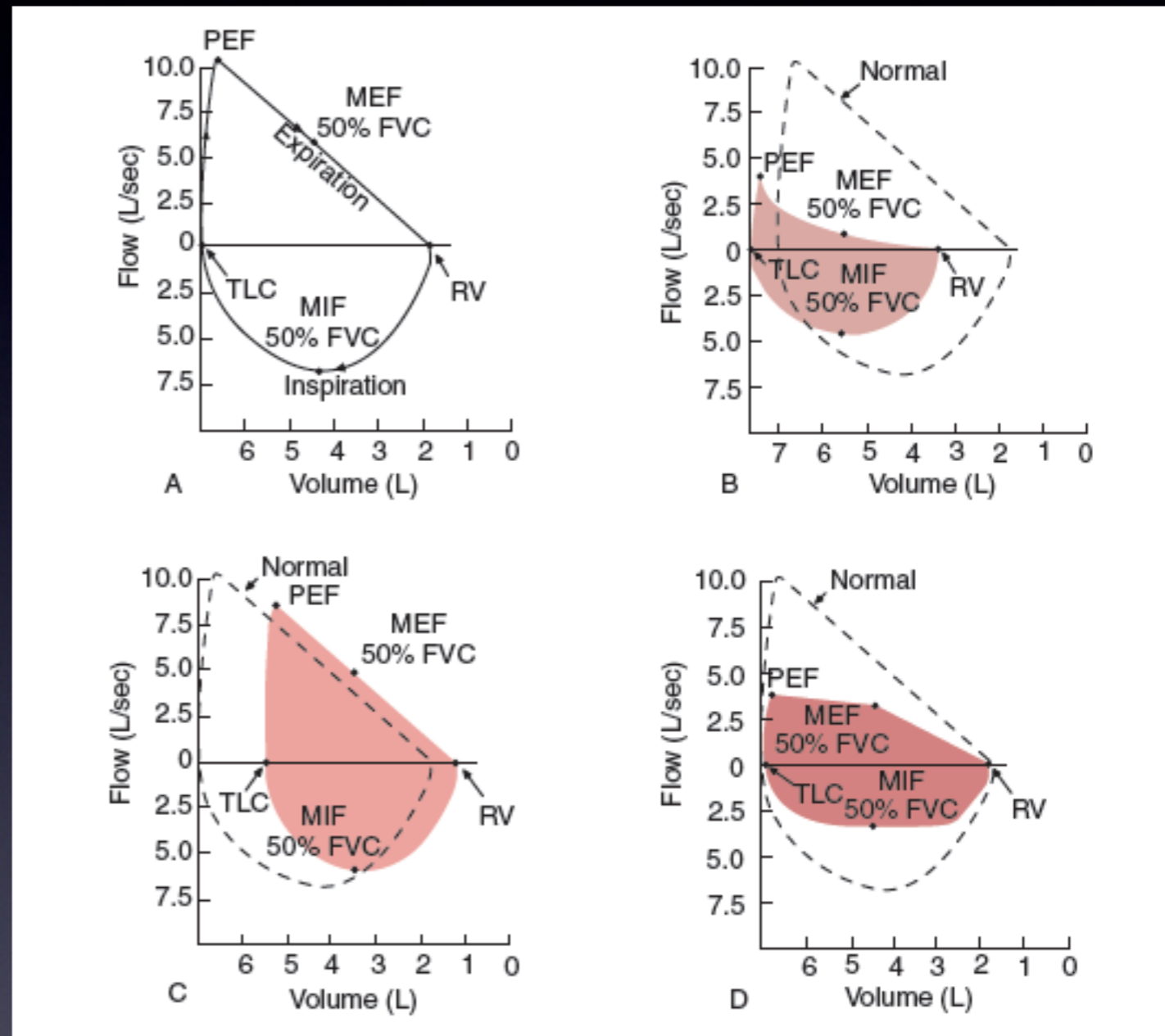




Asthma

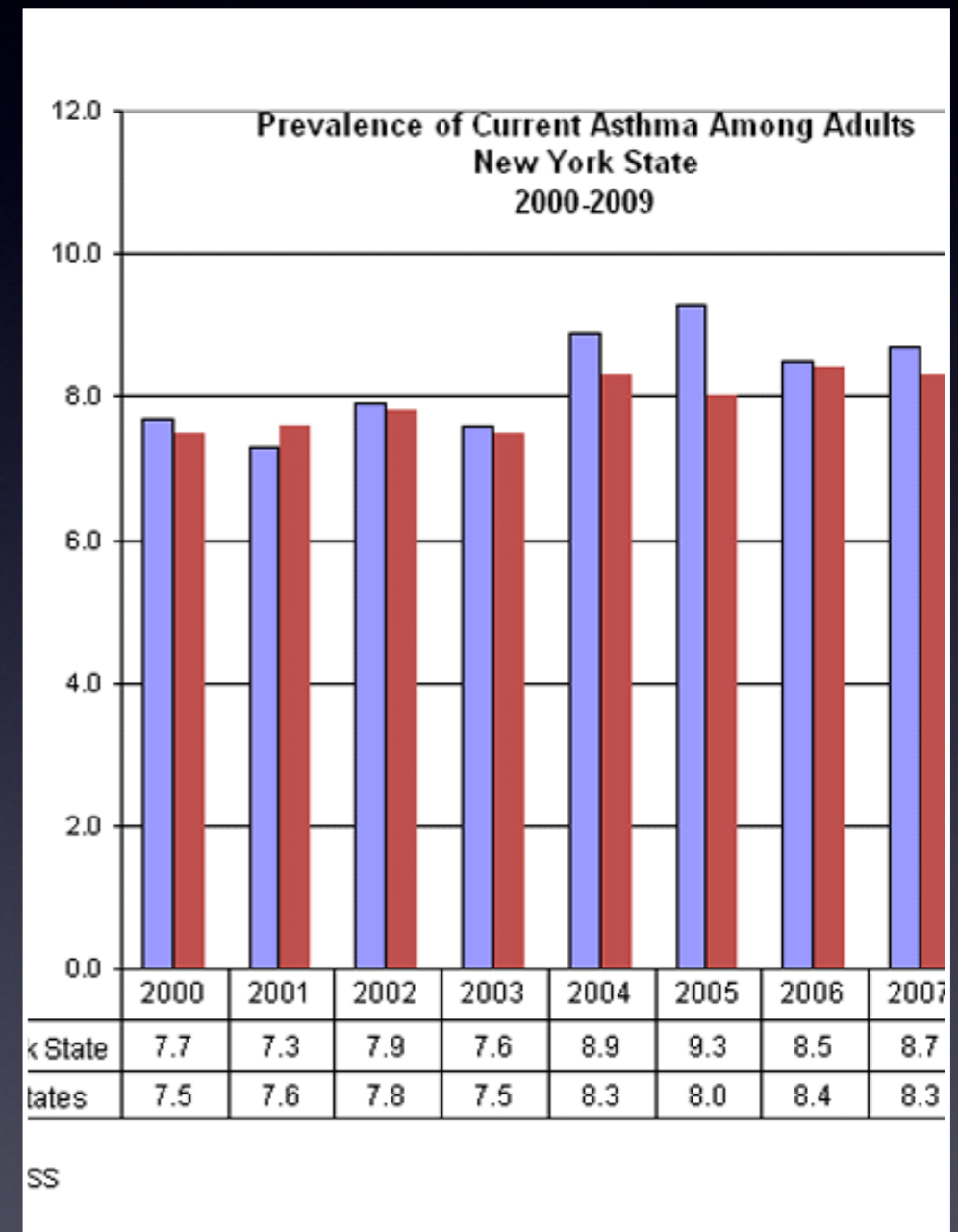
Air Flow Limitation

- In most serious respiratory disease, a key feature causing morbidity and functional disruption is air flow limitation.
- True whether reversible, asthma and exercise-induced bronchospasm, or irreversible, chronic bronchitis and emphysema
- Air flow limitation is measured in spirometry
- Air flow, like circulation, follows basic rules of physics, Ohm's Law, extended by Poiseuille's equation and modified by Reynold's Number.



