Biologics:** A class of medications given as an injection or intravenously to target specific cells and pathways that cause allergic inflammation linked to asthma.

**Bronchodilator** (BRON-ko-dy-lay-ter): medication that relaxes muscles around your airways and treats the noisy part of asthma: coughing, wheezing, choking and shortness of breath.

- **Quick-relief (short-acting) bronchodilators** work for 3-6 hours and should be used at the first sign of symptoms, before exercise and as directed by your doctor.
- **Long-acting (12-hour) bronchodilators** should be taken daily or twice-daily as prescribed, usually in conjunction with an inhaled corticosteroid.
- **Anticholinergics/Muscarinic antagonists:** A class of medications that block the action of neurotransmitters in the brain to prevent muscle bands around the airways from tightening.

**Bronchospasm:** twitching and sudden constriction of the airways that causes noisy symptoms of asthma: coughing, wheezing and shortness of breath.

**Combination medication:** contains two medicines in one dose, such as a long-acting bronchodilator and an anti-inflammatory corticosteroid.

**Corticosteroid** (cor-tih-co-STER-oyd): the most effective anti-inflammatory medication for asthma.

**Dry powder inhaler (DPI):** device used for powdered medication; breathing in activates the device to release medication.

**Fractional exhaled nitric oxide (FeNO):** a test that measures exhaled nitric oxide and indicates airway inflammation.

**IgE:** antibodies produced by the immune system that set off allergy symptoms.

**Immunotherapy:** A treatment in which small amounts of an allergen are given to a patient in ever-increasing doses, with the goal of boosting tolerance to the allergen and reducing symptoms.

**Leukotrienes** (LOU-ka-try-eens): chemicals involved in immune responses that cause inflammation, swelling and tightening of the airways.

**Metered-dose inhaler (MDI):** a pressurized device used to spray medicine for inhalation.

**Nebulizer** (NEH-byuh-lye-zur): electric or battery-powered machine that turns liquid medicine into mist that can be inhaled.

**Peak flow meter:** a handheld device that measures peak expiratory flow rate (PEFR), the maximum speed that you can force air out of your lungs.

**Spacer:** device that fits onto an MDI inhaler or is a built-in part of the MDI that helps direct the flow of medicine into the back of your throat; user must coordinate spray with inhalation, as spacer does not trap particles.

**Spirometer** (Spy-RAW-meter): device that measures how much air you can push in and out of your lungs.

**Valved Holding chamber:** a valved device that fits onto a metered-dose inhaler (MDI) to trap and suspend medication spray so user can inhale when ready or during 3-5 breaths; also helps reduce amount of spray that hits tongue and inside cheeks.

## Misleading Terms

*Using shorthand or slang to talk about asthma can be confusing. Reconsider the following terms:*

**Rescue inhaler:** Don't wait until you need "rescue" or are near death before using your quick-relief bronchodilator.

**As needed:** One person's "Need it now" is another's "Maybe later." Get specific details on when to use each medication.

**Controller medication:** Most asthma medications "control" symptoms in one way or another. One medication alone may not give asthma patients full symptom control.

**Mild or moderate asthma:** All asthma is serious. Mild asthma symptoms can turn severe in a moment.

**Outgrowing asthma:** Your child may have fewer or no asthma symptoms into teenage years, or may have a lifetime of asthma and allergy symptoms. Airways are always sensitive for life.

**Puffer:** Inhaler asthma medications don't puff up or inflate your lungs.



# Is This Asthma?

## Find Out For Sure

### Steps To An Accurate Diagnosis

**A**ll that wheezes or coughs is not necessarily asthma. Getting to an accurate diagnosis begins with a conversation with your doctor. Like a skilled detective, the doctor combines information from your medical tests, physical exam and verbal reports to determine whether asthma or some other cause is responsible for your symptoms.

Some questions to discuss:

- When did you first notice symptoms, how long did they last and what made them better or worse?
- Does anyone in your family, home or workplace smoke?
- Do you or does someone in your family have a history of asthma, allergies, eczema, food allergies, allergic rhinitis, seasonal bronchitis, or colds that linger for months instead of days?
- Do you have breathing problems when exercising or sleeping through the night?
- What is your home, school, and work environment like? Do you have pets, carpets or wood floors, or water damage in your basement?





Next, the doctor will do a physical exam, looking for signs of conditions that often go along with asthma such as rhinitis (inflammation of the nose), sinusitis (inflammation of the sinuses), nasal polyps (mucus-filled bulbous sacks in the nose), eczema or atopic dermatitis (skin irritation).

The physician will look inside your nose, watch the way your chest and stomach muscles move when you breathe, and use a stethoscope to listen to air flowing in and out of your lungs.

If the signs point to asthma, the doctor may use a spirometer to check how well your lungs are working. You'll be asked to take a deep breath in and then breathe out as hard as you can into the machine. The spirometer shows the amount of air you are able to breathe in and out and how fast you did it over a certain time period. If your airways are inflamed and narrowed, or if the muscles around your airways tighten up, the results will show it.

You may do this test several times, perhaps before and after using a quick-relief bronchodilator to relax the airways. Test results that improve after using the medicine are a strong indication of asthma.

If you are having no symptoms on the day of your exam, the results of your lung function testing may be normal. In this case, your doctor may order another test called a methacholine challenge. This medication causes a brief tightening of the airways that is more intense in people who have asthma.

Other tests might include:

- Allergy testing
- A test to see how your airways react to exercise
- Tests for other conditions, such as gastroesophageal reflux disease (GERD) or obstructive sleep apnea

- A test for sinus disease
- A chest x-ray or electrocardiogram to find out if a foreign object or other lung or heart disease could cause your symptoms
- A fractional exhaled nitric oxide (FeNO) test to measure lung inflammation

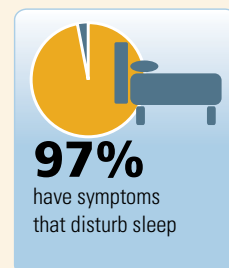
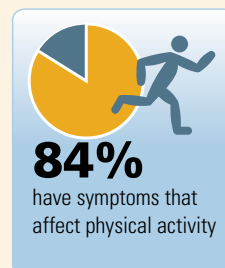
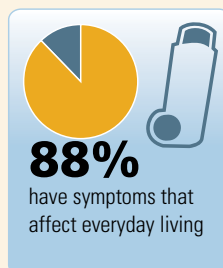
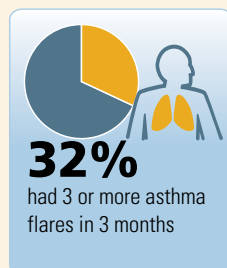
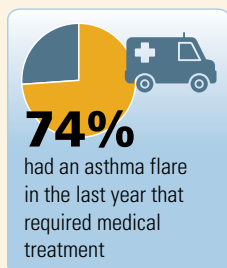
### Factors your doctor will consider to determine severity:

- Number and frequency of symptoms experienced
- How much symptoms interfere with your breathing and daily activities
- Results of diagnostic testing
- Hospitalizations or emergency visits, missed school or work days, and sleepless nights
- Types of medications needed to maintain control over symptoms



## Patients Often Misinterpret Asthma Control

A recent study found that while almost half of patients believe their asthma is under control – more than 9 out of 10 (94%) experience symptoms that indicate otherwise:





# Your Asthma Action Plan

A Personal Guide to Recognizing, Treating & Preventing Symptoms

**A**fter the diagnosis, you and your doctor will draw up your own personal plan of treatment, called an Asthma Action Plan.

This written document will spell out how to treat your asthma daily, what to do when symptoms get worse, and how to handle situations such as exercise or when you have a cold or virus.

As you are developing your plan with your healthcare team, **be sure you understand the following information:**

## 1. What medicines you should take, especially:

- What each is called
- Why you need it
- How much to take
- When to take it
- How to use the inhaler or nebulizer device
- How soon to expect results
- Potential side effects

## 2. What your asthma triggers are and how to reduce or eliminate exposure to them

## 3. How to monitor your asthma by tracking symptoms

## 4. How to recognize and handle worsening asthma, including:

- What signs to watch for
- How to adjust medicines in response
- When to seek emergency care from your doctor or the emergency room (ER)
- What numbers to call in an emergency

If you don't have an Asthma Action Plan designed specifically for you, make an appointment to talk with your healthcare professional about it as soon as possible. Go over each detail with your healthcare team until you are confident you understand it and can follow it in your daily life. Ask questions. Talk about any problems you think you might run into.

Your Asthma Action Plan will change as your asthma improves or worsens. Review the plan with your doctor at every appointment, including follow-up visits when your asthma is under control.



## Asthma Action Plan for Home & School



Name: \_\_\_\_\_

Birthdate: \_\_\_\_\_

Asthma Severity:     Intermittent     Mild Persistent     Moderate Persistent     Severe Persistent  
 He/she has had many or severe asthma attacks/exacerbations

	<b>Green Zone</b> Have the child take these medicines every day, even when the child feels well.
Always use a spacer with inhalers as directed. Controller Medicine(s): _____ _____ Controller Medicine(s) Given in School: _____ Rescue Medicine: Albuterol/Levalbuterol _____ puffs every four hours as needed Exercise Medicine: Albuterol/Levalbuterol _____ puffs 15 minutes before activity as needed	
	<b>Yellow Zone</b> Begin the sick treatment plan if the child has a cough, wheeze, shortness of breath, or tight chest. Have the child take all of these medicines when sick.
Rescue Medicine: Albuterol/Levalbuterol _____ puffs every 4 hours as needed Controller Medicine(s): <input type="checkbox"/> Continue Green Zone medicines: _____ <input type="checkbox"/> Add: _____ _____ <input type="checkbox"/> Change: _____ If the child is in the <b>yellow</b> zone more than <b>24</b> hours or is getting worse, follow <b>red</b> zone and call the doctor right away!	
	<b>Red Zone</b> If breathing is hard and fast, ribs sticking out, trouble walking, talking, or sleeping. <b style="text-align: center;">Get Help Now</b>
<b>Take rescue medicine(s) now</b> Rescue Medicine: Albuterol/Levalbuterol _____ puffs every _____ Take: _____ _____ <p style="text-align: center;"><b>If the child is not better right away, call 911</b>                  Please call the doctor any time the child is in the red zone.</p>	

**Asthma Triggers: (List)**

**School Staff:** Follow the Yellow and Red Zone plans for rescue medicines according to asthma symptoms. Unless otherwise noted, the only controllers to be administered in school are those listed as "given in school" in the green zone.

Both the asthma provider and the parent feel that the child may carry and self-administer their inhalers  
 School nurse agrees with student self-administering the inhalers

Asthma Provider Printed Name and Contact Information:	Asthma Provider Signature:
	Date:

**Parent/Guardian:** I give written authorization for the medications listed in the action plan to be administered in school by the nurse or other school members as appropriate. I consent to communication between the prescribing health care provider/clinic, the school nurse, the school medical advisor and school-based health clinic providers necessary for asthma management and administration of this medication.

Parent/guardian signature:	School Nurse Reviewed:
Date:	Date:

*Please send a signed copy back to the provider listed above.*



# Questions to Ask Your Doctor

## What are some warning signs of asthma?

Warning signs vary from one person to another but can be as simple as a tickle in the throat or chest, a sharp or sudden cough, a feeling of extreme tiredness or the feeling that you simply can't get a good, deep breath. When you keep a daily symptom diary, you will recognize the pattern of your early warning signs.

## What's the first thing to do when symptoms begin?

The moment you first notice symptoms, use your prescribed quick-relief bronchodilator (such as albuterol or levalbuterol). These medications relax the muscles that surround the airways, making it easier to breathe within a few short minutes. Some people mistakenly call these medications "rescue inhalers," which gives the impression that they should only be used in an emergency situation. Use these medications at the first sign of symptoms or before exercise to prevent symptoms from getting out of control.

**MYTH:**  
Children outgrow asthma.

**TRUTH:**  
*Asthma can go into periods of remission or may be so well controlled that symptoms are not experienced for long periods. However, once you have asthma, you always have asthma.*

## What are the signs that you need to get medical help?

One or more of these signs indicate the need for immediate medical treatment:

- Symptoms don't respond as indicated in your Asthma Action Plan.
- It feels like you can't catch a good deep breath or can't get the air out of your chest.
  - You can't talk except in short phrases.
  - You have a cough that will not stop or you simply feel too exhausted to breathe.
- Your shoulders tense and raise closer to your ears than normal.
- It's easier to breathe while sitting and leaning forward than when lying down.
- Your fingernails turn blue, or your lips become bluish or gray in color.
- You start sweating even though your skin feels clammy and cold.
  - The skin around your chest, ribs and collarbones sinks in with each breath and you're using stomach muscles to help you breathe.
- You experience swelling of your throat, tongue or limbs.



### How do I prevent symptoms from coming back?

Once the obvious symptoms of an asthma flare end, think about what happened in the moments, hours or days leading up to the episode. Look for clues as to what may have triggered the symptoms.

