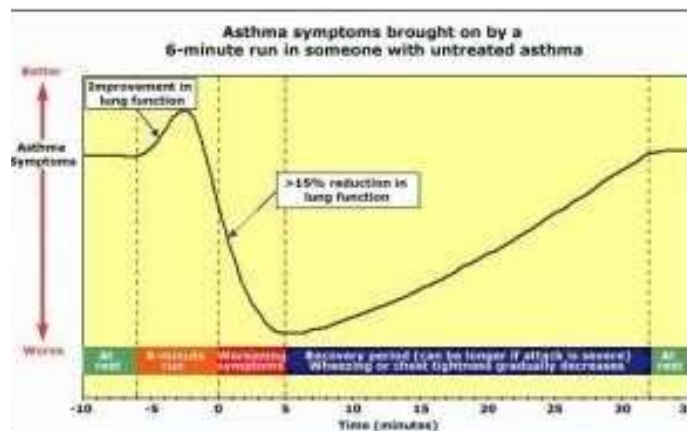


Air flow limitation

- In probably all serious respiratory disease, a key feature that causes morbidity and functional disruption is air flow limitation
- This is true whether it is reversible, as in asthma and exercise-induced bronchospasm, or irreversible, as in chronic bronchitis and emphysema
- This is what is measured in spirometry, and what causes patient distress
- Air flow, like circulation, follows basic rules of physics, starting with Ohm's Law, extended by Poiseuille's equation, and modified by Reynold's Number. If they are unfamiliar to you, or you have long forgotten them - as most have - look them up in 'Mission Physician'.



Asthma

Definition

A chronic inflammatory disorder of airways characterized by coughing, shortness of breath, and chest tightness

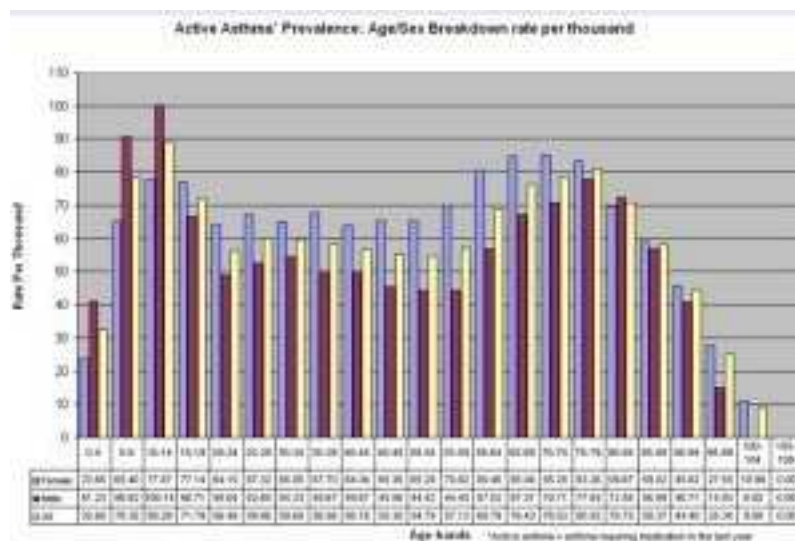
Prevalence

Affects more than 5% of the population of the US, including children

Triggers

Various situations may initiate or worsen an asthma attack, including:

- viral respiratory infections
- exercise
- exposure to irritants such as tobacco smoke
- genetic components



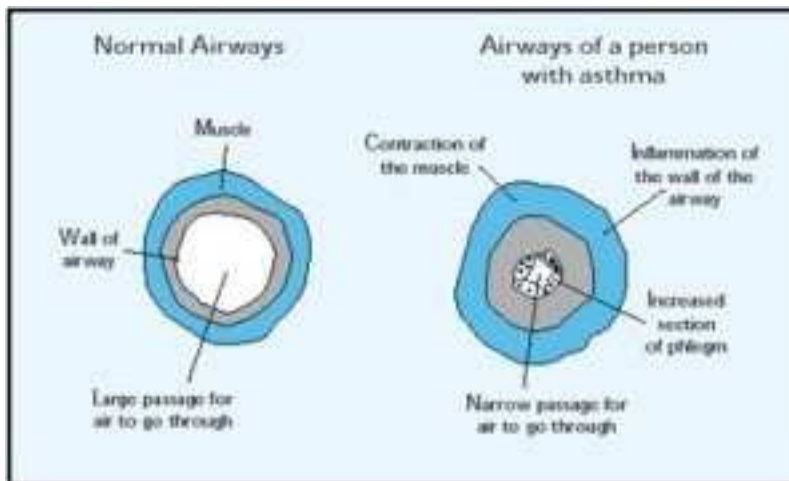
Pathophysiology

Symptoms are due to narrowing of airways caused by edema (fluid in the intracellular tissue space) and the influx of inflammatory cells into the walls of the airways.

Cause

"Complex" heritable disease. i.e. a number of genes contribute toward person's susceptibility to a disease.

