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## Asthma

### What is it?

Asthma is the most common chronic childhood illness, accounting for more school absences than any other chronic condition. It is also on the upswing: asthma cases have more than doubled in the U.S. in the past 20 years. Asthma is characterized by recurrent bouts (attacks) of obstruction in the small bronchial passages (bronchioli).

### What causes it?

Although we aren't certain why some children become asthmatics and others do not, we do know the following about the causes of asthma:

- **Allergy:** Although not every child with allergies will have asthma, most children diagnosed with asthma have some degree of allergy, whether in the form of nasal allergy or eczema.

- **Lack of exposure to infection early in life:** Called the "hygiene hypothesis," most infectious disease experts now believe that children who are exposed to a variety of germs in early childhood have their immune systems stimulated and are less likely to develop asthma and allergic diseases. This may account, at least in part, for the marked increase in asthma in the U.S. and other developing countries, where improvements in hygiene make exposure to germs less common.

- **Heredity:** Parents with asthma are more likely to have children with asthma, and if one child has asthma, then his sib often will have asthma as well.

The basic underlying mechanism that makes children wheeze is an overreaction of the small airways to a variety of stimuli. Such triggers as pollutants, allergens (pollens, dust, pet dander), germs (especially viruses), exercise, emotional stress and weather changes all cause the release from the lining of the bronchioles of certain chemicals, including histamine and leukotrienes, which increase mucus production, inflammation, and tightening of bronchial muscles, thus narrowing the passages. It is air passing through these narrowed bronchial passages that results in the wheeze of asthma -- much like the whistling sound made by wind whooshing through a narrow tunnel.

### What does it look like?

The end results of narrowing of the bronchial passages are:

- **Coughing:** The asthmatic's cough is usually dry, at least to start, and is often worse at night, with exercise and with laughing.
- **Wheezing:** The wheeze, a harsh or whistling sound made when air passes through a narrowed bronchiole, typically occurs on exhalation (breathing out). Since the forces of exhalation are weaker than the forces of inhalation, asthmatic airways will remain open when a child breathes in, except during a severe episode of asthma, when wheezing can be heard both on inhalation and exhalation. The wheeze is the hallmark sound of the asthmatic.
- **Chest tightness:** A sensation of tightness, squeezing, or pain in the chest is common in asthmatics, especially during exercise.
- **Itching:** Itching of the neck or chest is a common early symptom.
- **Respiratory distress:** In the severe attack, if left untreated, the asthmatic will develop rapid respirations, chest retractions, flaring of the nose, and cyanosis (blue lips). In the asthmatic child, an episode of wheezing can occur in response to a variety of **asthmatic triggers**, including:

- **Exercise:** Many children wheeze exclusively when they exercise. This is called exercise-induced asthma, and occurs with a variety of sports.
- **Emotional stress:** The anxious older child or teen may respond to stress by wheezing.
- **Gastroesophageal reflux:** GER is common in asthmatics. Although the mechanism for this association is not definite, it appears that flow of acid from the esophagus into the bronchial passages is, at least in part, responsible. This is one of the reasons why asthmatics usually do worse at night, when lying down.
- **Infection:** Such viral infections as cold and flu are the most common infectious stimulants in asthma.
- **Weather:** Changes in weather can precipitate an asthma attack, as can simply venturing out on a cold day.
- **Allergens:** The asthmatic child often wheezes in response to pollens, dust mites, mold spores or pet dander.
- **Irritants:** Pollutants can wreak havoc on the asthmatic, as can tobacco smoke, chemical odors and perfumes.

The severity of an asthmatic's symptoms can vary greatly, with some children having attacks every day and others having only the rare episode. Some children have few if any actual attacks but have a constant, chronic course of low-level wheezing and coughing. Fortunately, more than half of all asthmatic children eventually will have a marked reduction in symptoms and, as teens and adults, "outgrow" their asthma and be virtually wheeze-free.

## How is it treated?

The goal of treatment is to minimize the number of attacks and chronic symptoms, and to allow the child with asthma to lead a normal life. With proper treatment, the great majority of asthmatic children are able to do just that.

- **Inhaled bronchodilators:** Since narrowing of the bronchioles is a key mechanism underlying asthma, opening up these narrowed passages is the simplest and most direct form of treatment. The bronchodilator albuterol (or the closely related Xopenex) can be administered either by nebulizer (a small table-top machine that mixes the medication with compressed air to disperse it into a mist), or by metered dose inhaler (MDI), a hand-held device which is a quicker alternative to the nebulizer.

- **Inhaled steroids:** Inflammation of the bronchial passages is an important component of bronchial narrowing, and steroids are the most effective anti-inflammatory medications. Giving a steroid by inhalation, rather than orally, lessens any steroid side effects. Inhaled steroids are one of the best choices for prevention of asthmatic attacks, and also can be used, in conjunction with inhaled bronchodilators, during an attack of wheezing.

- **Combined long-acting inhaled bronchodilator and inhaled steroid:** Such combination inhalers as Advair and Symbicort are an effective means of preventing asthma attacks. They're not used, however, for acute attacks.

- **Other anti-inflammatory medications:** Although not so effective as steroids, such anti-inflammatory medications as montelukast (Singulair) prevent respiratory tract cells from releasing inflammatory chemicals. These medications are not effective in treating acute asthma attacks, but are used primarily to prevent attacks and exercise-induced wheezing.

- **Oral steroids:** When used for a short course (a few days to two weeks), oral steroids represent a safe and extremely effective method to treat a severe asthma attack.

In general, most asthmatic children with only occasional episodes of wheezing will do well simply with a puff or two of albuterol or Xopenex on an as-needed basis. When symptoms are more frequent than once or twice a week, a preventative regimen is used, usually some combination of the above medications.



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