A daily symptom diary can help you track how well your symptoms respond to steps in your Asthma Action Plan. By writing down your symptoms, medication use and peak expiratory flow rate (the reading from your peak flow meter) each day, you'll notice a pattern to your symptoms. Use a daily symptom diary for at least three months (12 months is best) to find patterns that you wouldn't otherwise notice. With each discovery, you'll see a new opportunity to stop the symptoms before they can stop you.

### How do I avoid triggers?

When you find out what sets off your symptoms, do your best to avoid them. This may require a change in lifestyle, such as avoiding exposure to cigarette, cigar and pipe smoke; keeping pets out of the bedroom or removing them from the home; and placing dust-mite-proof encasings on your pillows and mattress. It may mean changing your furnace filters more often or removing moldy carpeting and fixing the water leak that caused it.

However, you may not be able to avoid every circumstance likely to result in asthma symptoms, such as going outside when pollen counts are high. That's why medications are a necessary part of your Asthma Action Plan.

If you have allergic asthma, controlling allergies will help control your asthma. Immunotherapy can teach your immune system to respond less strongly to allergens such as animal dander, dust mites, molds and pollens.

### How do I reduce the need for medications?

Over time, you will learn about your asthma and what makes your symptoms worse. As a result, you'll find many ways to reduce your need for asthma medications.

- 1 Find things in your home, work or school that bring on your symptoms and try your best to avoid exposure wherever possible.
- 2 Learn about your treatment options and how to use your medications correctly. Different medications treat different parts of asthma. Find out from your medical care team exactly what each does in your body and when you're supposed to use it. Some of these medications are used daily while others are used only when you're having symptoms. Follow your Asthma Action Plan, even when you're not experiencing symptoms.
- 3 Treat asthma symptoms at the very first hint that they're present. The longer asthma symptoms are allowed to continue, the more likely you will need to take medications to get things back to normal.
- 4 Take good care of yourself – eat healthy, exercise and get enough sleep.



### Faces of Asthma

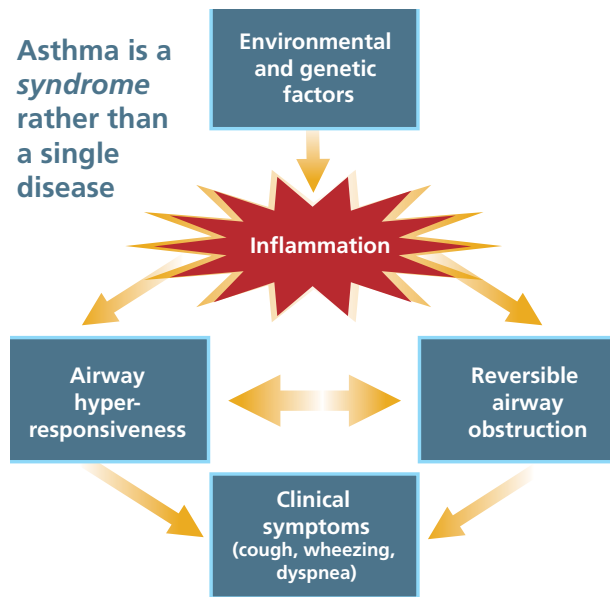
"I learned my early warning signs at a young age and make sure I treat my asthma when these signs are present. I have carried my inhaler with me for so long that it is automatic for me. I have multiple inhalers – one at home, one at work, and one in my gym bag."

– Andrew Morales

# When Your Asthma is Severe

Once considered a single, though complex disease, asthma is now recognized as a syndrome or spectrum of diseases with environmental and genetic factors that cause airway inflammation – leading to coughing, wheezing and shortness of breath.

The body’s attempts to correct the damage from inflammation can also lead to airway remodeling, or permanent structural and functional changes.



It’s estimated that 5-10 percent of people with asthma have severe asthma. However, the percentage may be higher because additional studies reveal about 50 percent of asthma patients have poorly controlled symptoms despite treatment.

Severe asthma is diagnosed when symptoms are not well controlled with inhaled corticosteroids, short- and long-acting beta2-agonists (SABA, LABA), leukotriene inhibitors such as montelukast, or long-acting muscarinic inhibitors (LAMA). These patients often experience high rates of emergency department visits, hospitalizations and school or work absenteeism.

However, not all uncontrolled asthma is severe and not all severe asthma is uncontrolled. Other factors that may play a role in assessing asthma severity and treatment options:

- Inhaler technique
- Medication adherence
- Allergen avoidance
- Stress management
- Access to treatment
- Cost of treatment

## Testing for Phenotypes

An asthma specialist will first identify characteristics of your asthma using skin and blood tests, FeNO (fractional exhaled nitric oxide) measurements, sputum analysis and/or bronchoscopy.

For some patients, high serum IgE levels and/or high eosinophil counts and high FeNO levels are associated with increased symptoms and asthma flares; for others, thickening of airway smooth muscle may be the primary contributor.

Medical researchers have identified at least four phenotypes that respond to targeted treatments for biologics and other therapies:

Asthma Phenotype	Characterized by difficult-to-treat asthma plus	Targeted Treatment
<b>Allergic asthma (IgE)</b>	Total serum IgE = 30-700 IU/mL and demonstrated IgE-mediated hypersensitivity to a perennial allergen	Add anti-IgE biologic • omalizumab
<b>Eosinophilic</b>	Blood eosinophils > 300 cells/uL and 2 or more exacerbations requiring OCS in past year OR ≥150 cells/uL and 3 or more exacerbations requiring OCS in past year	Add anti-IL5 biologic • mepolizumab • reslizumab • benralizumab Add anti-IL4 or anti-IL13 biologic • dupilumab
<b>Neutrophilic</b>	Sputum neutrophils in patients who do not respond to high-dose corticosteroids and do not have other type 2 markers	Consider adding a macrolide antibiotic
<b>Airway smooth muscle (ASM) hypertrophy</b>	Patient who doesn’t qualify for other targeted therapies and/or has tried and failed targeted therapies for which s/he might be eligible and demonstration of variable airflow obstruction by bronchodilator reversibility	Consider bronchial thermoplasty, an outpatient medical procedure, in addition to regular treatment

Patients with allergic asthma should consider allergen immunotherapy, which can reduce some underlying triggers of asthma – such as pollen, mold, house dust mites and pet dander – and decrease the severity of symptoms over time.

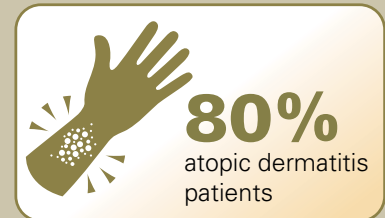
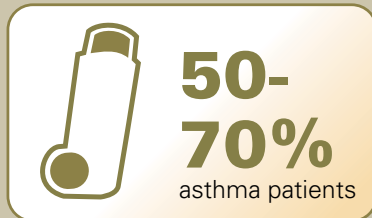
Talk with a board-certified allergist who can evaluate your symptoms and help you determine the best immunotherapy option for you. Visit [AllergyRelief.ACAAI.org](http://AllergyRelief.ACAAI.org) for an interactive tool and share the results with your doctor.



# Type 2 Inflammation

A systemic allergic response known to play a role in classic allergic diseases – including moderate-to-severe asthma, nasal allergies and atopic dermatitis.

## Who has Type 2?



Other conditions believed to be impacted by Type 2 inflammation:

**AERD, sinusitis, rhinitis, GERD, sleep apnea**

People with asthma may have high levels of Immunoglobulin E (IgE), antibodies produced by the immune system that set off allergy symptoms and may trigger breathing problems.

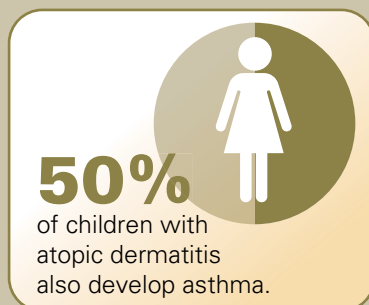
## Genetics Play a Role

If one or both parents have asthma, nasal allergies or atopic dermatitis related to Type 2 inflammation...

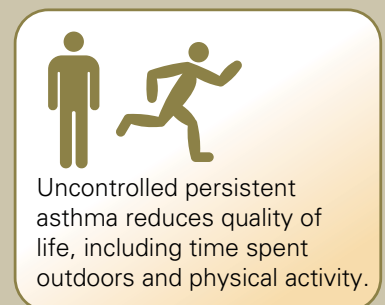
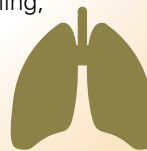


**THEIR CHILDREN ARE 4X MORE LIKELY**  
to have asthma, nasal allergies and/or atopic dermatitis.

## Impact



Airway remodeling, often driven by Type 2 inflammation, can lead to impaired lung function in large and small airways.



## Pathways to Type 2

The cytokines IL-4, IL-5, IL-13 and ILC2 (secreted proteins that signal cells and begin the immune response) are major contributors to Type 2 inflammation.

## Treatment

Biologics are often prescribed to treat moderate-to-severe and persistent asthma. Benralizumab, mepolizumab and reslizumab target IL-5 and dupilumab targets IL-4 and IL-13. These medications:

- reduce inflammation
- calm the immune system
- improve quality of life



# Medicine Matters

**A**sthma medications play a central role in your treatment plan. Some prevent or reduce airway inflammation; others interrupt the allergic reaction that triggers symptoms; others relieve coughing and wheezing, making it easier to breathe.

Your doctor will work with you to find the right combination of medicines to manage your asthma, and will adjust the type and amount based on your symptoms. The goal of asthma treatment is to have you feel your best with the least amount of medicine.

Get to know your medications. Understand how and why they heal and soothe your lungs. If you're prescribed an inhaler, ask for one that has a dose counter. Then follow your plan to better breathing.

## Quick-Relief Bronchodilators (also called "short-acting")



- ProAir Digihaler (albuterol)
- ProAir HFA (albuterol)
- ProAir RespiClick (albuterol)
- Proventil HFA (albuterol)
- Ventolin HFA (albuterol)
- Xopenex HFA (levalbuterol)

What they do:	What you need to know:	What to expect:
<p>Relieve noisy asthma symptoms of coughing, wheezing, shortness of breath (bronchospasm) by relaxing muscles around the airways.</p>	<ul style="list-style-type: none"> <li>• Use at the first sign of symptoms; do not wait to see if symptoms go away on their own. The earlier you begin treatment, the less damage there is to recover from.</li> <li>• Use according to your Asthma Action Plan.</li> <li>• Use if prescribed before exercise or exposure to one of your triggers to prevent symptoms.</li> <li>• Ask your doctor about generics available for ProAir HFA, Proventil HFA and Xopenex HFA.</li> </ul>	<ul style="list-style-type: none"> <li>• Breathing improvement within minutes, lasting 3-6 hours.</li> <li>• Possible increase in heart rate or shakiness; children may seem more energetic and excitable.</li> </ul>

**If symptoms are not going away as expected, or if more medication is needed, it could be a sign of:**

- Worsening asthma – time to call the doctor
- Poor inhaler technique
- A partially clogged inhaler; when was the last time you cleaned it?
- An empty inhaler; it runs out of medication before the canister feels empty

When asthma symptoms are controlled the way they should be, you won't need quick-relief bronchodilators every day or even every week except to prevent exercise-induced symptoms or particular exposures. Even though the different bronchodilators are similar in many ways, the Food and Drug Administration (FDA) states there are distinct differences among them. One brand should not be substituted for the other without both the patient/parent and doctor agreeing and understanding the differences.





**MYTH:**

I can control my asthma with over-the-counter drugs.

**TRUTH:**

Asthma is not a do-it-yourself condition; it requires careful, coordinated treatment plans worked out with qualified healthcare professionals.



## Long-Acting Bronchodilators



- Serevent (salmeterol)

**What they do:**

Help reduce bronchospasm for up to 12 hours when taken twice a day as part of a comprehensive treatment plan.

**What you need to know:**

- Should always be used along with inhaled corticosteroids when treating asthma.
- Do not use more often than once every 12 hours.
- Do not use to relieve sudden-onset asthma symptoms.

**What to expect:**

- No immediate sensation that it is working.
- Over time, less need for quick-relief bronchodilators.

## Inhaled Anti-Inflammatory Corticosteroids



- Alvesco (ciclesonide)
- ArmonAir Digihaler (fluticasone)
- ArmonAir RespiClick (fluticasone)
- Arnuity Ellipta (fluticasone)
- Asmanex (mometasone)
- Asmanex Twisthaler (mometasone)
- Flovent (fluticasone) Diskus and HFA
- Pulmicort Flexhaler (budesonide)
- QVAR Redihaler (beclomethasone)

**What they do:**

Treat and prevent airway inflammation – the quiet part of asthma you are not likely to notice.

**What you need to know:**

- Take daily as prescribed, whether you think you need them or not.
- Rinse your mouth with water after using to prevent irritation.
- Do not use at higher doses or more frequently than prescribed.
- Tell your healthcare provider if you are using more than one type of corticosteroid medication, such as nasal sprays, eye drops, skin creams or pills.
- Not related to anabolic steroids used by some athletes to build muscle mass.

