Chronic obstructive Pulmonary disease (COPD)

- Chronic partial or complete obstruction to air flow
- Trachea - smallest airway
- Functional disability of lungs
- Diffuse lung diseases

COPD

- Emphysema
- Chronic bronchitis
- Bronchial asthma
- Bronchiectasis

Emphysema

- Permanent dilalatation of air spaces distal to terminal bronchioles
- Destruction of wall of dilated air spaces
- Usually associated with ch bronchitis

Classification of 'True Emphysema' and 'Overinflation'.

A. TRUE EMPHYSEMA

1. Centriacinar (centrilobular) emphysema
2. Panacinar (panlobular) emphysema
3. Paraseptal (distal acinar) emphysema
4. Irregular (para-cicatricial) emphysema
5. Mixed (unclassified) emphysema

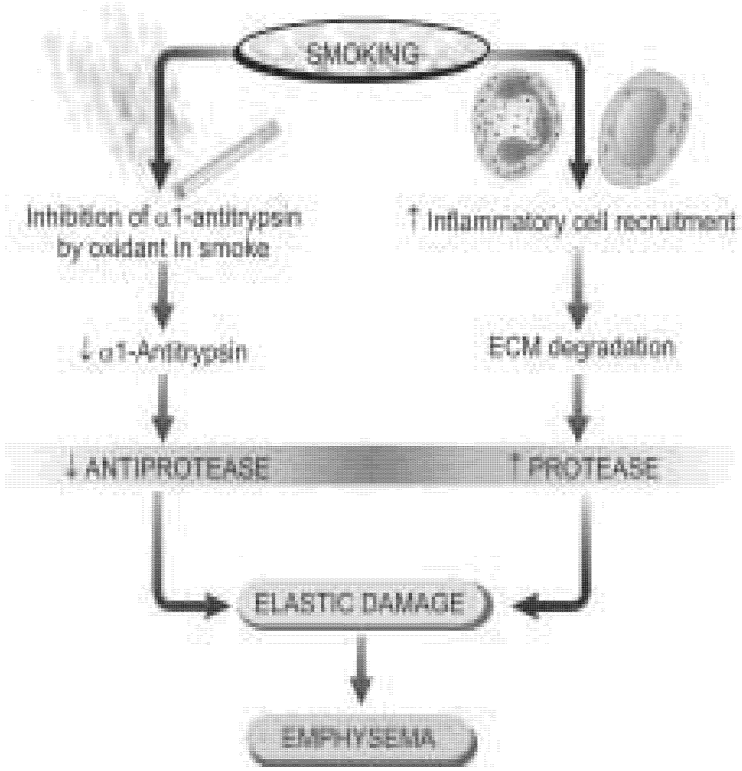
B. OVERINFLATION

1. Compensatory overinflation (compensatory emphysema)
2. Senile hyperinflation (aging lung, senile emphysema)
3. Obstructive overinflation (infantile lobar emphysema)
4. Unilateral translucent lung (unilateral emphysema)
5. Interstitial emphysema (surgical emphysema)

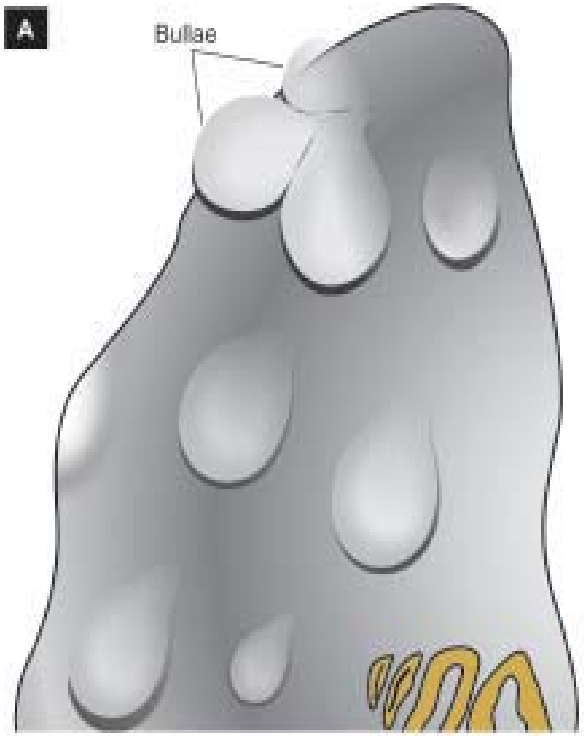
Aetiopathogenesis Emphysema

- **Imp factors**
- tobacco smoke and air pollution
- Occupational exposure
- Infection
- Familial & genetic influences

