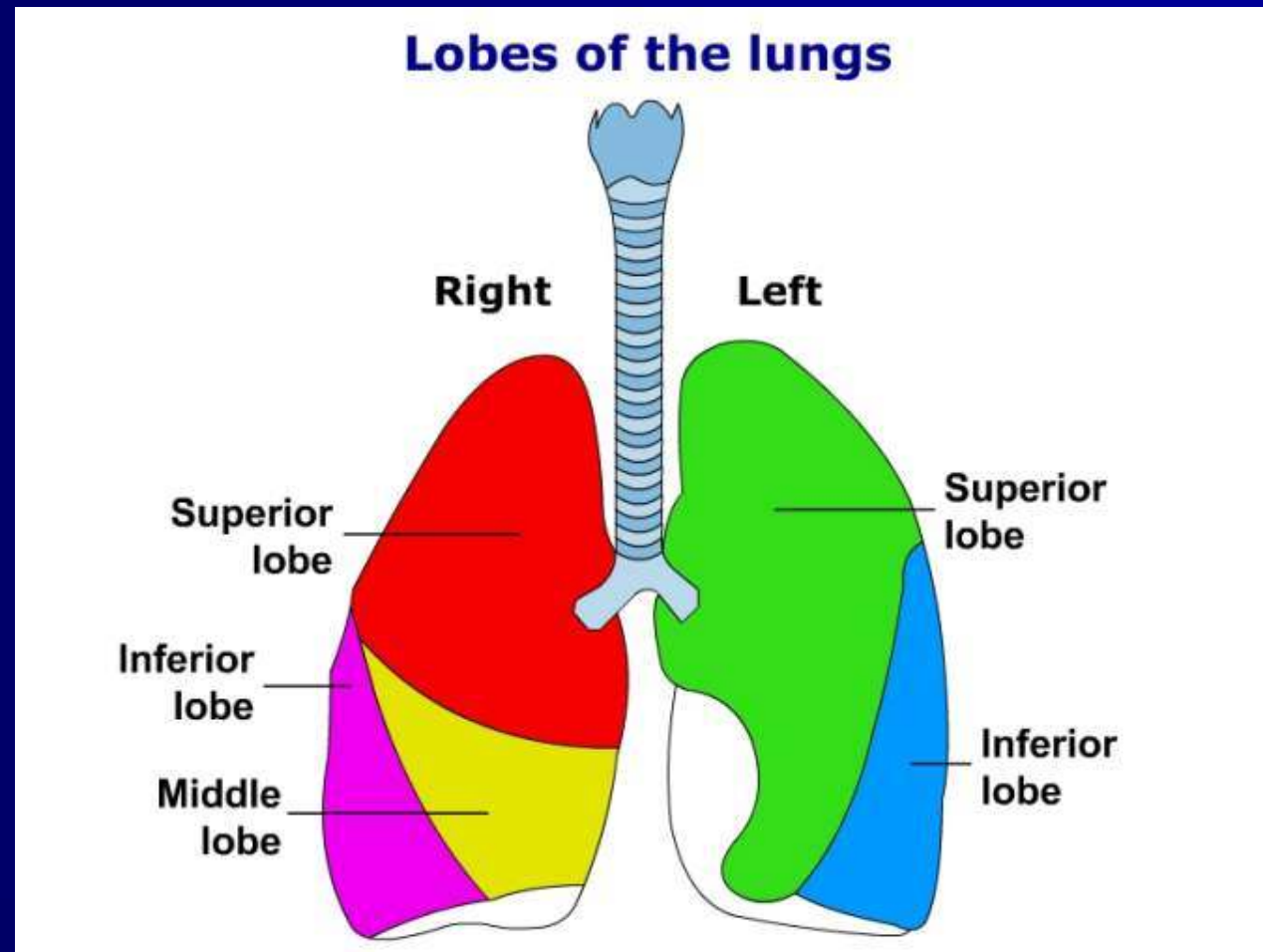


# Review of common conditions of the Respiratory System



# Respiratory pathologies

## common conditions

- Chronic Obstructive Airway Disease
- Asthma
- Tuberculosis
- Pneumonia
- Pleurisy
- Acute Bronchitis
- Influenza
- Bronchiectasis
- Pneumothorax
- Pulmonary embolus
- Carcinoma of the bronchus