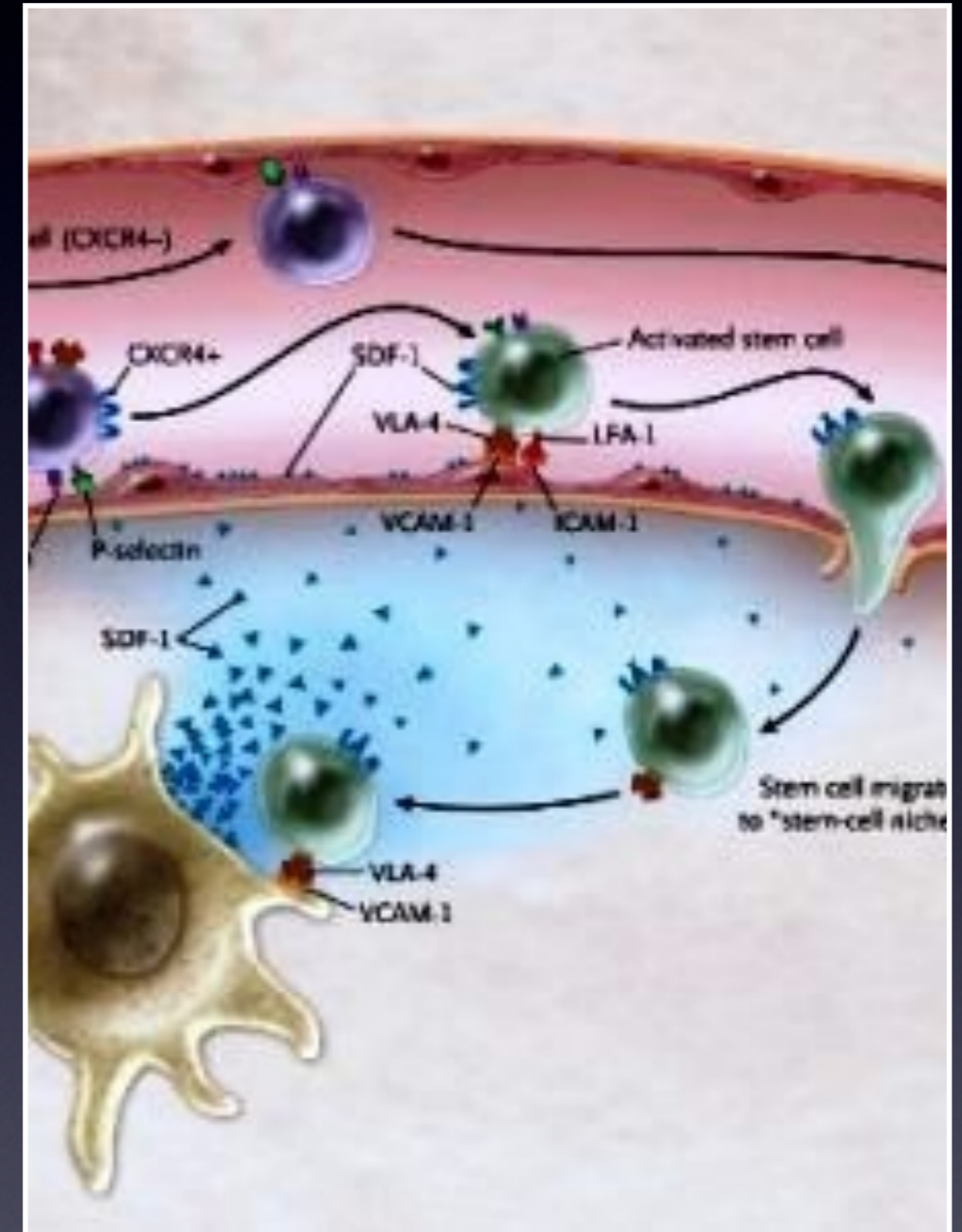
Asthma

- Definition - chronic inflammatory disorder of airways characterized by coughing, shortness of breath, and chest tightness.
- Prevalence - more than 5% of US population including children.
- Triggers - various, including:
 - viral respiratory infection
 - exercise
 - irritant exposure, tobacco smoke, dust
 - genetic components



Pathophysiology

- Narrowing of airways caused by edema (fluid in the intracellular tissue space) and influx of inflammatory cells into walls of airways.
- Cause - "Complex", inheritable disease ie. number of genes contribute towards disease susceptibility. An investigational site is chromosome 5 - rich in genes coding for key molecules in inflammatory response.