**What to expect:**

- No immediate sensation that it is working.
- A gradual improvement in symptoms.
- Over time, less need for quick-relief bronchodilators.



## Oral Corticosteroids



- Prednisone • Prednisolone • Dexamethasone

### What they do:

Treat and prevent airway inflammation and swelling; decrease mucus in the airways.

### What you need to know:

- Prescribed primarily to treat an asthma flare for 5-7 days, or until symptoms are better.
- For severe asthma, some patients may require daily treatment.
- Dose of oral corticosteroids are often more than 10 times the dose of inhaled corticosteroids, increasing the risk of side effects.
- Oral corticosteroids may interact with other drugs; discuss this with your doctor.

### What to expect:

- A gradual reduction of asthma symptoms and an opening of the airways.
- An in-depth discussion with your doctor and whether the benefits of taking oral corticosteroids outweigh the side effects.
- Side effects can include insomnia, moodiness and depression, headaches, heartburn, easy bruising of the skin and weight gain.
- When taking long-term, side effects can include eye problems, diabetes onset, increased risk of infections, thinning bones and adrenal problems.

## Long-Acting Muscarinic Antagonists



- Atrovent HFA (ipratropium) • Incruse Ellipta (umeclidinium) • Spiriva Respimat (tiotropium)
- Spiriva Handihaler (tiotropium) • Tudorza Pressair (aclidinium)

### What they do:

Open asthma-constricted airways for approximately 24 hours and reduce the risk of asthma flares.

### What you need to know:

- Take daily as prescribed as an inhalation spray; for patients 6 years of age and older.
- May be prescribed as an add-on treatment for patients who still experience asthma symptoms while taking a long-acting beta-agonist or inhaled corticosteroids.
- May cause allergic reactions, such as hives, itching, or swelling of the lips, tongue or throat making it difficult to breathe or swallow; if these symptoms occur, stop taking the medication and seek emergency medical care.
- May cause breathing to suddenly worsen; if this happens, use a quick-relief inhaler and seek medical care.

### What to expect:

- A gradual improvement in asthma symptoms and control.
- Reduced risk of experiencing an asthma flare.



## Combination Medications



- Advair Diskus and HFA (fluticasone and salmeterol)
- AirDuo Digihaler (fluticasone and salmeterol)
- AirDuo Respiclick (fluticasone and salmeterol)
- Anoro Ellipta (umeclidinium and vilanterol)
- Bevespi Aerosphere (glycopyrrolate and formoterol)
- Breo Ellipta (fluticasone furoate and vilanterol)
- Breztri Aerosphere (budesonide, glycopyrrolate and formoterol fumarate)
- Dulera (mometasone and formoterol)
- Stiolto Respimat (tiotropium and olodaterol)
- Symbicort (budesonide and formoterol)
- Trelegy Ellipta (fluticasone, umeclidinium and vilanterol)
- Wixela Inhub (fluticasone and salmeterol)

### What they do:

Combine an inhaled corticosteroid with a long-acting bronchodilator in one device to treat underlying airway inflammation as well as reduce bronchospasm.

### What you need to know:

- Take no more than once every 12 hours.
- Do not use to relieve sudden-onset asthma symptoms; use the quick-relief bronchodilator listed in your Asthma Action Plan.

### What to expect:

- No immediate sensation that it is working
- Over time, less need for quick-relief bronchodilators

## Leukotriene Modifiers

- Singlair (montelukast)
- Accolate (zifirlukast)
- Zflo (zileuton)

### What they do:

Block the action of leukotrienes, chemicals involved in immune responses that cause inflammation, swelling and tightening of the airways.

### What you need to know:

- Available as granules, chewables and tablets.
- Do not use to treat sudden-onset asthma symptoms; always have a quick-relief bronchodilator available.
- May reduce severity of exercise-induced asthma.
- Montelukast may cause side effects such as sleep disturbances and behavior or mood changes. Contact your healthcare provider if these occur.

### What to expect:

- No immediate sensation that it is working
- A gradual improvement in allergy and asthma symptoms.

## Biologics (Immunomodulators)



- Cinqair (reslizumab)
- Dupixent (dupilumab)
- Fasenna (benralizumab)
- Nucala (mepolizumab)
- Xolair (omalizumab)

### What they do:

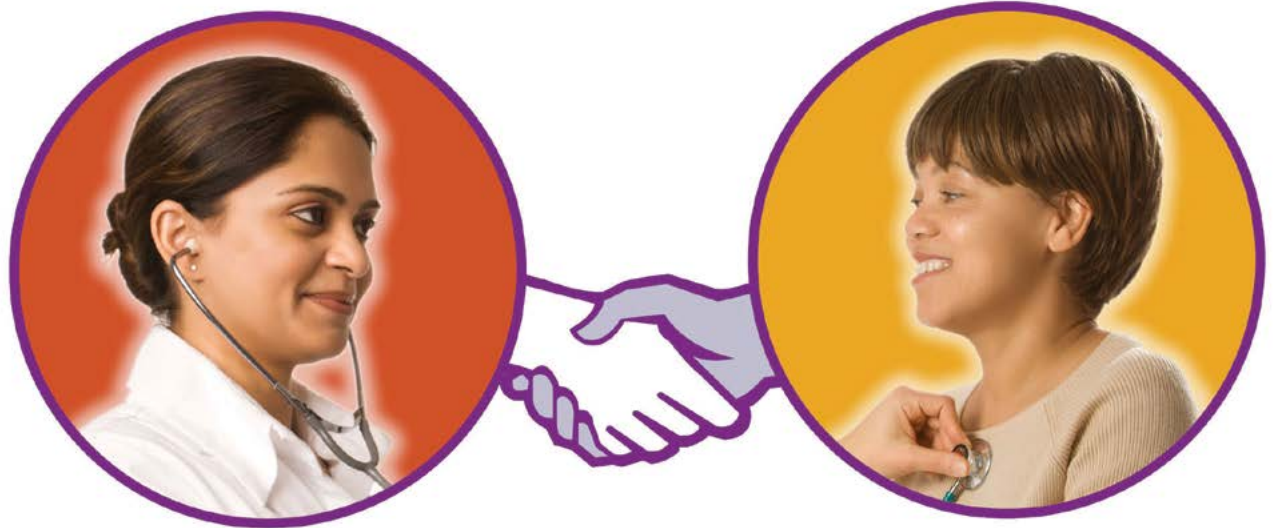
Target specific cells and pathways that cause allergic inflammation linked to asthma.

### What you need to know:

- Delivered by injection or IV in a doctor's office.
- Approved as add-on therapy for patients who have specific phenotypes of severe asthma not controlled by other medications.
- Omalizumab targets IgE antibodies that cause allergic reactions; also approved to treat chronic hives.
- Benralizumab, mepolizumab and reslizumab target interleukin-5 (IL-5), which signals overproduction of eosinophilic blood cells that cause lung inflammation.
- Dupilumab targets interleukin-4 (IL-4) and IL-13 to also treat eosinophilic asthma.

### What to expect:

- A gradual reduction in asthma and/or allergy symptoms.



# Come Together



## How Doctor-Patient Partnerships Are Transforming Asthma Care

**H**ealthcare works best with collaboration and coordination to arrive at the best care for you. This practice is called Shared Decision Making – and it benefits doctors and patients alike.

Shared decision making encourages patients and families to take a more central and active role in their care by working with doctors to select tests and treatment plans. It's evidence-based and balances risks and results with a patient's preferences and values.

Studies show when patients and families work closely with doctors and make healthcare decisions together, it improves their knowledge of the condition and they are more likely to adhere to treatment plans and go to follow-up appointments.

Allergy & Asthma Network has partnered with the American College of Allergy, Asthma & Immunology (ACAAI) and American College of Chest Physicians to develop interactive Shared Decision Making Tools for severe asthma patients.

### Benefits of Shared Decision Making

- Improves patient outcomes and satisfaction
- Increases patient knowledge
- Improves self-management skills
- Creates more certainty, less anxiety about treatments
- Ensures follow-through on treatment plan
- Aligns with patient preferences and cultural values
- Builds a trusting relationship with the doctor





## Stepping Up Severe Asthma Care

If standard medications (a daily high-dose inhaled corticosteroid and quick-relief inhaler) and management strategies (reducing exposure to allergens/irritants) are not effective, your doctor may recommend clinical testing for substances in your blood and breath called biomarkers. After testing, discuss the pros and cons of treatment options. Then, along with your doctor, make the decision.

### What's the best treatment option for my severe asthma?

<p><b>Long-Acting Muscarinic Antagonist (LAMA)</b> Inhaler taken 1-2 times daily; for uncontrolled asthma despite standard of care treatment</p>	<p><b>Oral Corticosteroids</b> A pill taken at home or an in-office injection; for patients with unresolved severe symptoms following a flare – short-term use only (not to exceed &gt;2 bursts per year)</p>	<p><b>Anti-IgE Biologic</b> In-office injection every 2-4 weeks; for moderate to severe allergic asthma with elevated IgE</p>	<p><b>Anti-IL5 Biologic</b> In-office injection or IV every 4-8 weeks; for patients with elevated eosinophils and history of 2+ flares per year requiring oral corticosteroids</p>	<p><b>Anti-IL4 and IL13 Biologic</b> In-office or at-home injection every 2 weeks; for patients with uncontrolled moderate to severe asthma with high blood eosinophils or oral corticosteroid-dependent asthma</p>	<p><b>Macrolide</b> Antibiotic pills; taken as prescribed as an add-on medication when other therapies fail to work</p>	<p><b>Bronchial Thermoplasty</b> 3 outpatient surgical procedures requiring anesthesia; for uncontrolled severe asthma – considered when other therapies fail to work</p>
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### What are the side effects?

<p><b>LAMA</b> Sore throat, sinus problems, upset stomach, vomiting, constipation, urinary retention, rapid heartbeat; severe allergic reaction requiring emergency epinephrine may occur</p>	<p><b>Oral Corticosteroids</b> Eye problems, bone weakness, diabetes, high blood pressure, weight gain, sleep problems, mood swings, depression, anxiety</p>	<p><b>Anti-IgE Biologic</b> Pain, swelling, redness or itching at site of injection; severe allergic reaction requiring emergency epinephrine may occur</p>	<p><b>Anti-IL5 Biologic</b> Pain, swelling, redness or itching at site of injection; severe allergic reaction requiring emergency epinephrine may occur</p>	<p><b>Anti-IL4 and IL13 Biologic</b> Pain, swelling, redness or itching at the injection site; severe allergic reaction requiring emergency epinephrine may occur</p>	<p><b>Macrolide</b> Reduced hearing, cardiac arrhythmia or gastrointestinal problems</p>	<p><b>Bronchial Thermoplasty</b> Asthma flares may occur – they typically resolve 1 week after procedure</p>
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### What is the cost? (Out-of-pocket costs will depend on your insurance coverage.)

<p><b>LAMA</b> Moderate cost; financial help available</p>	<p><b>Oral Corticosteroids</b> Low cost</p>	<p><b>Anti-IgE Biologic</b> High cost; financial help available</p>	<p><b>Anti-IL5 Biologic</b> High cost; financial help available</p>	<p><b>Anti-IL4 and IL13 Biologic</b> High cost; financial help available</p>	<p><b>Macrolide</b> Low cost; financial help available</p>	<p><b>Bronchial Thermoplasty</b> High cost</p>
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Take the complete Shared Decision Making Tool at [SevereAsthmaTreatments.chestnet.org](https://SevereAsthmaTreatments.chestnet.org). Share the results with your doctor so that you both come to a decision on the best treatment plan for you. For a Shared Decision Making Tool for childhood asthma, visit [KidsAsthmaRelief.ACAAI.org](https://KidsAsthmaRelief.ACAAI.org).



# Mastering Your Inhaler

Inhaling medication delivers it quickly and directly to inflamed and congested airways. Pills or tablets must go through the digestive system and bloodstream, slowing down their effectiveness.

There are two basic types of inhalers:

- metered-dose inhalers (MDIs), pressurized canisters that release medication in a fine spray
- dry powder inhalers (DPIs), devices of many different styles that release medication as a fine powder for inhaling

Proper inhaler technique is important for each. Before using, become familiar with your specific inhaler by reading the patient instructions.

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## Metered-Dose Inhalers (MDIs)

Different MDIs look the same on the outside, but each is distinctly different in operation and maintenance.

You must inhale the spray quickly enough to prevent it from landing on your tongue or inside your cheek, yet slowly enough to let it get deep into your lungs.

### Step-By-Step Instructions:

**1 Remove the MDI mouthpiece cap and look at the tiny exit hole where the medication comes out of the canister.** It should be free of debris or white powder. If it's not, follow package instructions to thoroughly clean the inhaler.

**2 Shake the inhaler** if necessary to mix the powder medication with other ingredients inside the canister. Check your patient instruction sheet to see if your inhaler requires shaking (and how much), as a few brands (including Alvesco® and QVAR®) are blended differently and don't need shaking.

