

NURS 821 Alterations in Respiration and Ventilation

Lecture 7
Part 4 Complex Pulmonary Disorders

Complex Respiratory Problems

Alterations in
Ventilation, Perfusion,
Diffusion

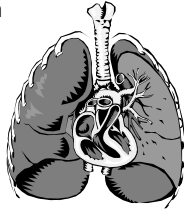
Asthma Definition



- Asthma is a lung disease characterized by:
 - Airway obstruction or narrowing
 - Partially or totally reversible spontaneously or with treatment
 - Airway inflammation
 - Airway hyper-responsiveness to various stimuli
 - **Reversible, therefore, not C.O.P.D.!**
 - (NHLBI)

Asthma Statistics

- One of the most common conditions in the U.S.
- In 1995, affected 14.9 million
 - 1.5 million E.R visits
 - 500,000 hospitalizations
 - 5,500 deaths
 - (NIH, 2000)



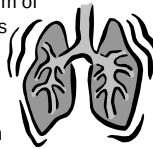
Asthma Incidence

- **Affects more females than males, except in children**
 - Females had higher hospitalization rates
- Increased incidence in children
- Increased in African Americans
- Prevalence increasing since the early 1980's
 - All ages increased 75%
 - Children below 4, increased 160%



Asthma in the 21st Century

- Researchers at NIEHS (2000) collected indoor dust from 831 homes in 75 diverse areas
 - >45% (44 million homes) have bedding w dust mite concentration exceeding 2 mcg/gm of dust; level associated w allergies
 - Over 23% of these (22 million) concentrations > 10mcg.gm- level that triggers asthma symptoms in susceptible persons
 - 17% (6 million homes) cockroach allergen detectable in bedding



Dust Mite

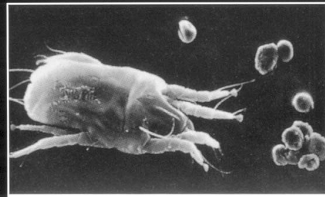


Fig. 23.18 House dust mite – a major allergen. Electronmicrograph showing a house dust mite, Dermatophagoides pteronyssinus, and faecal pellets (bottom right) which represent the major source of allergen. It is the faecal pellets rather than the mite itself that become airborne and reach the lungs. (Courtesy of Dr R. Tovey.)

Hyper-responsive lungs are TRIGGER happy!

- Some common triggers include antigens or allergens.

Avoid Irritants!

- Irritants can stimulate the inflamed hyper-responsive asthmatic airways.
- Irritants vary from individual to individual.
- Common potential irritants are tobacco and wood smoke; strong odors from perfumes, cleaning products, paints, cooking; air pollutants, ozone, and sulfur oxide.

Irritants

- Noxious odors
 - Pool chlorine
 - Paint
 - New carpeting and carpet glues
 - Synthetic upholstery
 - ??? Sick Building Syndrome ???

Asthma Triggers

- Illness – sinusitis, PND, URI, OTM, nasal polyps, cough states
- Allergies
- Irritants
- Exercise
- Aspirin
- Emotion – exacerbates!

Temperature and Climate Issues

- Temperature
 - Too hot or too cold
- Humidity
- Fog
- Pollen
- Barometric pressure changes

Emotions and Asthma

- Anxiety results from shortness of breath and can further exacerbate the condition.

Women and Asthma

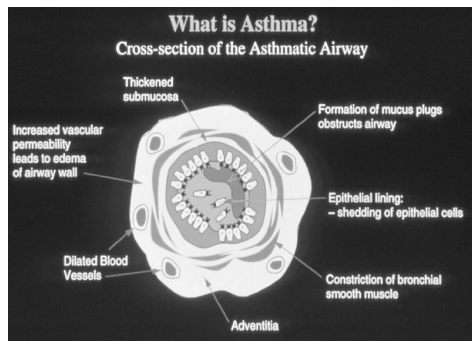
- Diminished estrogen exacerbates asthma
 - Researchers studied 200 ED admissions for women. >59% occurred 3 days pre- or 4 days post-menses when estrogen drops
 - Immune function diminishes premenstrually-increased URIs.
 - Asthma severity increases post-menopause
 - (Allegheny University of Health Sciences, 1997)

Effects of Peptide Leukotrienes in Asthma

- Airway Constriction
- Increased Vascular Permeability
- Mucosal Edema
- Mucus Hypersecretion

Asthma Pathophysiology

- Bronchial irritant
- ANS imbalance: PSNS dominance or SNS local block
- IgE mast cell mediator release
- Asthma attack: bronchospasm, mucosal edema, increased thickened mucus production
- Large and small airway obstruction
- Labored breathing
- Expiration difficult



Asthma Exacerbations

- Acute or sub-acute episodes of progressively worsening shortness of breath, wheezing, cough, chest tightness, or a combination of symptoms.
- Characterized by decreased expiratory airflow.

Airway Obstruction Causes the Clinical Manifestations of Asthma

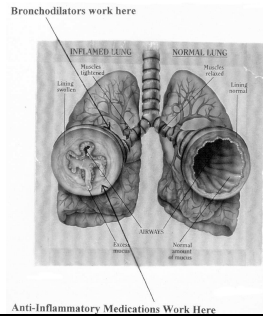
- Wheezing
- Dyspnea
- Cough

Airflow Obstruction is Determined by Airway Diameter

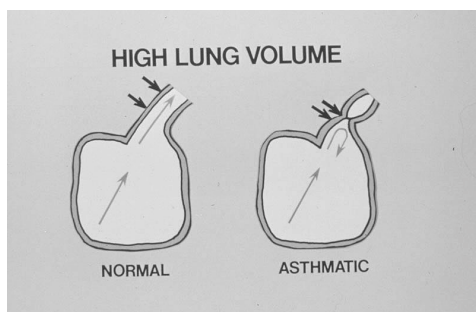
- Airway diameter is influenced by inflammatory events:
 - Bronchial wall edema
 - Mucus production
 - Airway smooth muscle contraction
 - Airway hypertrophy

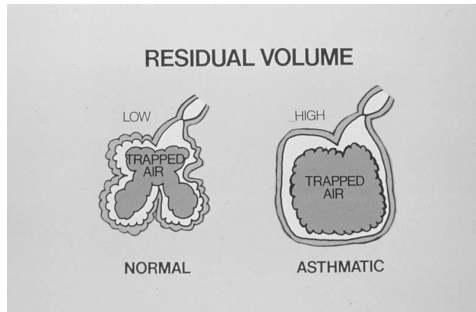
Airway inflammation is a key factor in airway hyper-responsiveness, suggesting that airway inflammation is present in all forms of asthma, even mild asthma.

Inflammation in Asthma



- Increased airway resistance
- Decreased FEV and flow rates
- Hyperinflation
- Changed elastic recoil
- Altered arterial blood gases





- Manifested by chronic or recurrent productive cough.
- Present on most days for a minimum of three months in the year for two or more successive years.
- Mucus hyper-secretion should not be due to specific diseases such as lung abscess, bronchiectasis, tuberculosis.

Clinical Manifestations of Chronic Bronchitis

- "Blue Bloater"-chronic hypoxemia leads to polycythemia and increased amount of deoxygenated Hgb
- Chronic inflammation-increased mucus production and trapping leads to increased work of breathing, infections, and inflammation promoting the cycle
- Generally, not cachectic in appearance