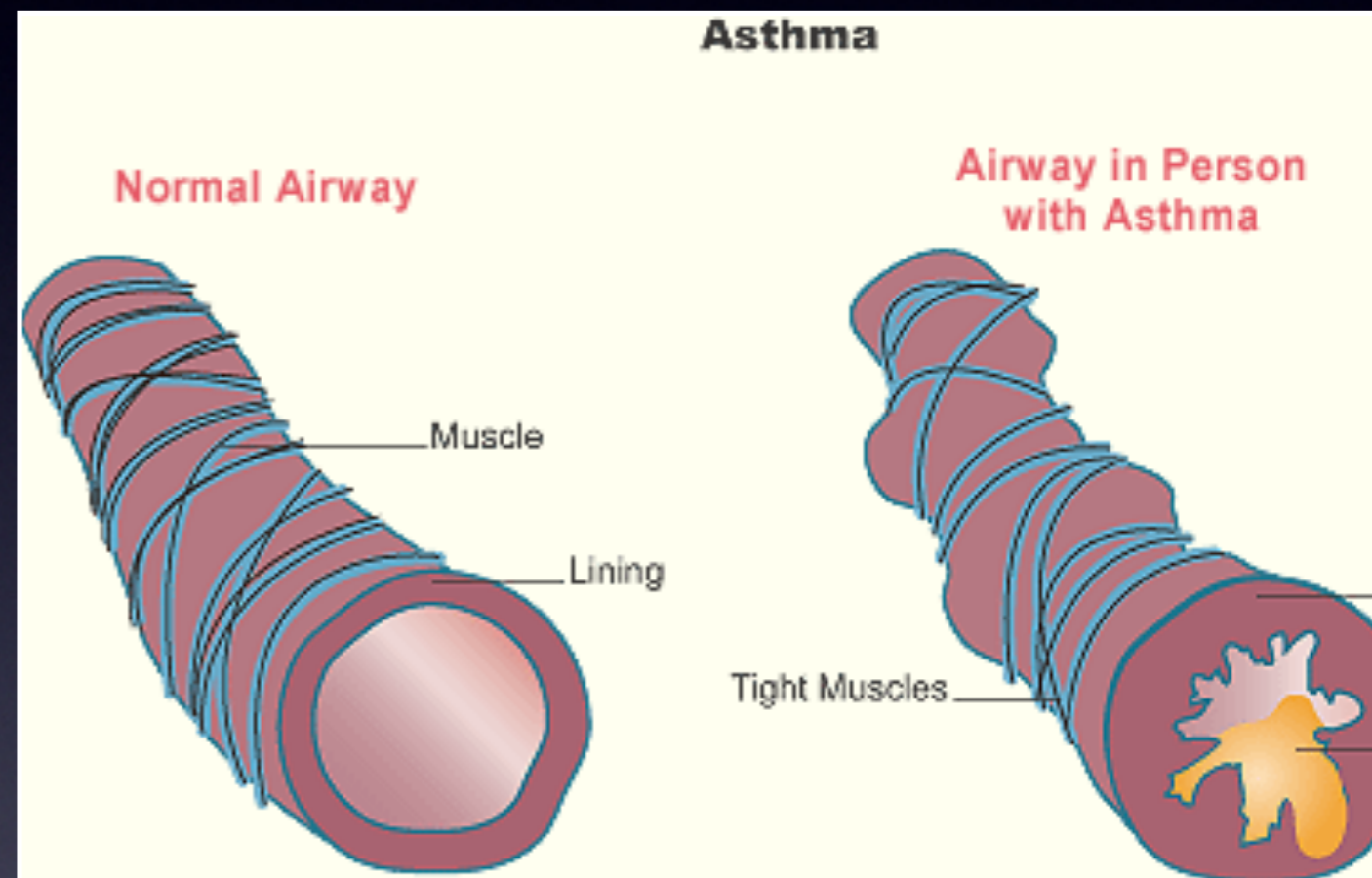


Airway obstruction

4 factors

1 Acute bronchoconstriction

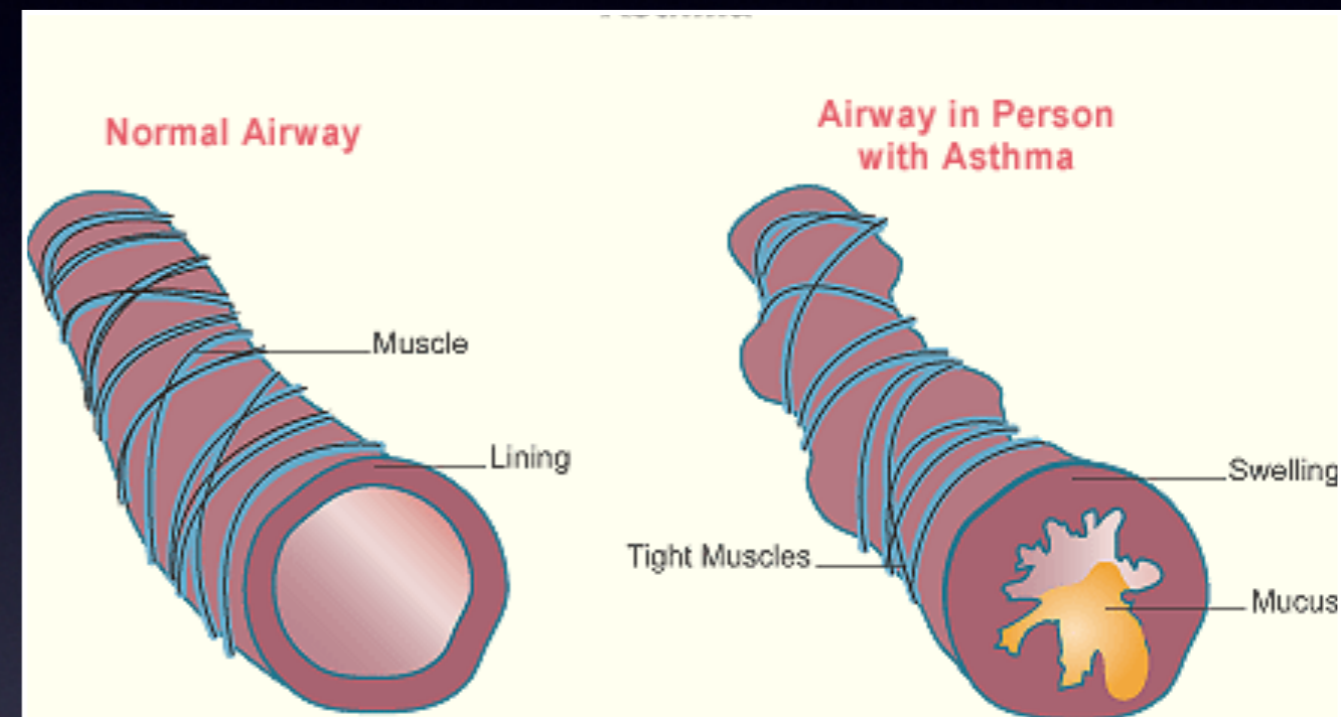
- Results from IgE dependent release of mediators from mast cells including histamine, tryptase, leukotrienes and prostaglandins which directly contract airway smooth muscle.
- Other stimuli including exercise, cold air and irritants can initiate the response.
- Aspirin and other non-steroidal agents can do so in susceptible subjects.