**3 Prime the inhaler if necessary.** When the MDI is new or hasn't been used in a while, the ingredients may separate. Priming ensures the dose you inhale contains the labeled amount of medication. (Note: Priming instructions are different for each MDI brand; check your patient instruction sheet.) When using a valved holding chamber, insert the MDI mouthpiece into the end port of the chamber after priming.

**4 Stand or sit up straight and breathe out completely.** Emptying your lungs as much as possible gives you room to inhale the medication slowly and deeply.

**5 Hold the inhaler upright** with the mouthpiece at the bottom and the top pointing up. Position it as instructed by your physician or the medication's patient instruction sheet. Some recommend holding the inhaler about 1-2 inches away from your open mouth; others recommend putting the MDI mouthpiece between your teeth and closing your lips tightly around it. Be sure to keep your tongue out of the way of the spray.

**MYTH:**

I can stop my medications during seasons I don't have exposure to my asthma triggers.

**TRUTH:**

*It's important to follow your Asthma Action Plan and take your anti-inflammatory medications daily, as prescribed. Once your asthma symptoms are well under control, your physician may recommend reducing your daily medication dosage or schedule. It is dangerous to do this without medical supervision.*

**6** **Begin to inhale slowly, then activate the inhaler** a split-second later. If you wait too long, you won't have enough breath left to inhale the medicine deep into your small airways.

**7** **Continue inhaling slowly for 3-5 seconds,** until your lungs are full. You might be surprised at how long a time that is, so test yourself. Using a stopwatch device or clock with a second hand, begin to inhale and pretend to actuate your inhaler. See how long it takes you to fill your lungs. Did you run out of room in your lungs before three seconds? If so, try it again, more slowly. Practice until you're able to get it right. Then practice again ... and again.

**8** **Hold your breath for 10 seconds,** if possible. (You can take the inhaler out of your mouth.) When you hold your breath, you allow the tiny particles of medication to settle on the surface of your airways.

**9** **Exhale slowly.**

**10** **Repeat steps 2 through 9** if your Asthma Action Plan says to take a second dose. (Skip step 3; your inhaler would not need to be primed again so soon.)

**11** **Replace the cap on your inhaler** and store it where it won't be exposed to moisture or extreme temperature changes. Check your

## Dose Counters

Even the most perfectly timed inhalation won't do you any good if there's no medicine left in the inhaler. That's why it's important to count each dose and priming spray and replace the inhaler after using the labeled number of sprays.

Don't rely on how it "feels": Long after the active medication has been used up, MDIs will continue to spray or feel full when shaken.

Allergy & Asthma Network believes all inhalers should have a built-in dose counter. If yours does not, develop a system to keep track. For daily medications, simply mark the canister when you first open it and figure how long it will last. With inhalers like quick-relief bronchodilators that you take only when needed, you must keep track as you go.

Do not use MDIs beyond the recommended number of doses on the canister label. There is no way to know if the dose contains medication.

patient instruction sheet to see if your inhaler needs to be stored in an upright position; some do. For best results, store and use the inhaler at normal room temperature – between 59 and 77 degrees F. In very cold weather, keep it close to your body, not in your car or in a backpack. In cold temperatures, warm the inhaler with your hands before using it.

**12** **Clean the inhaler** according to your patient instructions, usually weekly. If using water, leave time for the inhaler to air dry.



## Faces of Asthma

"Inhaling at the right speed is like driving a car. If you drive at 100 mph, you're going to go off the road at the first major turn. You can't get around it. And if you take a very fast breath with your inhaler, the medication will slam into the wall of your airway at the first big curve, instead of travelling down into the lungs."

– Ben Francisco, PhD, AE-C



### Dry Powder Inhalers (DPIs)

DPIs do not require the hand-breath coordination of a pressurized MDI. They are breath-actuated, meaning the medicine is released to your airways when you take a deep, fast breath from the inhaler. DPIs typically require a quick, forceful inhalation; for some patients, this may make a DPI more or less difficult to use during an asthma flare.

Medication particles in DPIs are powdered, not wet like an MDI, and are so small they can reach the tiniest airways. You may not taste or feel the particles. They do not contain chemical propellants and people with milk allergy should be aware they contain traces of lactose.

Some asthma medications are available in both DPI and MDI form, and some patients include both in their treatment plan. Talk with your doctor about exactly what medication and device is best for you.

#### Step-By-Step Instructions:

- 1 Follow your device instructions to load the medication dose.** Multi-dose inhalers are preloaded with medication, which you typically prepare with a click of the device. Single-dose inhalers use separately packaged capsules that you drop into the chamber.
- 2 Stand or sit up straight and breathe out completely.** Emptying your lungs is one of the most important steps.
- 3 Put the mouthpiece into your mouth, close your lips tightly around it and breathe in quickly and forcefully.**
- 4 Take the DPI out of your mouth, hold your breath for 5-10 seconds, then exhale slowly.**

**5 If your treatment plan calls for a second dose,** reload and repeat the steps.

**6 When using a capsule device, open the chamber** and check to see if the powder has been fully inhaled. If you see remaining powder, close the device, exhale fully, close your mouth around the mouthpiece and inhale again. When the capsule is empty, remove and discard it.

**7 Close the device and store in a dry place.** Do not wash with water; use only a dry cloth to wipe the mouthpiece.

#### Quick Tips

- Do not open the device until you are ready to use it.
- Never open or swallow the capsule – always use it with its matching DPI.
- Do not shake the DPI.
- Do not use a holding chamber or spacer with a DPI.
- With most DPIs, the mouthpiece should be pointed up or held horizontal when using in order to not dump the medication after loading.
- Rinse your mouth after using, if instructed by your physician.
- Multi-dose devices have an indicator to alert you to the number of doses remaining, or when the device is almost empty.
- General instructions are that you should not allow your DPI to get wet. The mouthpiece should be wiped regularly with a clean, dry cloth.
- Inhaling the dry powder may cause some people to cough; talk with your doctor if this happens.

### Slow-Moving Mist Inhalers

Slow-moving mist inhalers deliver a metered dose of medication in a spray designed to be easier to inhale than a metered-dose inhaler (MDI). Inhalation technique is similar to MDI:

1. Prime the inhaler according to instructions before first use, after three days nonuse, or after 21 days nonuse.
2. Exhale fully; put the inhaler mouthpiece into your mouth and close your lips around it; begin slow inhalation and press the dose release button.
3. Continue to breathe in slowly and deeply.
4. Remove the inhaler from your mouth, hold your breath for 10 seconds, then exhale.
5. Close the cap.





# The Ins and Outs of Holding Chambers

To effectively treat asthma symptoms using a metered-dose inhaler (MDI), you must inhale at just the right moment and just the right speed – but catching that fleeting dose in a slow, deep inhalation is often very difficult, especially for children.

Talk with your doctor about using a valved holding chamber – a handheld device that attaches to your MDI and captures the medicated mist as it sprays out. The medication is trapped long enough inside the holding chamber to be inhaled at your own speed.

Most importantly, it pulls out large particles of medication and prevents them from settling in your mouth or throat.

When your doctor prescribes one, you'll likely receive whatever model your local pharmacy offers. There are other options available – you might want to research models online and choose one that fits your needs.

Holding chambers are often confused with spacers, but the two devices are different. Both direct the medicine into the airways, but the holding chamber “holds” the medicine and allows users to inhale at their own speed.

## Using a Mask

Holding chambers are available with and without masks — these are often essential for children, the elderly or disabled people who cannot close their lips securely around the mouthpiece or who need to take several breaths to inhale the medication fully.

Choose one that is big enough to fit over the user's mouth and nose, and soft enough to seal tightly to the face. A new feature on one holding chamber allows parents of young children to insert a pacifier into the mask, offering the child comfort during the procedure.

## How-To Tips

- Before you insert the MDI into the holding chamber, shake and prime the MDI according to the medication's instructions. If you need a second dose and your MDI instructions say to shake before each use, you don't have to remove the holding chamber. Just shake the whole system.
- Send just one dose of medication into the holding chamber at a time. After inhaling, follow MDI instructions about how long to wait before taking a second dose (if needed).



- The holding chamber cannot suspend the medication forever, so begin inhaling as soon as you activate your MDI. If possible, take 4-5 seconds to inhale with a long, slow deep breath to move the medication deep into your lungs. Most adults can inhale from a chamber in one breath, while children may require 2-3 breaths; talk with your doctor for specifics.
- It's important not to inhale too quickly. Some holding chambers have a whistle that sounds off if you inhale too hard.
- When using a mask, attach it to the holding chamber first, then prime the MDI (according to package instructions) and insert it into the chamber. Place the mask firmly against the face, covering the mouth and nose, before activating the inhaler.
- Carefully read and follow package instructions on how to keep the holding chamber clean. It should be washed at least once a week if used daily. Soak the holding chamber in a mild dishwashing detergent; some can go in the dishwasher (check package instructions), but masks should be washed by hand. Let the holding chamber air dry after washing – don't use a drying cloth. Stand it on end so water droplets don't settle on the side.



# Nebulizers

**T**oday's nebulizers are easy to use – many are small enough for travel or dorm rooms and quiet enough for silent nights. For small children and others unable to coordinate inhaler timing, nebulizers are often necessary. The medication comes in sterile, unit dose vials – no measuring and mixing necessary.

### Step-By-Step Instructions:

#### 1 Wash your hands

To keep your nebulizer – and your lungs – free of germs, always wash your hands before handling the medication and equipment.

#### 2 Check your medication

Before you begin, look closely at your medicine:

- Has it expired?
- Is the vial crushed or damaged?
- Does the medicine look discolored?
- Has it been exposed to any extremely hot or cold temperatures?

If you answer “yes” to any of these, replace the medicine.

#### 3 Gather your equipment

In most set-ups, you have a compressor (the basic machine), tubing, a cup (the nebulizer) for the medicine, and a mouthpiece. You might also have a mask.

The compressor forces air into the medication in the cup, breaking the liquid into an aerosol. The cup design determines how well the system can produce droplets that are the right size to travel deep into the airways. Breath-enhanced and breath-actuated units allow less medication to escape into the air.

Very young children and disabled or elderly patients unable to use a mouthpiece effectively should always use a mask. Choose one that is soft and flexible enough to fit snug on the face and large enough to cover mouth and nose.

#### 4 Pour medication into the nebulizer cup

Unit-dose vials are a snap to use; just twist off the top and pour. Choose a nebulizer cup that will sit flat for easy pouring. Take a sniff as you pour and throw out any medication that smells foul, spoiled or like it may contain rubbing alcohol. Don't overfill the cup as it may not aerosolize the medication at the correct particle size.



#### 5 Sit back and relax

Put the mask on or place the mouthpiece over your tongue and close your teeth and lips tightly around it, then turn on the machine. Breathe normally. If you start to cough, turn the machine off until you can breathe freely again. Continue the breathing treatment until the cup is empty. If the medication foams or bubbles, stop the treatment; you may have defective or contaminated medicine or equipment. Don't 'blow-by' or mist the medication in front of the child's face; this will release the medicine into the air, not the lungs. Use a mask.

#### 6 Wash up

Follow manufacturer's instructions to keep your nebulizer cup, mouthpiece and tubing clean; whatever gets into your cup – from your hands, medication or house dust – will get into your lungs. When everything is clean and dry, store the system where it will stay dust-free.

Nebulizer cup/mouthpiece units and tubing don't last forever. The plastic will break down over time. Replace them as recommended – and don't forget to clean or change the air filter if there is one.

### On the Go

Portable nebulizers are available for travel or day trips. There are three types: compressor, ultrasonic and vibrating mesh.

Compressor (or “jet”) nebulizers use compressed air to vaporize medication; ultrasonic nebulizers use high-frequency sound waves; and vibrating mesh units use vibration. All create an aerosol mist.

Ultrasonic and vibrating mesh nebulizers may offer faster delivery and operate more quietly – these features may be preferable for travelers who may need to nebulize in a public area.



# When to See a Specialist

**M**ost often, the original asthma diagnosis comes from a primary care provider who may also take a blood test to identify allergies that may trigger your asthma.

Is that enough, or should you ask for a referral to a specialist? It depends on how well the treatment plan is working and how complicated your medical situation is.

**Asthma is a complex, ever-changing condition that requires constant attention.** If you or your child continue to experience symptoms that disrupt sleep or everyday activities, even after strictly following your management plan, then a visit to a specialist is in order.

National Institutes of Health (NIH) asthma guidelines recommend seeing a specialist if any of the following apply:

- ❑ You have had a life-threatening asthma flare.
- ❑ You are not responding to treatment after 3-6 months.
- ❑ You have persistent asthma symptoms, limited physical activity and frequent flares.
- ❑ You need continuous high-dose inhaled corticosteroids or more than two courses of oral corticosteroids in one year.
- ❑ You need additional testing like allergy tests, complete spirometry breathing tests, rhinoscopy (looks into nasal passages and sinuses) or bronchoscopy (looks into the lungs).
- ❑ You are being considered for immunotherapy (allergy shots or under-the-tongue tablets).
- ❑ You have conditions that complicate your asthma or diagnosis, such as severe hay fever, sinusitis, GERD (gastroesophageal reflux) or exercise-related breathing problems.
- ❑ You require additional education on complications of therapy or allergen avoidance at home, school or work.