# Chronic Obstructive Airway Disease (COAD)

- Chronic bronchitis
- Emphysema
- COPD is a chronic, slowly progressive disorder characterised by airways obstruction ( $FEV_1 < 80\%$  predicted and  $FEV_1/FVC$  ratio  $< 70\%$ ) which does not change markedly over several months. The impairment of lung function is largely fixed but is partially reversible by bronchodilator or other therapy.
- Environmental pollution and smoking contribute to the increasing incidence of COPD.
- COPD is an important cause of activity limitation in the population.

# Chronic bronchitis

## Definition

- Chronic bronchitis is defined clinically as cough productive of sputum for at least three months in each year for three consecutive years.

### **FVC - forced expiratory vital capacity**

The volume change of the lung between a full inspiration to total lung capacity and a maximal expiration to residual volume. The measurement is performed during forceful exhalation; the preceding maximal inhalation need not be performed forcefully. The volume assessed is the forced expiratory vital capacity (FEVC), commonly called forced vital capacity (FVC). The maneuver is almost invariably performed in conjunction with the assessment of the FEV1 and of maximum expiratory flow-volume curves. In patients with obstructive lung disease  $FVC < EVC < IVC$ .

### **FEV1 - forced expiratory volume in 1 second, FEV1%VC**

# Chronic bronchitis

## Pathogenesis

- Caused by chronic irritation of the airways by inhaled substances, especially tobacco smoke. This results in:
  - Hypertrophy of the submucosal glands in the trachea and bronchi - causing mucus hypersecretion
  - Goblet cell metaplasia of the bronchiolar lining with an increase in mucus production and a diminution in the number of clara cells

# Chronic bronchitis

## Clinical features

Clinical features of blue bloaters include:

- Relatively mild dyspnoea
- Loose cough and sputum - mucoid or mucopurulent
- Frequent infective exacerbations
- Often oedematous and readily lapse into right congestive heart failure
- Palpation reveals a hyperinflated chest with reduced expansion
- Percussion reveals increased resonance
- Breath sounds are reduced with end-expiratory high or low pitched wheezes and early inspiratory crackles.

# Chronic bronchitis

## Management & Prognosis

- Depends on:
  - FEV values
  - Pre-existing conditions
  - Lifestyle
  - Care
  - Cardiovascular complications

# Acute bronchitis

## Inflammation of the bronchi

- It is caused by influenza
- Subsequent bacterial infection
  - pneumococcus, H. influenzae and Staph. aureus.
- Risk factors: smoking, damp or dusty environment.



# Emphysema

## Definition

- Emphysema is enlargement of the air spaces distal to the terminal bronchioles in the lungs, either from dilatation, destruction or distension of their walls.

# Emphysema

## Causes

Localised areas of emphysema may be caused by:

- Scarring, etc

- Generalised:

- Idiopathic / primary

- Chronic bronchitis

- Chronic asthma

- Smoking

# Emphysema

## Pathogenesis

- Tobacco smoke and other irritants result in inflammation and the influx of neutrophils and macrophages into the alveoli and bronchioles
- As a result there are long-term structural changes to the alveoli

# Emphysema

## Clinical features

- Dyspnoea
- Pursed-lip breathing
- The absence of cyanosis
- Tachypnoea
- Thin and often elderly patient
- Scanty sputum production
- Chest hyperinflation
- Reduced breath sounds - quietest over bullae
- Cor pulmonale is infrequent, but usually terminal

# Emphysema

## Investigations

- Chest radiography
- Lung function tests
- Arterial blood gases
- Full blood count