Protease-antiprotease hypothesis:


SMOKING
Inhibition of α1-antitrypsin by oxidant in smoke
↑ Inflammatory cell recruitment
↓ α1-Antitrypsin
ECM degradation
↓ ANTIPROTEASE
↑ PROTEASE
ELASTIC DAMAGE
EMPHYSEMA

Morphology



Clinical features

- 1. There is long history of slowly increasing severe exertional dyspnoea.
- 2. Patient is quite distressed with obvious use of accessory muscles of respiration.
- 3. Chest is barrel-shaped and hyperresonant.
- 4. Cough occurs late after dyspnoea starts and is associated with scanty mucoid sputum.
- 5. Recurrent respiratory infections are not frequent.
- 6. Patients are called ‘pink puffers’ as they remain well oxygenated and have tachypnoea.
- 7. Weight loss is common.
- 8. Features of right heart failure (cor pulmonale) and hypercapneic respiratory failure are the usual terminal events.
- 9. Chest X-ray shows small heart with hyperinflated lungs.

Types of emphysema

Centriacinar emphysema:

- Involves respiratory bronchioles(central or proximal part)
- Common in smokers/coal miners

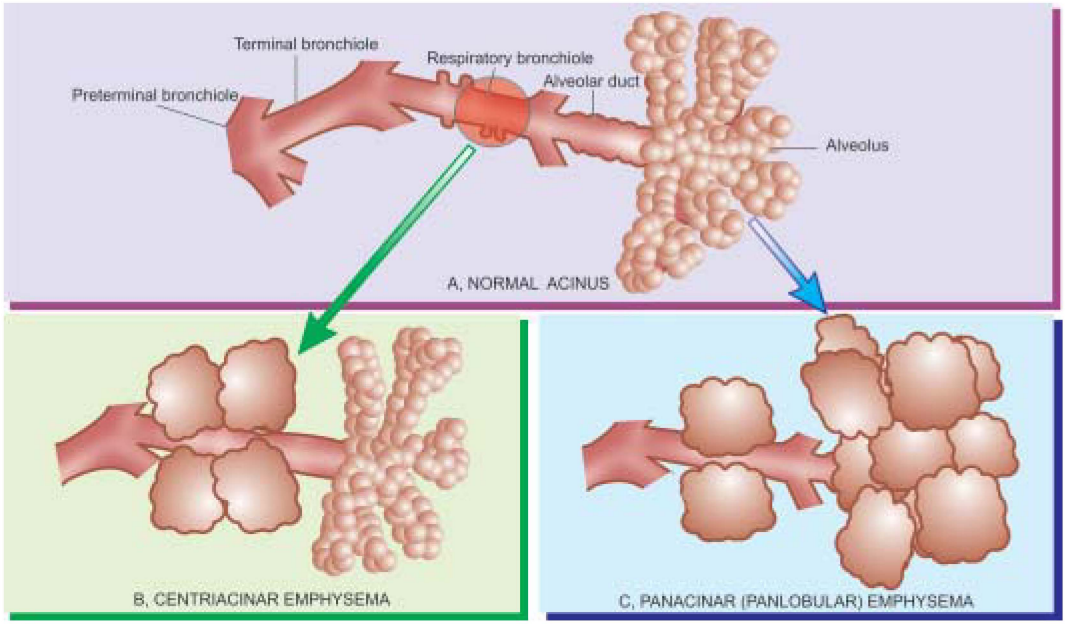
G/A:

- Lesions in upper lobes of lung
- Distended air spaces in centre of lobules
- Lobules separated by fine fibrous septa
- Large amount of black pigment in wall

M/E:

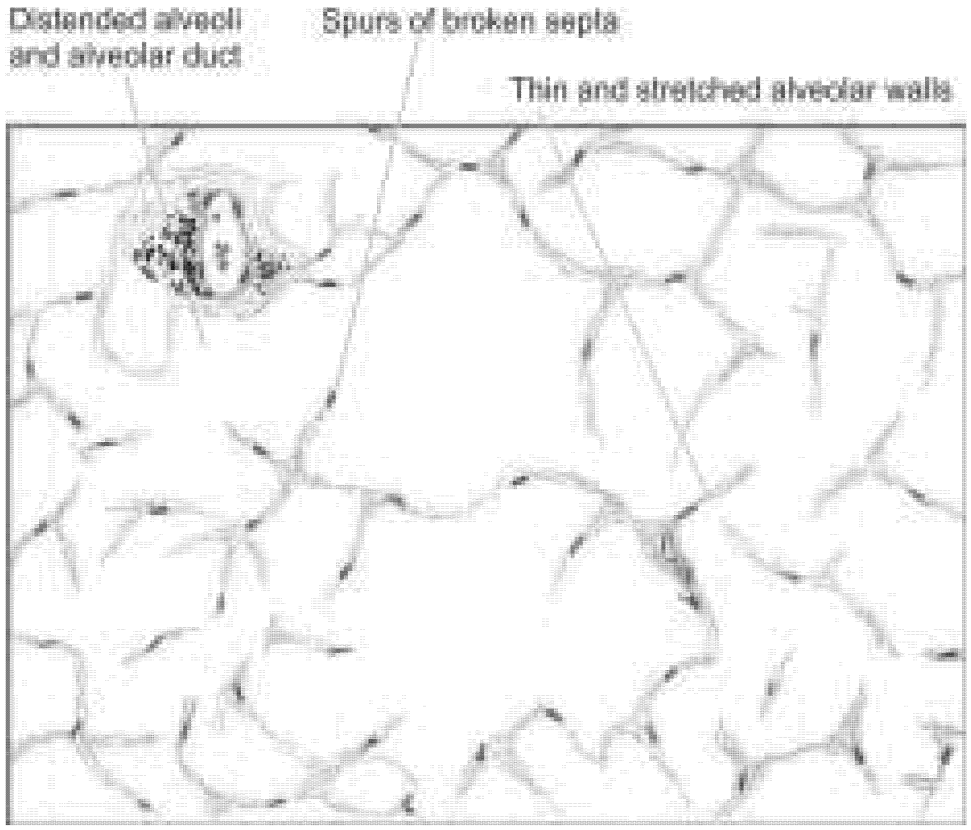
Distension & destruction respiratory bronchiole

Uninvolved alveoli at perphery


Terminal bronchiole
Respiratory bronchiole
Preterminal bronchiole
Alveolar duct
Alveolus
A, NORMAL ACINUS
B, CENTRIACINAR EMPHYSEMA
C, PANACINAR (PANLOBULAR) EMPHYSEMA

Types

- **Panacinar emphysema:**
- Middle age
- Smokers
- Portion of acinus affected not entire lung
- Associated with α1 antitrypsin deficiency
- **G/A**:
- Involve lower zone of lung
- Lungs enlarged and overinflated
- **M/E:**
- All portions of acini distended, wall stretched & thin
- Ruptured wall and spur of broken septa.
- Capillaries stretched & thin
- No inflammation


Distended alveoli
and alveolar duct
Spurs of broken septa
Thin and stretched alveolar walls

- **Paraseptal emphysema:**
- Involve distal part of acinus
- Along pleura
- Adjacent to area of fibrosis and atelectasis
- Causes spontaneous pneumothorax in adults
- Subpleural portion show 0.5-2.0cms air filled cysts

- **Irregular emphysema:**
- Most common type
- Often asymptomatic
- Around scars
- Involvement irregular
- Incidental autopsy finding

- **Mixed emphysema**:
- Same lung show more than one type of emphysema
- Due to more severe involvement
- **Interstitial emphysema (Surgical emphysema):**
- Entry of air in connective tissue lung
- i) Violent coughing with bronchiolar obstruction e.g. in children with whooping cough, bronchitis, in patients with obstruction to the airways by foreign bodies, blood clots and exposure to irritant gases.
- ii) Rupture of the oesophagus, trauma to the lung, or major bronchus and trachea.
- iii) Entry of air through surgical incision.
- iv) Fractured rib puncturing the lung parenchyma.
- v) Sudden change in atmospheric pressure e.g. in decompression sickness.