For children, NIH guidelines say toddlers under age 3 who require daily anti-inflammatory medicine should see a specialist, and those under 4 with symptoms three or more days a week and two or more nights a month should consider seeing one.

When looking for a specialist, check to see if the doctor is board certified in the specialty. Board certification is a voluntary process that indicates a physician is going above and beyond licensing



requirements – it shows a commitment to continually expanding knowledge in a medical specialty.

## Specialists Who Treat Asthma and Allergies

**Allergist/Immunologist:** Specializes in diagnosis and treatment of allergies, asthma and immune disorders, including allergy testing and immunotherapy.

**Pulmonologist:** Specializes in diagnosis and treatment of lung diseases; often treats asthma complicated by colds, flu and pneumonia.

### Rules of Two®

Your treatment is not working if:

- You have asthma symptoms and require use of a quick-relief bronchodilator two or more times a week.
- Your asthma wakes you up two or more times a month.
- You are refilling your quick-relief bronchodilator canister two or more times a year.

\* Rules of Two is a federally registered service mark of Baylor Health Care System. ©2011



Allergy & Asthma Network is a national nonprofit organization dedicated to ending needless death and suffering due to asthma, allergies and related conditions through outreach, education, advocacy and research.

DISEASE STATES: A = ASTHMA G = COPD

1223 = DOSE INDICATOR G = GENERIC AVAILABLE

AllergyAsthmaNetwork.org  
800.878.4403



## SHORT-ACTING BETA<sub>2</sub>-AGONIST BRONCHODILATORS

relax tight muscles, in airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours

**ProAir<sup>®</sup> Digihaler<sup>™</sup>** HFA 117 mcg albuterol sulfate inhalation powder 1223 A A G

**ProAir<sup>®</sup> HFA** 100 mcg albuterol sulfate inhalation powder 1223 A G

**Proventil<sup>®</sup> HFA** 120 mcg albuterol sulfate inhalation powder 1223 A

**Xopenex<sup>®</sup> HFA** 59 mcg levalbuterol tartrate inhalation powder A G

## LONG-ACTING BETA<sub>2</sub>-AGONIST BRONCHODILATORS

muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

**Serevent<sup>®</sup> Diskus<sup>®</sup>** 50 mcg salmeterol xinafoate and fluticasone propionate inhalation powder 1223 A G

**Serivert<sup>®</sup> Respimat<sup>®</sup>** 2.5 mcg olodaterol hydrochloride inhalation powder 1223 G

## INHALED CORTICOSTEROIDS

reduce and prevent sudden symptoms of coughing, wheezing or shortness of breath

**Alvesco<sup>®</sup> HFA** 90, 180 mcg ciclesonide inhalation powder 1223 A

**ArmonAir<sup>®</sup> Digihaler<sup>™</sup>** 50, 113, 232 mcg fluticasone propionate inhalation powder 1223 A

**ArmonAir<sup>®</sup> Respiclick<sup>®</sup>** 50, 113, 232 mcg fluticasone propionate inhalation powder 1223 A

**ArmonAir<sup>®</sup> Arnuity<sup>®</sup>** 50, 100, 200 mcg fluticasone furoate inhalation powder 1223 A

**Asmanex<sup>®</sup> HFA** 100, 200 mcg mometasone furoate inhalation powder 1223 A

**Asmanex<sup>®</sup> Twisthaler<sup>™</sup>** 110, 220 mcg mometasone furoate inhalation powder 1223 A

**Asmanex<sup>®</sup> Diskus<sup>®</sup>** 50, 100, 250 mcg fluticasone propionate inhalation powder 1223 A

**Flonair<sup>®</sup> HFA** 4, 10, 20 mcg fluticasone propionate inhalation powder 1223 A

**Pulmicort<sup>®</sup> Flexhaler<sup>™</sup>** 90, 180 mcg budesonide inhalation powder 1223 A

**QVAR<sup>®</sup> Redihaler<sup>™</sup>** 40, 80 mcg beclomethasone dipropionate inhalation powder 1223 A

## COMBINATION MEDICATIONS

contain both inhaled corticosteroid and long-acting beta<sub>2</sub>-agonist (LABA)

**Advair<sup>®</sup> Diskus<sup>®</sup>** 100/50, 250/50, 300/50 mcg fluticasone propionate and salmeterol inhalation powder 1223 A G G

**Advair<sup>®</sup> HFA** 4921, 115/21, 230/21 mcg fluticasone propionate and salmeterol inhalation powder 1223 A G G

**AirDuo<sup>®</sup> Digihaler<sup>™</sup>** 55/14, 113/14, 232/14 mcg fluticasone propionate and salmeterol inhalation powder 1223 A

**AirDuo<sup>®</sup> Respiclick<sup>®</sup>** 55/14, 113/14, 232/14 mcg fluticasone propionate and salmeterol inhalation powder 1223 A G

**Breo<sup>®</sup> Ellipta<sup>®</sup>** 100/25, 200/25 mcg fluticasone furoate and vilanterol inhalation powder 1223 A G

**Dulera<sup>®</sup>** 100.5, 200.5 mcg mometasone furoate and formoterol fumarate dihydrate inhalation powder 1223 A

**Symbicort<sup>®</sup>** 80/4.5, 160/4.5 mcg budesonide and formoterol fumarate dihydrate inhalation powder 1223 A G G

**Wixela<sup>™</sup> Inhub<sup>™</sup>** 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol xinafoate inhalation powder (Advair Diskus) 1223 A G G

## COMBINATION MEDICATIONS

contain both long-acting beta<sub>2</sub>-agonist (LABA) and long-acting muscarinic antagonist (LAMA)

**Bevespi<sup>®</sup> Aerosphere<sup>®</sup>** 9/4.5 mcg tiotropium bromide and formoterol fumarate inhalation powder 1223 G

**Stiolto<sup>™</sup> Respimat<sup>®</sup>** 2.5/2.5 mcg tiotropium bromide and olodaterol inhalation powder 1223 G

**Anoro<sup>®</sup> Ellipta<sup>®</sup>** 62.5/2.5 mcg umedidinium and vilanterol inhalation powder 1223 G

**Breztri<sup>™</sup> Aerosphere<sup>®</sup>** 100/5/3 mcg tiotropium bromide, glycopyrrate and formoterol fumarate inhalation powder 1223 G

**Trelegy<sup>®</sup> Ellipta<sup>®</sup>** 200/5/2.5 mcg tiotropium bromide, fluticasone furoate, and umedidinium and vilanterol inhalation powder 1223 A G

## MUSCARINIC ANTAGONISTS (ANTICHOLINERGIC)

relieve cough, sputum production, wheeze and chest tightness associated with chronic lung diseases

**Atrovent<sup>®</sup> HFA** 17 mcg ipratropium bromide inhalation powder 1223 G

**Incruse<sup>®</sup> Ellipta<sup>®</sup>** 62.5 mcg umedidinium inhalation powder 1223 G

**Spiriva<sup>®</sup> HandiHaler<sup>®</sup>** 16 mcg tiotropium bromide inhalation powder G

**Spiriva<sup>®</sup> Respimat<sup>®</sup>** 1.25, 2.5 mcg tiotropium bromide inhalation powder 1223 A G

**Tudorza<sup>™</sup> Pressair<sup>™</sup>** 400 mcg aclidinium bromide inhalation powder 1223 G

## COMBINATION MEDICATIONS

contain muscarinic antagonist and beta<sub>2</sub>-agonist

**Respiomax<sup>®</sup> Respimat<sup>®</sup>** 20/100 mcg tiotropium bromide and albuterol inhalation powder 1223 G

**Duaklir<sup>®</sup> Pressair<sup>®</sup>** 400, 12 mcg aclidinium bromide and formoterol fumarate inhalation powder 1223 G

## BIOLOGICS

target cells and pathways that cause airway inflammation; delivered by injection or IV

**Cinqair<sup>®</sup>** realicizumab A

**Dupilixent<sup>®</sup>** dupilumab A

**Fasenra<sup>™</sup>** benralizumab A

**Nucala<sup>™</sup>** mepolizumab A

**Xolair<sup>®</sup>** omalizumab A

## BRONCHIAL THERMOPLASTY

A minimally invasive procedure that smooths the airway walls, leading to fewer severe asthma flares, ER visits, and days lost from activities. www.bronchus.com



## PDE4 INHIBITORS

ease lung inflammation and reduce exacerbations

**Daliresp<sup>®</sup>** 250, 500 mcg roflumilast G



# Biologics: Targeting the Source of Asthma

**S**ome severe asthma patients do not respond well to standard medications. If you have tried high-dose inhaled corticosteroids, long-acting beta-agonist bronchodilators and muscarinic antagonists (anticholinergics) and you're still experiencing symptoms, then biologics may be the next step.

Biologics are prescribed as an add-on therapy for severe asthma. Administered as an injection or infusion typically every 2-4 weeks, they are designed to treat the source of symptoms, rather than the symptoms themselves.

Biologics target the cells and pathways that lead to allergic inflammation and bronchoconstriction. Doctors prescribe them based on the patient's different phenotypes or characteristics of severe asthma. (See page 15.) Different biologics block certain mediators, the chemicals that cause inflamed airways.

This medication approach opens a window into the patient as an individual – part of a trend toward precision or personalized medicine in healthcare.

When biologics are effective, they help the body gain long-term control of asthma symptoms and reduce the risk of an asthma flare.

## What's Your Type?

Your doctor will have to determine which type of asthma you have before prescribing a biologic.

The first biologic approved for allergic asthma was omalizumab (Xolair®) in 2003. It blocks immunoglobulin E (IgE), the antibody that causes

allergic reactions. Omalizumab is approved for patients 6 years of age and older with moderate-to-severe asthma that is not well controlled by inhaled corticosteroids and long-acting beta2-agonists. Dosage and frequency vary based on the patient's weight and levels of IgE.

Mepolizumab (Nucala®), reslizumab (Cinqair®) and benralizumab (Fasenra™) block the chemical interleukin 5 (IL-5) to reduce the number of eosinophil blood cells causing airway inflammation. Mepolizumab and benralizumab are injections for patients ages 12 years and older, while reslizumab is administered as an infusion for patients 18 and older.

Dupilumab (Dupixent®) blocks the chemicals interleukin 4 (IL-4) and interleukin 13 (IL-13) to treat eosinophilic asthma. It's an injection for patients ages 12 years and older whose asthma is not well-controlled with current medications, including oral corticosteroids, and it can be taken in the doctor's office or at home.

## Side effects?

Some people taking biologics may experience an allergic reaction. These reactions are rare, but in some cases may be serious. The most serious is anaphylaxis, which can be life-threatening; symptoms range from hives and mouth or throat swelling to difficulty breathing and dizziness. Your doctor will have epinephrine, the first-line of treatment for anaphylaxis, readily available after administering the biologic.

Other side effects may include headache and soreness at the site of the injection.

# How the 'Asthma Yardstick' Measures Up



**H**ow do doctors know when to step up treatment for severe or difficult-to-control asthma?

Leading board-certified allergists and pulmonologists developed a series of recommendations called the Asthma Yardstick. It offers guidance for doctors on treating patients with severe asthma, as well as when it's necessary for patients to see a specialist.

The Asthma Yardstick uses patient profiles to help doctors determine what steps should be taken in treatment. Here are two examples:

- **A patient with moderate-to-severe asthma** who has had symptoms for at least two months or required oral corticosteroids to treat a flare twice

in the past year despite being on low-dose inhaled corticosteroids *may be a candidate for* stepping up to medium-dose inhaled corticosteroids, combination asthma medications or leukotriene inhibitors.

- **A patient with uncontrolled asthma** who shows persistent eosinophil-related inflammation despite taking high-dose inhaled corticosteroids and long-acting beta2-agonists *may be a candidate for* biologics.

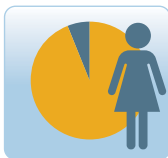
Before recommending step-up therapy, doctors will also take into account: Is the patient following the medication schedule and using the prescribed inhaler correctly? Are there other medical conditions worsening symptoms? Is cost of medications a factor? Are lifestyle issues such as stress worsening symptoms?

When asthma symptoms improve, an Asthma Controller Step Down Yardstick is available to guide doctors and patients on how to determine when to step down treatment – typically when symptoms are well-controlled for at least 3 months, or longer for high-risk patients.

The complete Asthma Yardstick, including the Step Down Yardstick and a Pediatric Asthma Yardstick, can be found at [www.annallergy.org](http://www.annallergy.org).

## 'Still Fighting For Breath' Global Data

Asthma impacts patients and caregivers in many ways, from limitations in daily physical and social activities to psychological and emotional struggles.



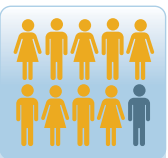
**94%**  
of respondents reported symptoms indicating either partial control or uncontrolled asthma under the Global Initiative for Asthma (GINA) guidelines, yet 42 percent thought they were well controlled.