Airway obstruction

2 Airway edema

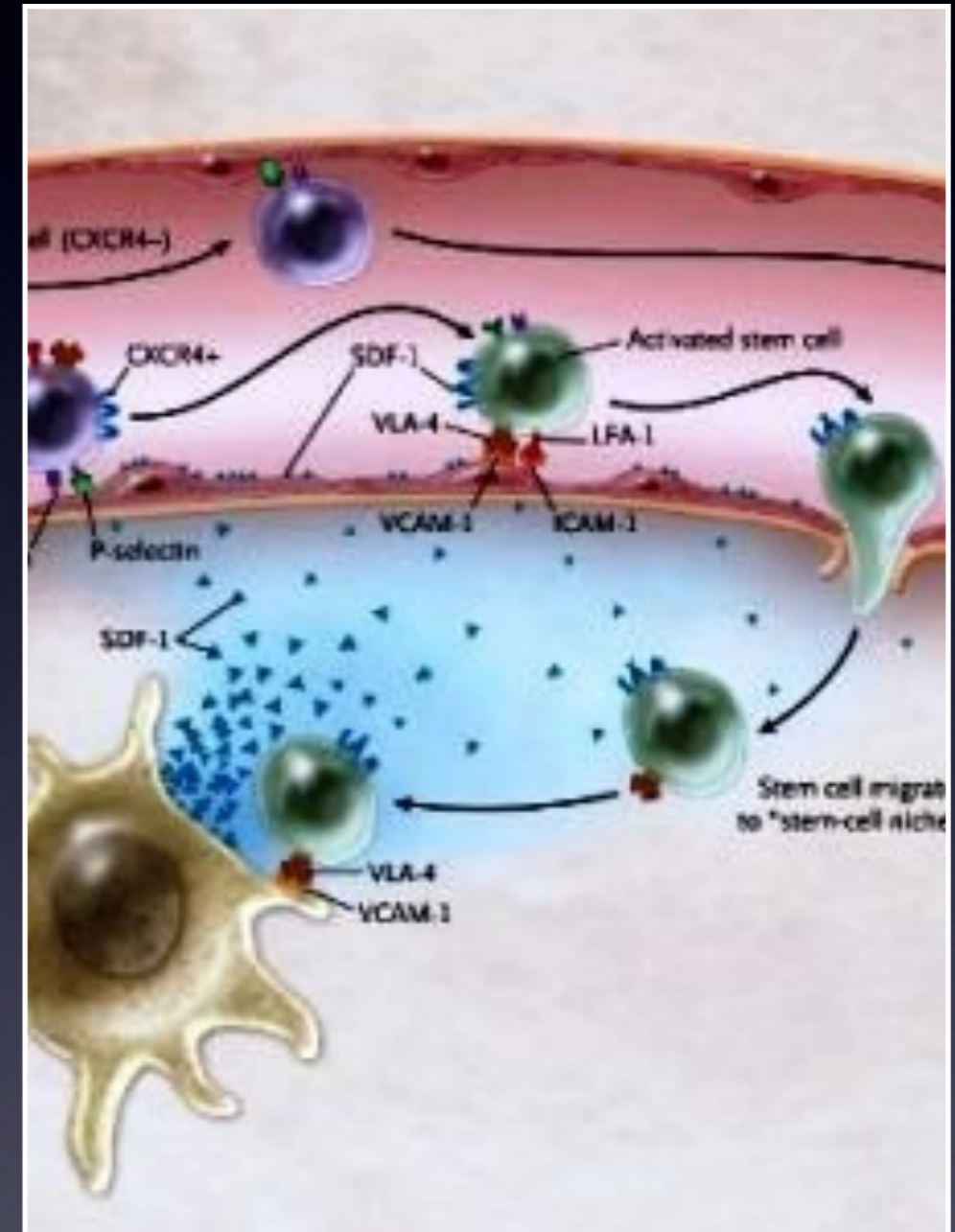
- edema of wall of airway limits airflow without smooth muscle contraction of bronchoconstriction
- increased microvascular permeability and leakage, caused by released mediators, also contributes to mucosal thickening and swelling of airway wall.
- Consequent airway swelling causes rigidity which also interferes with airflow



