Topic Page: Asthma

Definition: **asthma** from *Philip's Encyclopedia*

Disorder of the respiratory system in which the bronchi (air passages) of the lungs go into spasm, making breathing difficult. It can be triggered by infection, air pollution, allergy, certain drugs, exertion or emotional stress. Allergic asthma may be treated by injections aimed at lessening sensitivity to specific allergens. Otherwise treatment is with bronchodilators to relax the bronchial muscles and ease breathing; in severe asthma, inhaled steroids may be given. Children often outgrow asthma, while some people suddenly acquire the disease in middle age. Air pollution is increasing the number of asthma sufferers. *See also* bronchitis; emphysema; lungs

Image from: **asthma** in *The Royal Society of Medicine Health Encyclopedia*

Summary Article: **Asthma**
From *Black's Medical Dictionary, 43rd Edition*

A common disorder of breathing characterised by widespread narrowing of smaller airways within the lung. In the UK the prevalence among children in the 5–12 age group is around 10 per cent, with up to twice the number of boys affected as girls. Among adults, however, the sex incidence becomes about equal. The main symptom is shortness of breath, especially on exercise, exposure to an allergen or with respiratory infection. A major feature is that the airway-narrowing and consequently, the breathlessness can be reversed spontaneously or in response to treatment with a BRONCHODILATOR.

Cause

Asthma runs in families, so that parents with asthma have a strong risk of having children with asthma, or with other atopic (see ATOPY) illnesses such as HAY FEVER or eczema (see DERMATITIS). There is therefore a great deal of interest in the genetic basis of the condition. Several GENES seem to be associated with the condition of atopy, in which subjects have a predisposition to form ANTIBODIES of the IgE class against allergens (see ALLERGEN) they encounter – especially inhaled allergens.

The allergic response in the lining of the airway leads to an inflammatory reaction. Many cells are involved in this inflammatory process, including lymphocytes, eosinophils, neutrophils, and mast cells. The cells are attracted and controlled by a complex system of inflammatory mediators. The inflamed airway-wall produced in this process is then sensitive to further allergic stimuli or to non-specific challenges such as dust, smoke or drying from the increased respiration during exercise. Recognition of this inflammation has concentrated attention on anti-inflammatory aspects of treatment.

Continued inflammation with poor control of asthma can result in permanent damage to the airway-wall such that reversibility is reduced and airway-narrowing becomes permanent. Appropriate anti-inflammatory therapy may help to prevent this damage.

Many allergens can be important triggers of asthma. House-dust mite, grass pollen and animal dander are the commonest problems. Occupational factors such as grain dusts, hard-metals fumes and chemicals in the plastic and paint industry are important in some adults. Viral infections are another common trigger, especially in young children.

The prevalence of asthma appears to be on the increase in most countries. Several factors have been linked to this increase; most important may be the vulnerability of the immature immune system (see IMMUNITY) in infants. High exposure to allergens such as house-dust mite early in life may prime the immune system, while reduced exposure to common viral infections may delay the maturation of the immune system. In addition, maternal smoking in pregnancy and infancy increases the risk.

Clinical course

The major symptoms of asthma are breathlessness and cough.

The onset is usually in childhood, but it may begin at any age. Children who have mild asthma are more likely to grow out of the condition as they go through their teenage years, although symptoms may recur later.

The degree of airway-narrowing, and its change with time and treatment, can be monitored by measuring the peak expiratory flow with a simple monitor at home – a PEAK FLOW METER. The typical pattern shows the peak flow to be lowest in the early morning, and this 'morning dipping' is often associated with disturbance of sleep.

Acute exacerbations of asthma may be provoked by infections or allergic stimuli. If they do not respond quickly and fully to medication, expert help should be sought urgently since oxygen and higher or more frequent doses of drugs may be necessary to control the attack. In a severe attack the breathing rate and the pulse rate rise and the chest sounds wheezy. The peak-flow rate of air entering the lungs falls. Patients may be unable to talk in full sentences without catching their breath, and the reduced oxygen in the blood in very severe attacks may produce the blue colour of CYANOSIS in the lips and tongue. Such acute attacks can be very frightening for the patient and family.

Some cases of chronic asthma are included in the internationally agreed description CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) – a chronic, slowly progressive disorder characterised by obstruction of the airflow persisting over several months.

Treatment

The first important consideration in the treatment of asthma is avoidance of precipitating factors. When this is a specific animal or occupational exposure, this may be possible; it is however more difficult for house-dust mite or pollens. Exercise-induced asthma should be treated by controlling the condition with medication rather than avoiding exercise.

Desensitisation injections using small quantities of specific allergens are used widely in some countries, but rarely in the UK as they are considered to have limited value since most asthma is precipitated by many stimuli and controlled adequately with simple treatment.

There are two main groups of drugs for the treatment of asthma. The first are the bronchodilators which relax the smooth muscle in the wall of the airways, increase their diameter and relieve breathlessness. The most useful agents are the beta adrenergic agonists (see ADRENERGIC RECEPTORS) such as salbutamol and terbutaline. They are best given by inhalation into the airways since this reduces the general side-effects of oral use. These drugs are usually given to reverse airway-narrowing or to prevent its onset on exercise. However, longer-acting inhaled beta agonists such as salmeterol and formoterol, given in a combined preparation with a steroid or the theophyllines given in tablet form, can be used regularly as prevention. The beta agonists can cause TREMOR and

PALPITATIONS in some patients.

The second group of drugs are the anti-inflammatory agents that act to reduce inflammation of the airway. The main agents in this group are the CORTICOSTEROIDS. They must be taken regularly, even when symptoms are absent. Given by inhalation they have few side-effects. In acute attacks, short courses of oral steroids are used; in very severe disease regular oral steroids may be needed. Other drugs have a role in suppressing inflammation: sodium cromoglycate has been available for some years and is less effective than inhaled steroids. Newer agents directed at specific steps in the inflammatory pathway, such as leukotriene receptor antagonists, are also prescribed in some cases.

Treatment guidelines have been produced by various national and international bodies, such as the British Thoracic Society. Most have set out treatment in steps according to severity, with objectives for asthma control based on symptoms and peak flow. Patients should have a management plan that sets out their regular treatment and their appropriate response to changes in their condition.

Prognosis

A study in 2003 reported on a follow-up of persons born in 1972–3 who developed asthma and still had problems at the age of nine. By the time these persons were aged 26, just over a quarter were still having problems; around half of that number had never been free from the illness and the other half had apparently lost it for a few years but it had returned.

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