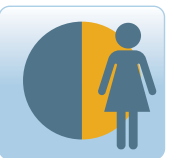
**86%**  
of respondents reported experiencing an asthma flare in the past 12 months.



While most patients physically recover from an asthma flare within 24 hours, **more than 1/2 of patients needed longer than 24 hours to recover** emotionally and psychologically.



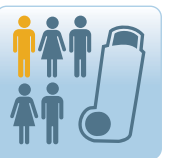
**9 out of 10** adults and two-thirds of children with asthma felt limited in their daily activities. Meanwhile, 69 percent of caregivers said they felt limited due to their child's asthma.



About **1/2** of patients reported asthma impacted their self-esteem, while **40%** experienced anxiety and **28%** reported depression.



**58%** of adults in the survey believe asthma negatively impacts their work lives.

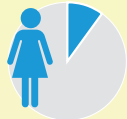


**1 in 5** patients only use quick-relief inhalers to treat their asthma.



# Asthma and Oral Corticosteroids

Your doctor may prescribe oral corticosteroids (OCS) such as prednisone to treat moderate to severe asthma flares. These medications are used to decrease inflammation in the airways and reduce mucus quickly.



**5-10%**  
of asthma  
patients have  
severe asthma



**>50%**  
of these  
patients have  
uncontrolled  
asthma



Short course of OCS =  
**3-5 days**  
(called a steroid burst)



**> 2 bursts** in 12 months  
indicate poor asthma control

OCS = Typically 10X  
stronger dose than  
inhaled corticosteroids

## Potential for serious side effects

### SHORT-COURSE USE

- Eye problems
- Weight gain, particularly in abdomen, face and neck
- Swelling in lower legs
- High blood pressure
- Muscle weakness
- Mood swings and aggressive behavior
- Depression and anxiety
- Sleep problems

### LONG-TERM USE

- Slow growth in children
- Diabetes onset
- Increased risk of infections
- Bone weakness
- Easy bruising of the skin
- Reduced hormone production

## OCS Overuse?

### TEXAS MEDICAID STUDY

- 42-44% of children with asthma were prescribed OCS >1X per year
- 25% of children received additional OCS prescriptions in subsequent years
- > 80% of children did not have indications of poor asthma control: albuterol refills, hospitalizations and ER visits
- Children ages 1-4 were more likely to receive multiple prescriptions than older children

### NATIONWIDE OCS USE

- 141,000 hospital stays per year
- 43% more expensive to healthcare system

## Talk with your doctor...

- Ask for a blood test to determine your type of asthma.
- Find out if oral corticosteroids are the only option for you.
- Balance the risks vs. benefits of taking oral corticosteroids



Sources: CHEST Foundation; "Overuse of Oral Corticosteroids for Children with Asthma in a Large Medicaid Managed Care Program," Pediatrics, April 10, 2017



# Bronchial Thermoplasty

## A New Hope for Severe Asthma

**P**atients whose symptoms do not respond to normal asthma medications face serious restrictions on their daily activities, often finding themselves in and out of the emergency room, with frequent hospitalizations.

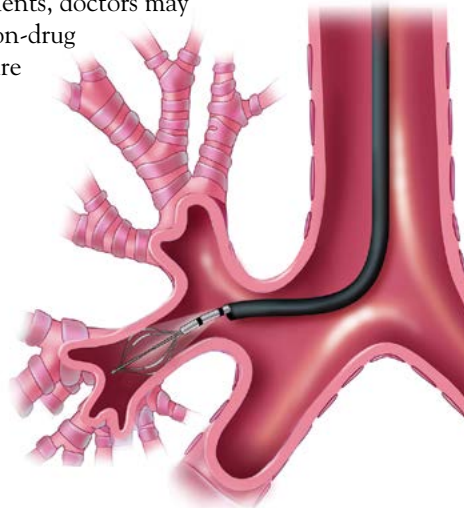
This type of longstanding, difficult-to-control asthma can lead to an overgrowth of the muscles that surround the airways of the lungs. It can thicken the airway wall, narrow the air space and restrict breathing.

For these patients, doctors may recommend a non-drug medical procedure called bronchial thermoplasty. It's approved for adults ages 18 or older whose asthma is not well controlled using a combination of high-dose inhaled corticosteroids and a long-acting beta-agonist (LABA) or maintenance medications such as oral corticosteroids and biologics.

Bronchial thermoplasty involves inserting a long, slender, flexible tube called a bronchoscope into the lungs and surrounding airways to heat and shrink bronchial muscle tissue. The procedure is designed to decrease the ability of the airways to constrict, allowing more air to pass and make breathing easier.

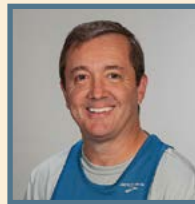
Bronchial thermoplasty is performed under moderate or general anesthesia in three outpatient visits, typically scheduled 3-4 weeks apart. Each session targets a different section of the lungs. Side effects may include a short-term worsening of asthma symptoms, including the possibility of hospitalizations. These symptoms usually resolve within a week.

If you have severe, difficult-to-control asthma, talk with a board-certified allergist or pulmonologist to determine if bronchial thermoplasty is right for you. And be sure to check your health insurance to confirm if the procedure is covered under your plan.



### Success Stories

*79% of patients treated with bronchial thermoplasty reported significant improvement in their asthma-related quality of life*



**Tony Cook,**  
Special Assistant, Pentagon

"For years, I suffered from severe asthma. I'd cough and wheeze continuously and my breathing was so constricted it felt as if a boa constrictor had

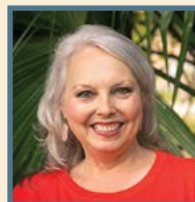
wrapped itself around my chest. In 2010, I became the first person to undergo bronchial thermoplasty after it was approved by the FDA. The procedure changed my life – I now run long distances without any difficulty. The boa constrictor around my chest loosened up and went away. I finally feel my asthma is well controlled."



**Richard Jefferson,**  
Former NBA player

"After the procedure, I noticed the difference in my breathing in the first few months. My asthma continued to get better. I was able to play basketball at a level

that was normal for me. It was all about regaining my stamina on the court. It was evident in how I played, in my athleticism, and in my ability to impact a game. My need for a quick-relief inhaler decreased and I didn't need a nebulizer before games anymore. Those were all things I was glad to be able to put behind me and move forward with my career."



**Laurie Hochstetler,**  
Band Director

"Bronchial Thermoplasty has given me a new lease on life. Prior to the procedure, I would get out of breath just walking around my house. Now I walk

upstairs easily. I can walk a mile outside and feel no shortness of breath. I still take asthma and allergy medications, but they are much more effective now."

Learn more at [BTforAsthma.com](http://BTforAsthma.com).





# Allergy Testing & Immunotherapy

**M**ost children and adults with asthma have allergies to things they breathe, touch or eat – and these allergies can set off asthma symptoms.

Knowing which allergens affect you puts you one step closer to asthma control. Make an appointment with a board-certified allergist who will take a detailed medical and family history, discuss your symptoms, and use skin prick or blood tests to confirm a diagnosis.

Allergists consider **skin tests** to be the gold standard for allergy testing. They are quick, inexpensive and produce reliable results, when interpreted by a trained allergist.

Another option is a **blood test**, often done by primary care doctors as an initial screening or by allergists where skin prick tests are not recommended. Results must be interpreted in conjunction with your medical and family history and pattern of allergy symptoms, as a positive result does not always mean that you will experience a reaction to the allergen.

Once you know what you are allergic to, you and your doctor can make a plan to avoid exposure. Some allergens, such as pollen, mold, house dust mites, animal dander and insect stings are very difficult to avoid. However, allergies – and the asthma flares they spark – often can be dramatically improved with immunotherapy.

## Immunotherapy

Immunotherapy is the process of introducing controlled amounts of an allergen to the immune system on a regular schedule, gradually increasing your tolerance. It is proven to be successful for pollen, mold, animal dander, house dust mites, cockroach allergens and insect venom. There are two options.

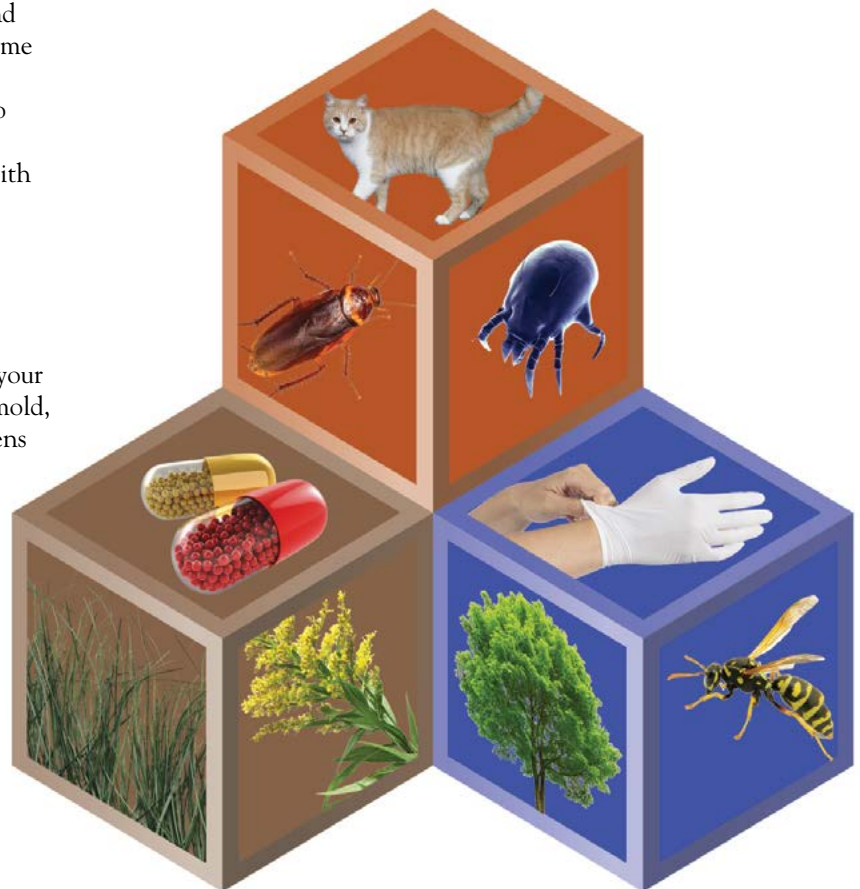
Traditional immunotherapy uses **allergy shots**, also called subcutaneous immunotherapy or SCIT, given in a board-certified allergist's office once or twice a week. Epinephrine auto-injectors should be readily available in case the allergy shot provokes anaphylaxis, a severe allergic reaction. After 3-5 years, the shots can usually be discontinued.

A newer form of immunotherapy called sublingual immunotherapy (SLIT) uses **tablets** that dissolve under the tongue. Unlike allergy shots that can treat multiple allergens at the

same time, tablets are specific to one or a few related substances and are taken daily either seasonally or year-round. SLIT tablets are available for grass and ragweed allergies and for house dust mites. The first tablet is taken in the doctor's office and then patients can take them at home – as long as epinephrine auto-injectors are available to treat potential anaphylaxis.

Another form of SLIT involves drops of liquid allergens held under the tongue. Concentrated allergen extracts for drop therapy have not been approved yet in the United States and are still considered experimental. The treatment is typically not reimbursed under health insurance.

Discuss immunotherapy options with a board-certified allergist who can evaluate your symptoms and help you determine the best immunotherapy option. Visit [AllergyRelief.ACAAI.org](http://AllergyRelief.ACAAI.org) for a tool to help you decide; share the results with your doctor.





# Exercise and Asthma

About 1 in 10 people experience coughing, wheezing, chest tightness or shortness of breath during or shortly after physical activity. Symptoms usually appear 5-10 minutes after exercise starts or ends.

It's called EIB – exercise-induced bronchospasm. EIB occurs when airway muscle spasms constrict airflow, leading to symptoms. Often it's a sign of underlying asthma or lung inflammation. Many don't recognize the problem and simply avoid strenuous exercise.



## Faces of Asthma

"Before I go for a jog, I pack my inhaler and a water bottle. I always check the weather and I take note if it's particularly warm and humid, or if it's very cold. The last thing I want to feel is sick, out of breath and out of energy."

– Debbie Alford

## Mouth Breathers

People with EIB typically have airways that are very sensitive, especially to sudden changes in temperature and humidity. Nasal passages act as a mini-sauna for the air we breathe – warming the air and adding moisture – in addition to filtering unwanted particles out. But most people during exercise breathe through their mouths, allowing allergens (pollen and mold), irritants (air pollution) or cold, dry air to reach the airways.

If you think you have EIB, make an appointment with your doctor. The doctor will take your medical and family history and have you perform breathing tests before, during and after exercise.



## Warm Up and Cool Down

EIB symptoms sometimes occur due to rapid cooling or rapid warming of the airways, causing the airways to constrict. Doctors recommend 15-20 minutes of steady warm-ups before exercise and then a 15-20 minute cool-down period after exercise.