Airway obstruction

3 Chronic mucus plug formation

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

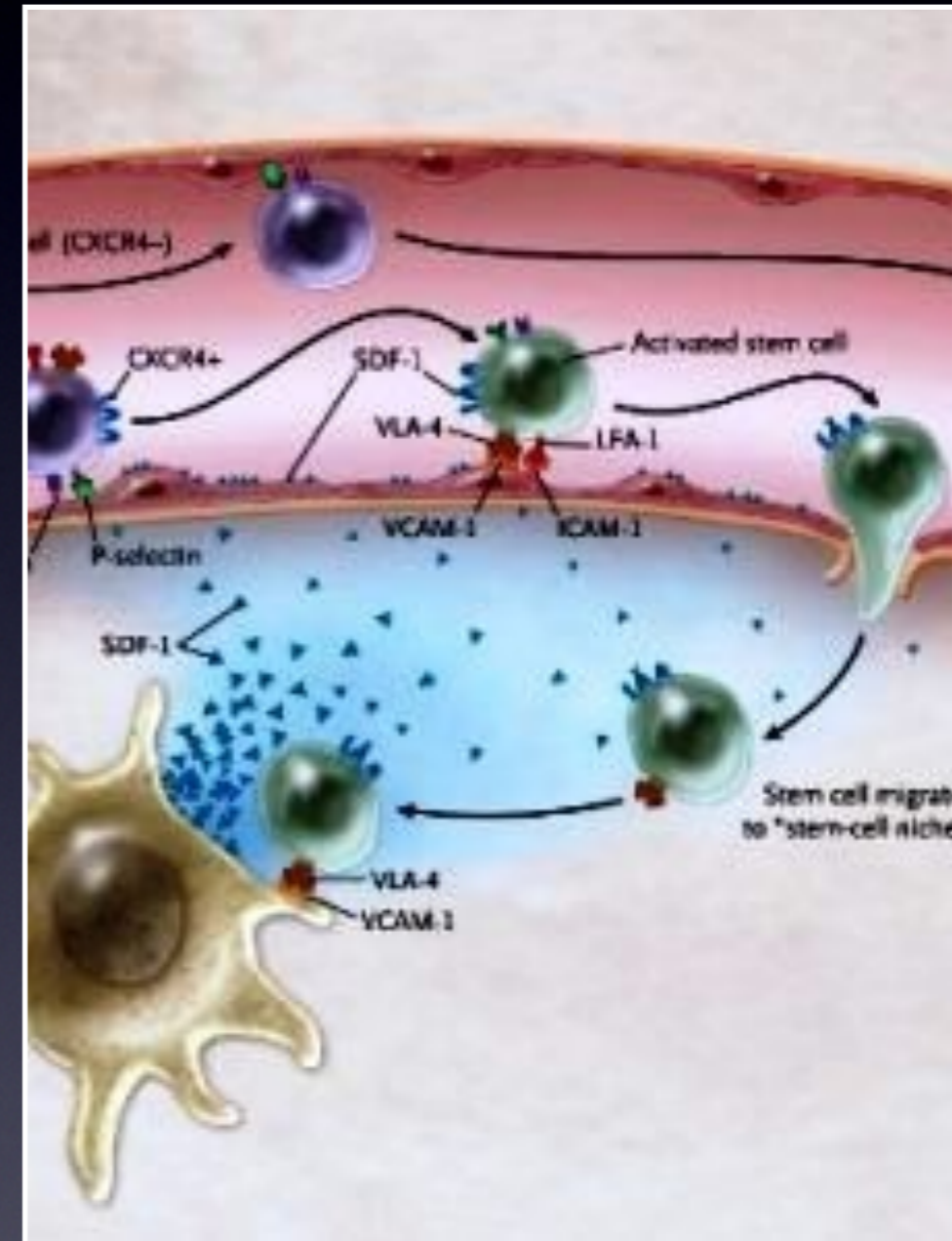


Airway obstruction

4 Airway remodeling

- In some, airflow limitation may be only partially reversible because:-
- questionable structural changes in airway matrix that may accompany longstanding and severe airway inflammation.
- questionable alteration in amount and composition of extracellular matrix in airway wall.

Consequently, airway obstruction may become persistent and unresponsive to management.



Treatment

Medications divided into rescue, and control

Rescue medications

- act quickly to relax airway bronchoconstriction. These short acting bronchodilators (SABA) include inhaled beta2-agonists (Albuterol) and anticholinergics (Ipratropium)
- For severe episodes, a short course of oral corticosteroids may be added and relieve symptoms after a few hours.



Management goals

- Achieve and maintain symptom control and normal daily activities
- Minimize need for short acting beta agonists
- Prevent exacerbations and ER visits
- Maintain pulmonary function as normal as possible, including during exercise
- Avoid adverse medication effects
- Prevent development of irreversible airflow limitation
- Prevent mortality



Treatment

Controller medications

- With daily use, prevent, reduce or revers airway swelling
- Include anti-inflammatory agents (cromolyn), inhaled/oral corticosteroids and leukotriene inhibitors
- Other agents include long-acting bronchodilators which may be used in conjunction with anti-inflammatory drugs.
- Current recommendations favor use of an inhalational corticosteroid combined with a long acting beta-agonist in all but mild, occasional asthma.