- Although a gene has not been specifically identified, an investigational site is chromosome 5 which is rich in genes coding for key molecules in inflammatory response



Airway obstruction

4 factors

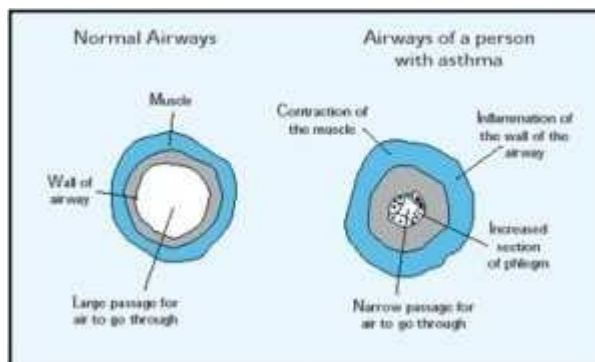
1. Acute

bronchoconstriction

- This results from IgE dependent release of mediators from mast cells that include histamine, tryptase, leukotrienes, and prostaglandins which directly contract airway smooth muscle
- Other stimuli, including exercise, cold air, and irritants, can initiate the response
- Aspirin and other non-steroidal anti-inflammatory drugs can also initiate the response in susceptible patients

2. Airway edema

- Airway wall edema, even without smooth muscle contraction or bronchoconstriction, limits airflow
- Increased microvascular permeability and leakage caused by released mediators also contribute to mucosal thickening and swelling of the airway
- Consequent swelling of the airway wall causes the airway to become more rigid and interferes with airflow



Airway obstruction

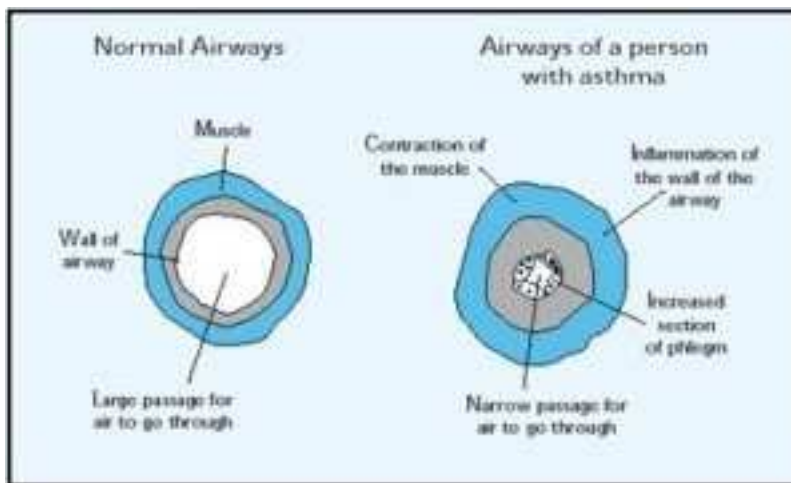
3. Chronic mucus plug formation

- This may arise as a consequence of mucus secretion and the formation of inspissated mucus plugs, which, in severe intractable asthma, may cause persistent airflow limitation

4. Airway remodeling

In some, airflow limitation may be only partially reversible because:-

- (?) structural changes in the airway matrix that may accompany longstanding and severe airway inflammation
- (?) Alteration in amount and composition of the extracellular matrix in the airway wall.
- Consequently, airway obstruction may become persistent and unresponsive



Management goals

1. Achieve and maintain control of symptoms
2. Prevent exacerbations
3. Maintain pulmonary function as close to normal levels as possible with normal activity levels, including exercise
4. Avoid adverse effects from medications
5. Prevent the development of irreversible airflow limitation
6. Prevent asthma mortality



Treatment

Medications are divided into those used for rescue, and those used for control

Rescue medications

- act quickly to relax airway bronchoconstriction. They are short-acting bronchodilators (SABA) including inhaled beta2-agonists (albuterol) and anticholinergics (ipratropium)
- for severe episodes, a short course of oral corticosteroid may be added which can help relieve acute symptoms within a few hours



Controller medications

- Taken daily can prevent, reduce or reverse airway swelling
- Anti-inflammatories agents (cromolyn), inhaled/oral corticosteroids and leukotriene inhibitors



- Other agents include long-acting bronchodilators may be used in conjunction with anti-inflammatory drugs

Current recommendations favor the use of an ICS (inhaled corticosteroid) combined with a LABA (long-acting beta-agonist) in all but the mildest, occasional asthma

Medications

Within the principles of treatment outlined, the medications selected depend on:

- severity
- chronicity
- pathophysiology

Medications are chosen with the pathophysiology in mind

For example:

- acute bronchospasm is treated with short acting beta-agonists(SABA) such as Ventolin.
- inflammation is treated with an inhaled corticosteroid (ICS) such as Azmacort, or sometimes, dependent on circumstances, by the oral or intravenous route.
- activation of the leukotriene pathway is dealt with by a leukotriene inhibitor such as Singulair.
- mast cell activity is diminished by drugs such as Cromolyn

Combinations of all are common



Patient goals

- Be active without having asthma symptoms - even during exercise and sports
- Sleep through the night without having asthma symptoms
- Prevent asthma episodes
- Have optimal measurable peak flow
- Avoid side effects from unnecessary medication

Wikipedia