# Emphysema

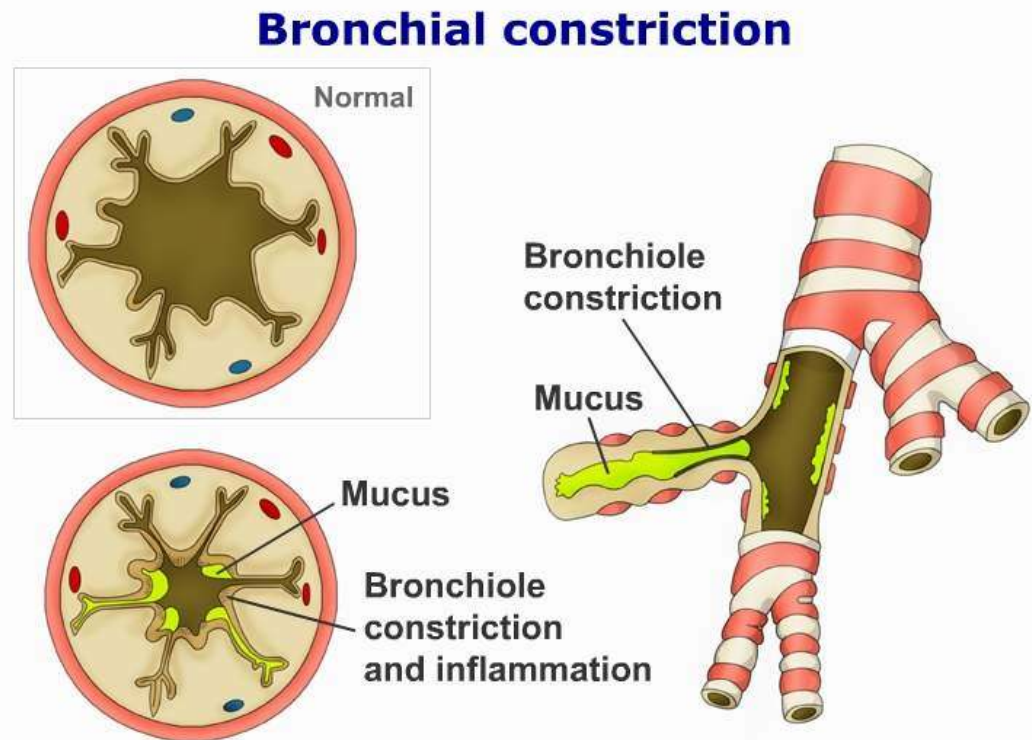
## Management & prognosis

- Management similar to COAD  
(self study)
- Prognosis similar to COAD  
(self study)

# Asthma

"Asthma is a syndrome of variable airflow obstruction" characterised by symptoms such as:

- Cough
- Chest tightness
- Wheeze



# Types of asthma

- Atopic asthma
- Intrinsic asthma
- Occupational asthma
- Aspirin-induced asthma
- Asthma of infancy



# Atopic asthma

Atopic asthma is the result of airways inflammation caused by exposure to an environmental allergen.

There are two phases of inflammation:

- Acute phase
- Delayed phase

The results of inflammation are:

- Bronchial hyper-reactivity
- Symptoms of cough, wheeze and chest tightness
- Signs of variable polyphonic wheezes

# Aetiologies for asthma

- Asthma is classified into extrinsic and intrinsic asthma.
  - Extrinsic asthma:
    - Atopy
    - airway hyperactivity
  - Intrinsic asthma
    - The aetiology is unknown