By making a gradual shift in temperature, you can lessen the chances of airway constriction and thus EIB symptoms.

## Manage With Medications

Doctors prescribe quick-relief albuterol inhalers for EIB. These inhalers open up and relax tight muscles in the airways, preventing bronchospasms.

If you have EIB, it's recommended you pre-treat your airways 10-20 minutes before moderate to vigorous exercise with an albuterol inhaler – even if your symptoms are well controlled. You should also use your albuterol inhaler if symptoms occur during exercise.

Always keep your quick-relief albuterol inhaler with you during exercise, in case you need it as you go.

## Evaluate Your Environment

Keep exercise to a minimum when potential EIB and asthma triggers are present. If you have a viral infection, it's cold outside or the pollen and air pollution levels are high, you might want to avoid strenuous physical activity.

Schedule your outdoor exercise during times when pollen counts are low.

In cold weather, wearing a scarf or mask may also help by warming the air you breathe and filtering out allergens.

Some activities are better than others for people with EIB. Swimming is often a good choice because it's done in a warm, humid environment. Sports with short bursts of activity such as baseball or golf may be ideal. Try walking, leisure biking or hiking – these forms of exercise can be paced more readily than vigorous activities.

## Get Up and Go

If you have exercise-induced bronchospasm, or you were diagnosed with asthma and know that exercise is one of your triggers, prevention and treatment are the keys to getting in the game.

“Warm up, pre-treat with albuterol, stay hydrated, pace yourself, and cool down afterwards – this will help your body function better, whether your EIB is caused by asthma or not,” says board-certified allergist and immunologist Timothy Craig, DO.

EIB and asthma should not hold you back from physical activity or participating in sports – as long as your condition is well managed.

A proper diagnosis can provide you with confidence that you can accomplish any exercise goal. Remember, exercise is supposed to be fun.

### MYTH:

I don't need to take my bronchodilator until I start wheezing.

### TRUTH:

*Don't be deceived by thinking your quick-relief bronchodilator is a "rescue" medicine that should be used only when absolutely necessary. Use it at the first sign of symptoms. If you're wheezing, you're already well into danger territory.*





# Breathing For 2

**A** tiny new life somersaults inside. Filled with hopes and dreams for your baby's future, you watch what you eat and drink. You get plenty of rest and exercise.

However, for many expectant mothers, asthma – one of the most common complications of pregnancy – presents special challenges.

## How does asthma affect pregnancy?

Asthma is unpredictable in moms-to-be. Some find that their symptoms worsen, while others find that they improve or stay the same.

While asthma is a serious, potentially life-threatening condition, women with well-controlled asthma can

enjoy a healthy pregnancy and baby.

The key to remember is that healthy breathing is vital to a healthy pregnancy. Your unborn

baby depends on you for a fresh air supply. Asthma symptoms such as coughing, wheezing or shortness of breath are signs that your baby's air supply is at risk.

Uncontrolled or severe asthma is dangerous for expectant moms and the unborn baby. It can cause a decrease in the mother's oxygen which, in turn, reduces the oxygen available to the developing baby. This can lead to increased risk of pre-eclampsia (a range of symptoms that include high blood pressure and kidney problems) for the mother and preterm birth, low birth weight, slowed

growth and even loss of life for the baby.

The good news is that asthma can be treated and prevented during pregnancy, as well as labor and delivery. The key is to work closely with both your asthma specialist and obstetrician to develop an Asthma Action Plan.

## Is it safe to take asthma medication during pregnancy?

It's best to be cautious using any medication during pregnancy, however most asthma medications are considered safe for mother and baby, according to the American College of Allergy, Asthma & Immunology.

The goal in using medications is to prevent asthma inflammation and treat symptoms when they first begin. This approach minimizes risks and maximizes benefits to both mother and child.

Your doctor will determine if there are any risks, carefully balancing medication use and symptom control, and whether the potential benefits of the medication outweigh those risks.

Inhaled medications are often recommended for pregnant women with asthma. They go to the airways in smaller doses and only a small amount enters the bloodstream.

Apart from medications, environmental control is key to managing asthma. Expectant moms must be extra careful to avoid anything that might lead to an asthma flare. This includes allergen and irritant avoidance measures, such as staying inside on high pollen days, eliminating mold from the home, and installing dust mite covers on mattresses and pillows.

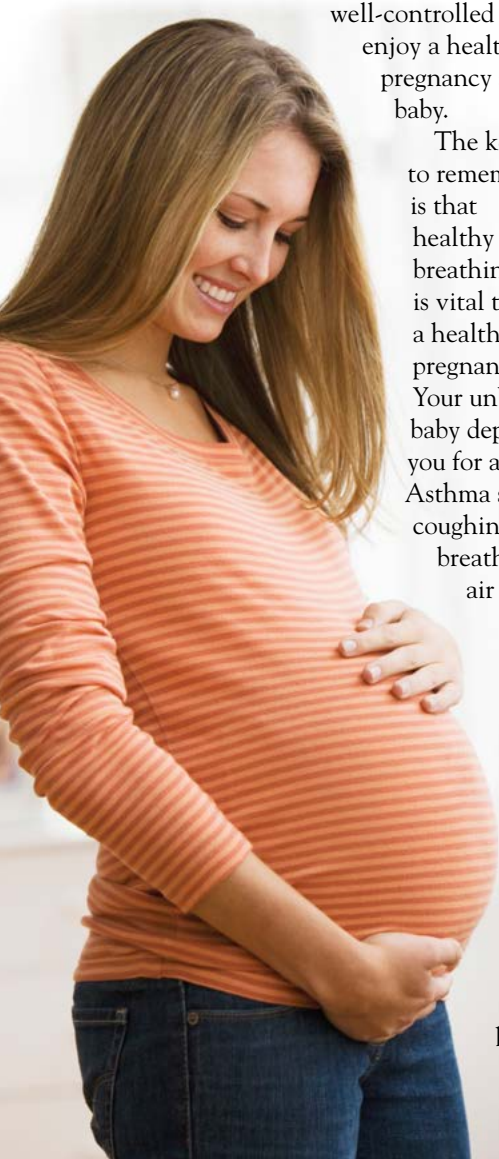
## What about labor and delivery?

Most expectant mothers with asthma experience no breathing problems during labor and delivery. Unless directed otherwise by your doctor, do not discontinue use of any prescribed medication once labor begins. You may be directed to bring your inhaler with you into the delivery room.

In the delivery room, your doctor may provide you with an external supply of oxygen through a mask. Should you have trouble breathing, the doctor can deliver inhaled medications through the same mask.

**MYTH:**  
*Expectant moms with asthma should not get the flu shot.*

**TRUTH:**  
*Expectant moms should get the flu shot when it's available – not only are they protected from the flu, but protection from the vaccine is also transferred across placenta, giving the baby some flu immunity.*





# ASTHMA: TAKE ACTION, TAKE CONTROL

asthma.chestnet.org

## ASTHMA HEALTH DISPARITIES

Asthma crosses all racial, ethnic and socioeconomic groups. It is more common among African-American, Hispanic and Native American populations, particularly those in poor urban areas.

### RATE OF ASTHMA-RELATED ER VISITS AND DEATHS COMPARED WITH CAUCASIANS

	ER VISITS	DEATHS
African-American children:	<b>4.5X</b> HIGHER	<b>7X</b> HIGHER
African-American adults:	<b>2.8X</b> HIGHER	<b>3X</b> HIGHER
Hispanic children:	<b>2.1X</b> HIGHER	<b>2X</b> HIGHER

### INCOME LEVEL AND EDUCATION PLAY A SIGNIFICANT ROLE IN ASTHMA PREVALENCE

Adults with an annual income of **<\$75,000** are **MORE LIKELY** to have asthma

Adults who didn't finish high school are **MORE LIKELY** to have asthma

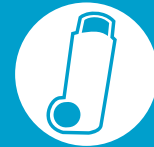
People with asthma who earn **<\$50,000** per year are **twice as likely** to have an asthma flare

ADULTS WHO CANNOT AFFORD THEIR ASTHMA MEDICATION: **1 in 4** African-Americans **1 in 5** Hispanics

### Native Americans

**30%**  
MORE LIKELY  
to have asthma

Asthma-related deaths  
**20%**  
HIGHER



Minority children are **LESS LIKELY** to take daily asthma medication

Asthma prevalence among Puerto Ricans is

**2X**  
GREATER

than other Hispanic populations



## FACTORS THAT CAN LEAD TO ASTHMA DISPARITIES



• **ACCESS TO CARE** – Limited or lack of transportation can result in patients missing or rescheduling doctor appointments and forgoing or delaying medication use.



• **INCOME** – Poverty can affect access to healthcare and health insurance, forcing low-income patients to skimp on medical care, including preventive medications.



• **ENVIRONMENTAL ALLERGENS AND IRRITANTS** – People with asthma who live in urban areas with substandard housing are exposed to more asthma triggers, including mold, dust mites, cockroaches and mice, cigarette smoke and vehicular exhaust from nearby highways.



• **EDUCATION INEQUALITY** – A lack of knowledge and understanding of the disease can lead to problems such as using asthma inhalers incorrectly or not following through on treatment.



• **LANGUAGE AND CULTURAL DIFFERENCES** – People with asthma who speak Spanish as a primary language may struggle to get appropriate health services.

TALK WITH YOUR LEGISLATORS ABOUT POLICIES THAT IMPACT COMMUNITIES EXPERIENCING A GREATER BURDEN OF ASTHMA.

Sources: Centers for Disease Control and Prevention, Office of Minority Health and Health Equity; National Institutes of Health; American Academy of Allergy, Asthma & Immunology



# Healthy Home Guide

**P**eople spend more time indoors these days, so breathing healthy air in your home is critical. Indoor allergens and irritants can come from many unlikely places. Make healthy air your goal!

**Say no to smokers.** Environmental tobacco smoke, or secondhand smoke, is a major indoor pollutant. Set a no-smoking policy both inside and around your house. Smoking is a major health issue for everyone.

**Monitor moisture.** Too much humidity makes your home a playground for mold and dust mites. Too little can irritate inflamed airways. Meet in the middle with a goal of 50 percent household humidity. An instrument called a hygrometer will measure your humidity level. Keep bacteria and mold under control by cleaning dehumidifiers and humidifiers regularly.

**Move out mold.** Use exhaust fans in bathrooms and vent outside to keep humidity low and make these areas less friendly for mold. Check for leaks around pipes, another common cause of mold growth. Potted plants and stacks of magazines and books can hold moisture and create new homes for mold. Limit them – particularly in bedrooms. Empty clothes hampers regularly and avoid putting wet clothes or towels in them. If you find mold forming in bedroom closets, leave a light on to help dry it out and look for the source of moisture. Hardware stores sell moisture meters to trace water leaks and mold.

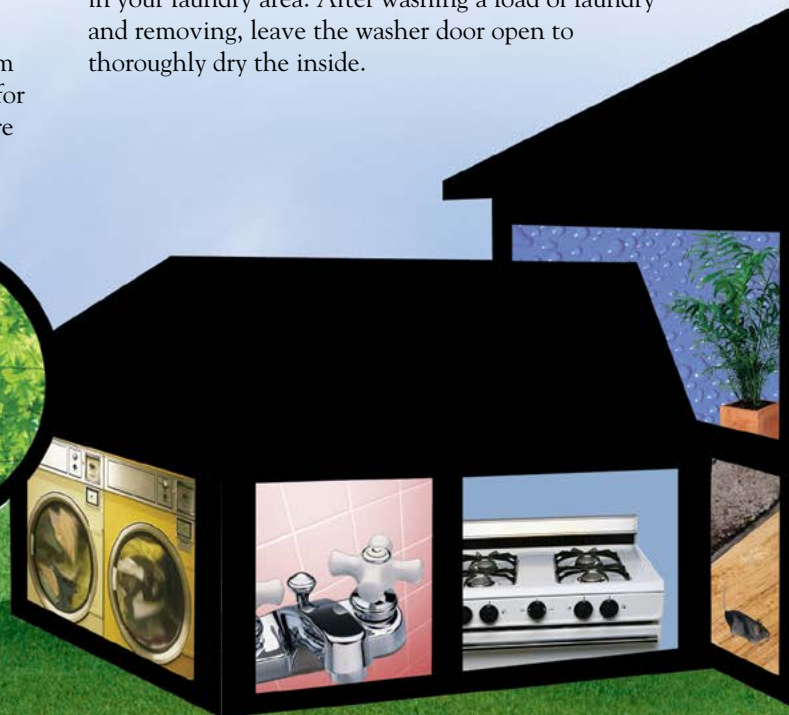
**Create 'no vacancy' for pests.** When the weather turns cold, cockroaches, mice and other household pests move indoors, bringing allergens that can cause asthma and allergy flares. Seal cracks around pipes

and windows and improve ventilation to damp areas. Remove boxes, piles of newspapers and other pest hiding places. Minimize trash kept inside the house and rinse bottles and cans before you toss them in the recycling bin. Eat only in the kitchen or dining room – especially not in carpeted areas – and clean dishes and any food and drink spills right away. Avoid using pesticide sprays, which can irritate sensitive airways.

