

BRONCHODILATORS

Air entering the lungs passes through narrow tubes called bronchioles. In asthma and bronchitis the bronchioles become narrower, either as a result of contraction of the muscles in their walls, or as a result of mucus congestion. This narrowing of the bronchioles obstructs the flow of air into and out of the lungs and causes breathlessness.

Bronchodilators are prescribed to widen the bronchioles and improve breathing. There are three main groups of bronchodilators: sympathomimetics, anticholinergics, and xanthine drugs, which are related to caffeine. They are all used for relief of symptoms, and do not affect the underlying disease process. Anticholinergics are thought to be more effective in, and are used particularly for, bronchitis. In chronic asthma, they are less effective, and are usually prescribed as additional therapy when control with other drugs is inadequate. Sympathomimetics are the first choice drugs in the management of asthma, and are frequently used in bronchitis. Xanthines have been used for many years, both for asthma and bronchitis. They usually need precise adjustment of dosage to be effective while avoiding side effects. This makes them more difficult to use,

and they are reserved for people whose condition cannot be controlled by other bronchodilators alone.

Why they are used

Bronchodilators help to dilate the bronchioles of people suffering from asthma and bronchitis. However, they are of little benefit to those suffering from severe chronic bronchitis.

Bronchodilators are usually taken when they are needed in order to relieve an attack of breathlessness that is in progress. Some people find it helpful to take an extra dose of their bronchodilator immediately before undertaking any activity that is likely to provoke an attack of breathlessness. A patient who requires treatment with a sympathomimetic inhaler more than twice a week or at night should see his or her doctor about preventative treatment with an inhaled corticosteroid.

Sympathomimetic drugs are mainly used for the rapid relief of breathlessness; anticholinergic and xanthine drugs are used both for acute attacks and long-term.

How they work

Bronchodilator drugs act by relaxing the muscles surrounding the bronchioles. Sympathomimetic and anticholinergic

drugs achieve this by interfering with nerve signals passed to the muscles through the autonomic nervous system (see p.35). Xanthine drugs are thought to relax the muscle in the bronchioles by a direct effect on the muscle fibres, but their precise action is not known.

Bronchodilator drugs usually improve breathing within a few minutes of administration. Corticosteroids act more slowly and it may be several days before the capacity for exercise increases substantially. Eventually the corticosteroids should reduce the need for bronchodilators.

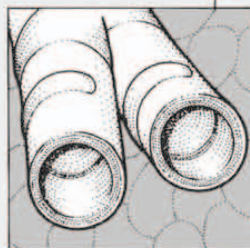
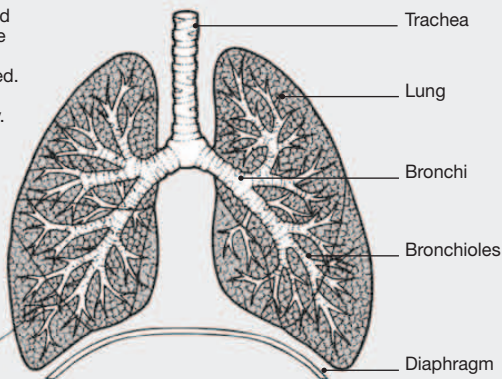
Because sympathomimetic drugs stimulate a branch of the autonomic nervous system that controls heart rate, they may sometimes cause palpitations and trembling. Typical side effects of anticholinergic drugs include dry mouth, blurred vision, and difficulty in passing urine. Xanthine drugs may cause headaches and nausea.

Risks and special precautions

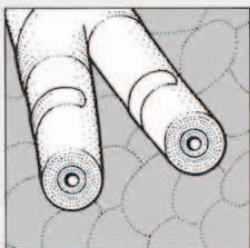
Since most bronchodilators are not taken by mouth, but inhaled, they do not commonly cause serious side effects. However, because of their possible effect on heart rate, xanthine and sympathomimetic drugs need to be prescribed with caution to people with heart problems, high blood pressure, or an overactive thyroid gland. Smoking tobacco and drinking alcohol increase excretion of xanthines from the body, reducing their effects. Stopping smoking after being stabilized on a xanthine may result in a rise in blood concentration, and an increased risk of side effects. It is advisable to stop smoking before starting treatment. The anticholinergic drugs may not be suitable for people with urinary retention or those who have a tendency to glaucoma.

ACTION OF BRONCHODILATORS

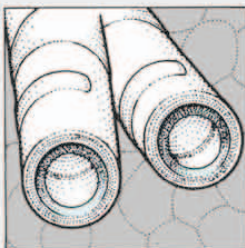
When the bronchioles are narrowed following contraction of the muscle layer and swelling of the mucous lining, the passage of air is impeded. Bronchodilators act on the nerve signals that govern muscle activity. Sympathomimetics enhance the action of neurotransmitters that encourage muscle relaxation. Anticholinergics block the neurotransmitters that trigger muscle contraction and reduce production of mucus. Xanthines promote muscle relaxation by a direct effect on the muscles.



Normal bronchioles
The muscle surrounding the bronchioles is relaxed, thus leaving the airway open.



Asthma attack
The bronchiole muscle contracts and the lining swells, narrowing the airway.



After drug treatment
The muscles relax, thereby opening the airway, but the lining remains swollen.

COMMON DRUGS

Sympathomimetics

Bambuterol
Ephedrine *
Epinephrine *
Fenoterol
Formoterol
Salbutamol *
Salmeterol *
Terbutaline *

Anticholinergics

Ipratropium
bromide *
Tiotropium *

Xanthines

Theophylline/
Aminophylline *

* See Part 3