# Asthma - Clinical features (of chronic attacks)

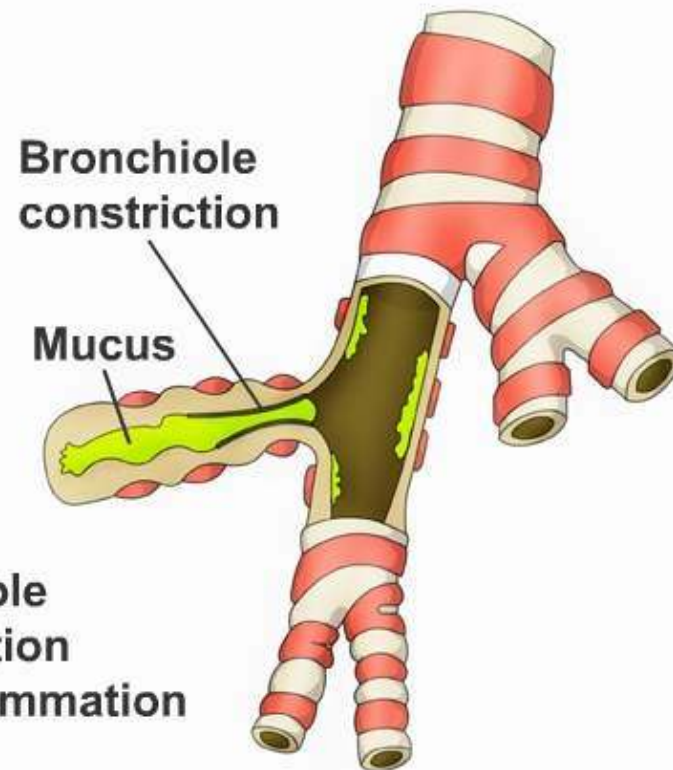
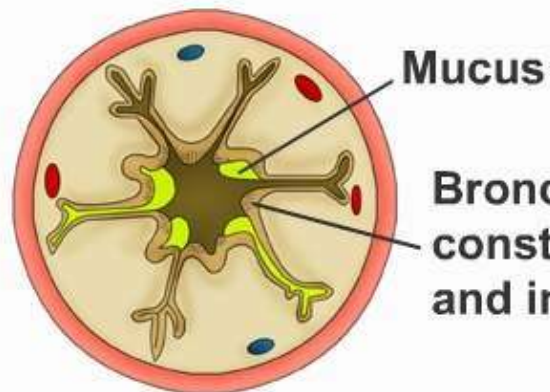
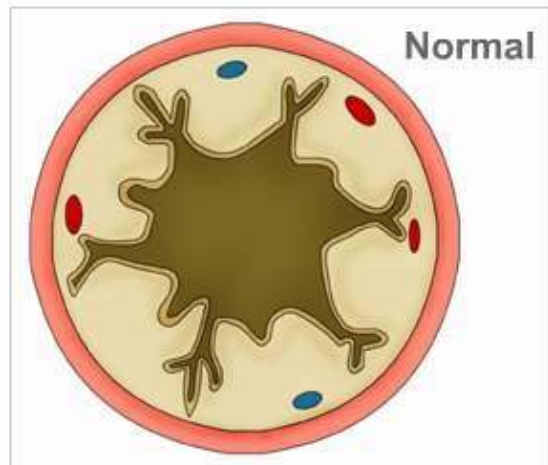
- Intermittent wheezing, coughing and breathlessness
- Diurnal pattern; a nocturnal cough may be the only symptom
- Morning tightness and wheezing
- During an attack:
  - Decreased peak flow
  - Tachypnoea
  - Use of accessory muscles of respiration
  - Hyperinflation, barrel chest
  - Prolonged expiration

# Asthma - Clinical features (of acute attacks)

- Difficulty in speaking:
- Tachycardia
- Pulsus paradoxus
- Silent chest
- Preterminal states
  - *Drowsiness due to hypercapnia*
  - *Cyanosis*