Medications

Within the principles outlined, selection of medications depends on:

severity
chronicity
pathophysiology

Examples:

- acute bronchospasm is treated with short acting beta-agonists (Ventolin)
- inflammation is treated with inhaled corticosteroid (Azmacort), sometimes orally
- activation of leukotriene pathway is treated with Singulair, a leukotriene inhibitor



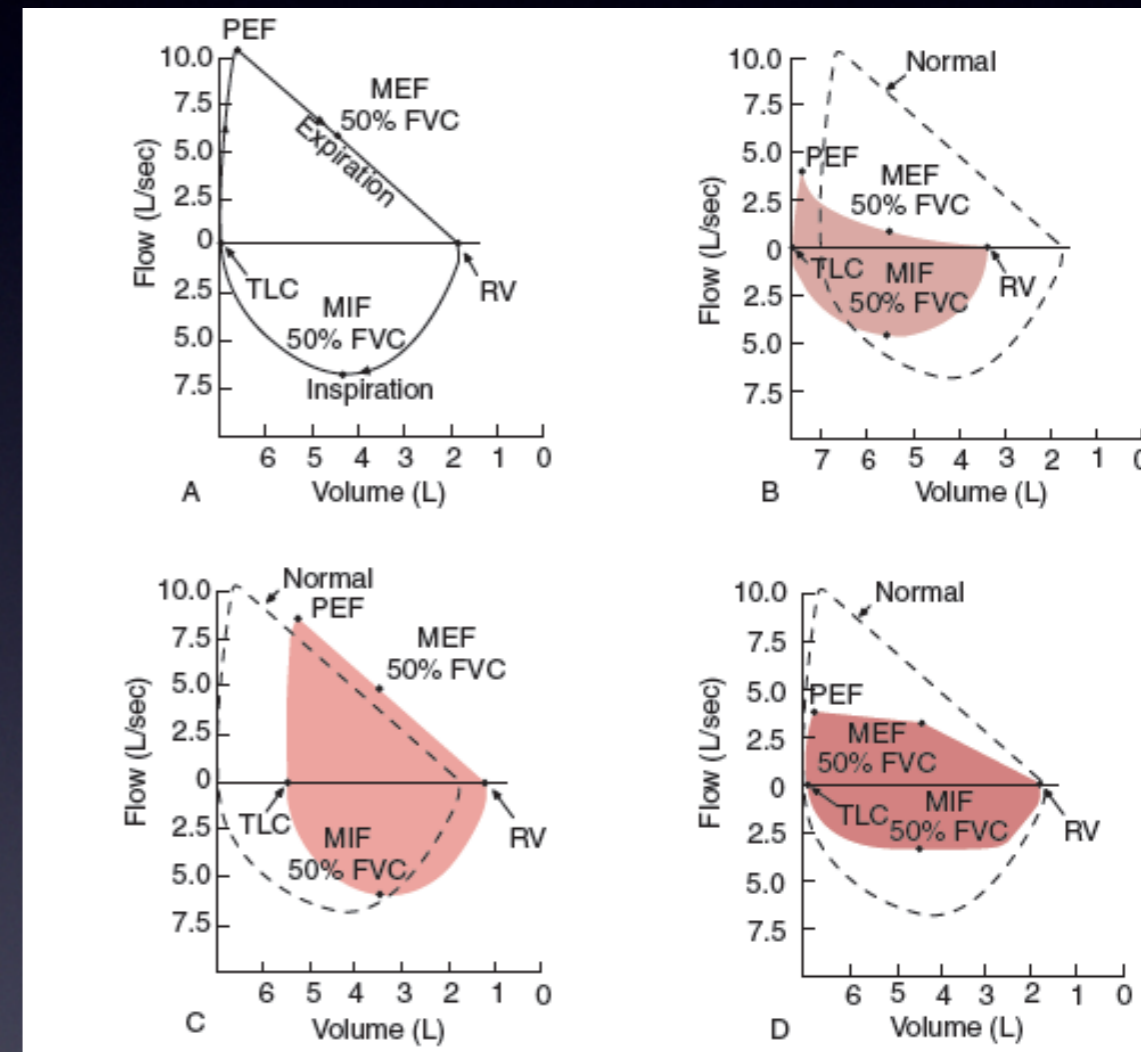
Patient goals

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



Criteria - intermittent asthma

- Daytime sx occurring < 2 times / week
- 2 or fewer nocturnal awakenings / month
- Use of SABA < twice / week
- No interference with normal activities between exacerbations
- FEV1 consistently within normal between exacerbations
- One or zero exacerbations / year requiring corticosteroids





End