**Put a wrap on dust mites.** One of the mainstays of dust mite diets is human skin flakes, and your bed is full of them. Encase pillows and mattresses with allergen covers to put a barrier between you and dust mites.

**Nix noxious gases.** Gas stoves, fireplaces and heaters can leak nitrogen dioxide (NO<sub>2</sub>), irritating eyes, nose, throat and lungs. Gas appliances must vent outside. Install an exhaust fan above your stove, vent outside and maintain gas appliances according to the manufacturer's recommendations to reduce NO<sub>2</sub> emissions.

**Put a spin on clothes.** Clothing dryers produce moisture, too. Clean the dryer hose and be sure the outside vent keeps moisture from building up in your laundry area. After washing a load of laundry and removing, leave the washer door open to thoroughly dry the inside.





**Upgrade your filter.** The filter that comes with your HVAC (heating, venting and air conditioning) system isn't designed to help you breathe better – it just keeps dust and debris from clogging up the working parts of your system. Improve the quality of the air you breathe and take your HVAC system up a notch with a high-efficiency MERV 11 (or higher) disposable filter. Filters should be changed at least every three months; your furnace and air conditioner unit should be serviced at least once a year.

**Solve the carpet conundrum.** Carpets are a favorite living area for dust mites and other pests. Consider removing them in favor of hardwood floors. If you can't remove carpets, vacuum them regularly and steam clean once a year to minimize allergens and the skin cells that dust mites feed on. Focus on rooms where you spend the most time, such as bedrooms. Vacuuming won't suck out the dust mites themselves – they have barbs on their legs to cling to carpets and soft furnishings. Use a vacuum with a HEPA (high efficiency particulate air) filter to prevent vacuumed allergens from escaping back into the air.

**Delve into ducts.** Are allergens lurking in your home's air ducts? Generally not, especially if you have a decent filter in place. Duct cleaning is frequently advertised as beneficial, but there is no scientific

evidence that this is true in most homes. Consider having your ducts professionally cleaned under the following circumstances:

- a history of flooding or water damage to duct work;
- high prevalence of mold contamination;
- a history of infestation with rodents or insects;
- high prevalence of dust or construction debris.

Steer clear of duct-cleaning services that want to add chemicals to your ducts – they can cause lung irritation.

**Stop idling around the house.** Don't warm up your car in the garage or near the house – carbon monoxide (CO) from the car exhaust can seep into the house. Even at low levels, CO can cause respiratory problems. Make sure you have a CO detector on each floor of your house.

**Pet-proof your home.** Some people are allergic to the flakes of skin (called dander) or dried saliva from pets with fur or feathers. Finding a new home for the pet is the most effective way to reduce pet dander in the home. If your family is unwilling to give up a beloved pet, then keep it out of bedrooms and sleeping areas. Replace carpets, upholstered furniture, heavy drapes and other allergen collectors with hardwood floors and washable furnishings.

**Keep outdoor allergens out.** The spread of pollen and mold spores in spring, summer and fall can lead to symptoms when they are inhaled. Keep windows closed and stay indoors from late morning to afternoon, when pollen and mold spore counts are high.

**Clear out odors.** Perfumes and other fragrances often irritate sensitive airways. Fireplaces and candles can produce smoke, soot and other airborne irritants. Potpourri can contain mold spores in their dried flowers and leaves. Burning incense can generate carbon monoxide and irritants. Rethink air freshening strategies.

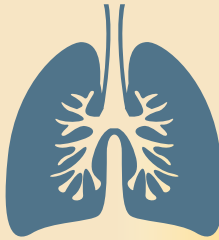




# Asthma and Smoking

**21%**

of people with asthma smoke cigarettes – even though they are a known asthma trigger.



**2nd**

Cigarette smoke is the most cited cause of asthma flares.

*Smokers with severe asthma have poorer asthma control and more unscheduled healthcare visits.*

**1,300**

deaths per day are attributed to smoking.



## Smoking or exposure to secondhand smoke can cause:

- Lung cancer
- More frequent and severe asthma flares
- COPD
- Respiratory infections
- Coughing and wheezing
- Ear infections in children
- Heart disease
- Stroke
- Nicotine addiction



## Secondhand Smoke



There's **NO** safe amount of secondhand smoke!

Kids with asthma who are exposed to secondhand smoke at home =

**2X**

more likely to be hospitalized due to asthma flare.

Secondhand smoke contains more than **7,000** chemicals, including 70 that can cause cancer. If you breathe secondhand smoke, you breathe in many of the same chemicals the smoker is inhaling.



## Benefits to Quitting Smoking

- Repairs the body – improved lung function
- Reduces risk of asthma flare
- Reduces risk of developing COPD
- Ensures you're not harming others via secondhand smoke
- Extends your life







# Avoid the September Asthma Peak

If the past predicts the future, then September could be the worst month for children with asthma. Studies show asthma-related hospitalizations spike soon after children go back to school.

Why does this happen? Experts point to several factors: fall ragweed pollen and mold – both are common asthma triggers; exposures to respiratory illnesses, including flu and the common cold; and not following the prescribed medication schedule during the summer when asthma symptoms may be less noticeable.

What can parents do? Schedule wellness doctor appointments before school begins or early in the school year and review your child's Asthma Action Plan.

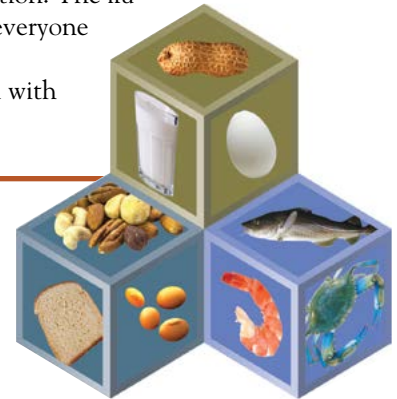
- **Discuss allergens and irritants that set off symptoms** and how to reduce exposures that touch off asthma flares. Uncertain about triggers? Ask for a referral to an allergist for testing.
- **Review inhaler technique with your child.** Ask about using a valved holding chamber, which attaches to the inhaler and captures and directs the medication to the airways.



- **Make sure your child continues to take daily anti-inflammatory medications** throughout the year, even during the summer. Refill prescriptions when necessary.
- **Involve children in the conversation**, helping them understand when, why and how to take medications and keep asthma under control.

## Immune System Smarts

Make sure all members of your family get the annual flu vaccination. The flu shot is recommended for everyone ages 6 months and older, especially those diagnosed with asthma.



# The Asthma-Food Allergy Connection

**A**sthma and food allergy symptoms often overlap. Respiratory symptoms common to asthma – coughing, wheezing and shortness of breath – are also common in food-induced anaphylaxis, a life-threatening allergic reaction. Here are four things you need to know:

**1** Studies show **35-50 percent of people with food allergy have asthma.** It's suspected there are many people with asthma who don't know they have a food allergy.

**2** People diagnosed with **asthma and food allergy are at higher risk of anaphylaxis** than those with just food allergies.

**3** Adolescents and young adults with asthma and food allergy face a higher risk of death from anaphylaxis. Eighty percent of life-ending episodes from food allergy occur in people between ages 15 and 30 years. It may be due to risk-taking behavior common to that age group, hormones, or a reluctance to carry epinephrine auto-injectors – the first line of treatment for anaphylaxis.

The key message to parents is to help children understand their asthma and food allergy so that when they are older, they know how to self-manage their condition.

**4** If you're **not sure symptoms indicate an asthma flare or anaphylaxis, use an epinephrine auto-injector first** and then use a quick-relief inhaler if needed. Any person diagnosed with asthma and food allergies should carry a quick-relief inhaler and epinephrine auto-injectors at all times.



# 5 Building Blocks for Better Breathing

A healthy, active life with asthma for you and your family is within reach. Getting there begins with a personalized evaluation from your healthcare team about what's causing your symptoms and how they can be prevented. It continues with a plan of action that fits your family, lifestyle and budget.

Every person's asthma is different so don't settle for a one-size-fits-all treatment. Look closely at the following five building blocks to asthma control. What changes do you need to make to meet your goal?

**1 Become an active player on your healthcare team.** Your team has the knowledge and tools to interpret your symptoms and develop an Asthma Action Plan. Set a schedule of regular asthma checkups so they see you when you're feeling good as well as when you're having problems. Discuss what is working and what isn't. Ask them to watch how you use your inhaler, to make sure you're doing it correctly. Ask whether a valved holding chamber or spacer would help. Make sure you understand everything in your Asthma Action Plan.

**2 Know your triggers.** Identify and avoid the allergens and irritants that bring on your asthma flares. Does exercise set off coughing and wheezing? There are solutions to most problems. Discuss them with your healthcare team.

**3 Know your medications.** Take some time to learn why each is important for your lungs, and you'll understand how they fit into your treatment plan. Remember: It takes more medication to put out an asthma flare than to prevent it. As



your asthma health improves, talk with your healthcare team about gradually decreasing your medication schedule or dosage. Never stop or change any of your prescribed medications without thoroughly discussing with your healthcare team. Bring medications with you on every visit to the doctor's office.

**4 Know your body.** Any change in your health can affect your asthma. Flares don't just happen. There are subtle and not-so-subtle warning signs. Your healthcare team will teach you

what to look for and exactly what to do, following your Asthma Action Plan. Let them know immediately about any other health problems you develop.

**5 Live healthy.** Healthy living keeps your body energized and your immune system working. That will mean better breathing. Many choices are yours: No smoking or exposure to smoke; nutritious eating habits; regular exercise; healthy sleep patterns; and age-appropriate vaccinations including an annual flu shot.



## Websites

Allergy & Asthma Network  
[AllergyAsthmaNetwork.org](http://AllergyAsthmaNetwork.org)

American Academy of Allergy,  
Asthma & Immunology  
[aaaai.org](http://aaaai.org)

American College of Allergy,  
Asthma & Immunology  
[acaai.org](http://acaai.org)

American College of CHEST  
Physicians  
[asthma.chestnet.org](http://asthma.chestnet.org)

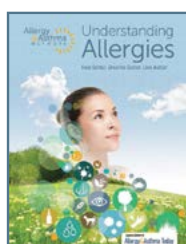
American Thoracic Society  
[thoracic.org](http://thoracic.org)

Guidelines for the Diagnosis and  
Management of Asthma  
[nhlbi.nih.gov/guidelines/asthma](http://nhlbi.nih.gov/guidelines/asthma)

U.S. Centers for Disease Control  
and Prevention  
[cdc.gov/asthma](http://cdc.gov/asthma)

U.S. Environmental Protection  
Agency  
[epa.gov/asthma](http://epa.gov/asthma)

## Publications & Apps



### Understanding Allergies –

How to prevent and reduce seasonal and environmental allergies – and improve your

quality of life. Download a FREE copy at [AllergyAsthmaNetwork.org/publications](http://AllergyAsthmaNetwork.org/publications) or call 800.878.4403



### Asthma Storylines

Free app allows you to document your daily symptoms and work with your doctor to

develop a personalized prevention and treatment plan. Visit [AllergyAsthmaNetwork.org](http://AllergyAsthmaNetwork.org).



### AsthmaTracker™

Easy-to-use 2-sided daily diary to track symptoms and medications for better understanding

of your asthma and communication with your healthcare provider. Free download at [AllergyAsthmaNetwork.org/store](http://AllergyAsthmaNetwork.org/store).

## Language of Asthma Quiz

Match these terms to their meaning, then check the answers to see how you did!

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Inhaled corticosteroid</li> <li>2. Bronchodilator</li> <li>3. Valved holding chamber</li> <li>4. Metered-dose inhaler</li> <li>5. Biologic</li> <li>6. Asthma Action Plan</li> <li>7. Daily symptom diary</li> </ol> | <ol style="list-style-type: none"> <li>a. Lists vital instructions, medications, triggers and management tools</li> <li>b. Targeted therapy for uncontrolled, moderate-to-severe asthma</li> <li>c. Reduces and prevents airway swelling</li> <li>d. Tracks your progress every day</li> <li>e. Traps and suspends aerosol medication while you slowly inhale</li> <li>f. Pressurized medication delivery system</li> <li>g. Relaxes the muscles around your airways</li> </ol> |
|--|---|

### Your Score

7 correct: You're fluent in the Language of Asthma! Now tell your medical care team what you learned.

4-6 correct: You need another language class. Review this publication again and retake the quiz.

1-3 correct: Go over this quiz with your healthcare professional to learn the terms, then retake the quiz.

Correct answers: 1-c, 2-g, 3-e, 4-f, 5-b, 6-a, 7-d.



# Breathe Better Together!

Allergy & Asthma Network engages, educates and empowers families to win over allergies and asthma.

Since 1985, it's been our mission to end needless death and suffering due to asthma, allergies and related conditions.

Join at no cost to you by visiting [AllergyAsthmaNetwork.org/join](http://AllergyAsthmaNetwork.org/join).



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