Definition

Today asthma is viewed as a chronic (long-lasting) inflammatory disease of the airways. In those susceptible to asthma, this inflammation causes the airways to narrow periodically. This, in turn, produces wheezing and breathlessness, sometimes to the point where the patient gasps for air. Obstruction to air flow either stops spontaneously or responds to a wide range of treatments, but continuing inflammation makes the airways hyper-responsive to stimuli such as cold air, exercise, dust mites, pollutants in the air, and even stress and anxiety.

Description

About 10 million Americans have asthma, and the number seems to be increasing. Between 1982-92, the rate actually rose by 42%. Not only is asthma becoming more frequent, but it also is a more severe disease than before, despite modern drug treatments. In the same 10-year period, the death rate from asthma in the United States increased by 35%.

The changes that take place in the lungs of asthmatic persons makes the airways (the "breathing tubes," or bronchi and the smaller bronchioles) hyper-reactive to many different types of stimuli that don't affect healthy lungs. In an asthma attack, the muscle tissue in the walls of bronchi go into spasm, and the cells lining the airways swell and secrete mucus into the air spaces. Both these actions cause the bronchi to become narrowed (bronchoconstriction). As a result, an asthmatic person has to make a much greater effort to breathe in air and to expel it.

Cells in the bronchial walls, called mast cells, release certain substances that cause the bronchial muscle to contract and stimulate mucus formation. These substances, which include histamine and a group of chemicals called leukotrienes, also bring white blood cells into the area, which is a key part of the inflammatory response. Many patients with asthma are prone to react to such "foreign" substances as pollen, house dust mites, or animal dander; these are called allergens. On the other hand, asthma affects many patients who are not "allergic" in this way.

Asthma usually begins in childhood or adolescence, but it also may first appear during adult years. While the symptoms may be similar, certain important aspects of asthma are different in children and adults.

Child-onset asthma

When asthma does begin in childhood, it often does so in a child who is likely, for genetic reasons, to become sensitized to common "allergens" in the environment (atopic person). When these children are exposed to house-dust mites, animal proteins, fungi, or other potential allergens, they produce a type of antibody that is intended to engulf and destroy the foreign materials. This has the effect of making the airway cells sensitive to particular materials. Further exposure can lead rapidly to an asthmatic response. This condition of atopy is present in at least one-third and as many as half of the general population. When an infant or young child wheezes during viral infections, the presence of allergy (in the child itself or a close relative) is a clue that asthma may well continue throughout childhood.

Adult-onset asthma

Allergenic materials may also play a role when adults become asthmatic. Asthma can actually start at any age and in a wide variety of situations. Many adults who are not allergic do have such conditions as sinusitis or nasal polyps, or they may be sensitive to aspirin and related drugs. Another major source of adult asthma is exposure at work to animal products, certain forms of plastic, wood dust, or metals.

Causes and symptoms

In most cases, asthma is caused by inhaling an allergen that sets off the chain of biochemical and tissue changes leading to airway inflammation, bronchoconstriction, and wheezing. Because avoiding (or at least minimizing) exposure is the most effective way of treating asthma, it is vital to identify which allergen or irritant is causing symptoms in a particular patient. Once asthma is present, symptoms can be set off or made worse if the patient also has rhinitis (inflammation of the lining of the nose) or sinusitis. When, for some reason, stomach acid passes back up the esophagus (acid reflux), this can also make asthma worse. A

viral infection of the respiratory tract can also inflame an asthmatic reaction. Aspirin and a type of drug called beta-blockers, often used to treat high blood pressure, can also worsen the symptoms of asthma.

The most important inhaled allergens giving rise to attacks of asthma are:
animal dander
mites in house dust
fungi (molds) that grow indoors
cockroach allergens
pollen
occupational exposure to chemicals, fumes, or particles of industrial materials in the air

Inhaling tobacco smoke, either by smoking or being near people who are smoking, can irritate the airways and trigger an asthmatic attack. Air pollutants can have a similar effect. In addition, there are three important factors that regularly produce attacks in certain asthmatic patients, and they may sometimes be the sole cause of symptoms. They are:
inhaling cold air (cold-induced asthma)
exercise-induced asthma (in certain children, asthma is caused simply by exercising)
stress or a high level of anxiety

Wheezing is often very obvious, but mild asthmatic attacks may be confirmed when the physician listens to the patient's chest with a stethoscope. Besides wheezing and being short of breath, the patient may cough and may report a feeling of "tightness" in the chest. Children may have itching on their back or neck at the start of an attack. Wheezing is often loudest when the patient breathes out, in an attempt to expel used air through the narrowed airways. Some asthmatics are free of symptoms most of the time but may occasionally be short of breath for a brief time. Others spend much of their days (and nights) coughing and wheezing, until properly treated. Crying or even laughing may bring on an attack. Severe episodes are often seen when the patient gets a viral respiratory tract infection or is exposed to a heavy load of an allergen or irritant. Asthmatic attacks may last only a few minutes or can go on for hours or even days (a condition called status asthmaticus).

Being short of breath may cause a patient to become very anxious, sit upright, lean forward, and use the muscles of the neck and chest wall to help breathe. The patient may be able to say only a few words at a time before stopping to take a breath. Confusion and a bluish tint to the skin are clues that the oxygen supply is much too low, and that emergency treatment is needed. In a severe attack that lasts for some time, some of the air sacs in the lung may rupture so that air collects within the chest. This makes it even harder to breathe in enough air. Almost always, even patients with the most severe attacks will recover completely.

Minimizing exposure to allergens (prevention)

There are a number of ways to cut down exposure to the common allergens and irritants that provoke asthmatic attacks, or to avoid them altogether:
If the patient is sensitive to a family pet, remove the animal or at least keep it out of the bedroom (with the bedroom door closed). Keep the pet away from carpets and upholstered furniture. Remove all feathers.
To reduce exposure to house dust mites, remove wall-to-wall carpeting, keep the humidity down, and use special pillow and mattress covers. Cut down on stuffed toys, and wash them each week in hot water.
If cockroach allergen is causing asthma attacks, kill the roaches (using poison, traps, or boric acid rather than chemicals). Take care not to leave food or garbage exposed.
Keep indoor air clean by vacuuming carpets once or twice a week (with the patient absent), avoid using humidifiers, and do use air conditioning during warm weather (so that the windows can be closed).
Avoid exposure to tobacco smoke.
Do not exercise outside when air pollution levels are high.
When asthma is related to exposure at work, take all precautions, including wearing a mask and, if necessary, arrange to work in a safer area