# Bronchiole changes in asthma

## Bronchial constriction



# Asthma

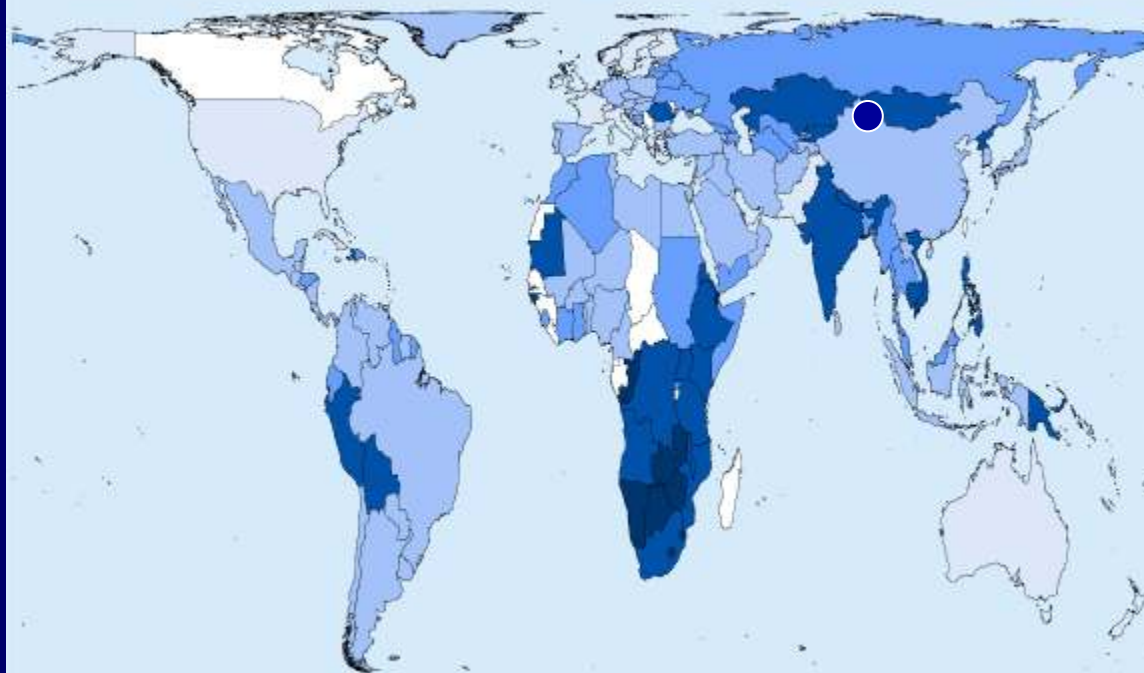
## Management

- Stop smoking
- Avoid allergens
- Avoidance of particular drugs, e.G. Beta-blockers
- Avoidance of respiratory infections

# Tuberculosis

Tuberculosis is the disease caused by infection with mycobacterium tuberculosis.

**2000: Cases of TB per 100 000 People**



# Types of meningitis

- **Primary**
- **Post-primary**
- **Miliary**
- **Meningitis**
- **Pericarditis**
- **Cervical lymphadenopathy**
- **Intestinal**
- **Plus many other forms**



# Primary TB

- Phases:
  - ➔ primary
  - ➔ post-primary
  - ➔ miliary
- Systemic features: night sweats, lassitude, weight loss, malaise, fever, anorexia.

# TB diagnosis

- Principal symptoms
  - Haemoptysis
  - Shortness of breath
  - Loss of appetite
  - Weight loss
  - Fever and sweating, especially at night
  - Fatigue and tiredness
  - Swollen glands
  - Chest radiography
  - Sputum
  - Biopsy
  - Tuberculin test

# Treatment of TB

- Initial phase - two months
  - Isoniazid
  - Rifampicin
  - Pyrazinamide
- Continuation phase - four months
  - Niazid
  - Rifampicin

# Pneumonia

Pneumonia is a term which describes inflammation of the lung parenchyma characterised by exudation and consolidation into the alveoli.

## Who gets it?

- Seriously ill, both in adults and in children
- Neonates
- Elderly
- In patients with pre-existing lung disease
- After operations
- In the immune compromised pts.

# Causes of pneumonia

- Infective:
  - Bacterial
  - Viral or chlamydial
  - Rickettsial
  - Mycoplasma
  - Yeasts and fungi
  - Protozoa and parasites
- Other:
  - Allergic
  - Chemical
  - Physical

# Signs and symptoms of pneumonia

- Cough
- Fever
- Pleuritic chest pain

Features which indicate the severity of pneumonia include:

- Confusion
- Respiratory distress
- Cyanosis

The classical physical signs of pneumonic lung consolidation are:

- Reduced percussion note
- Bronchial breathing
- Crackles

# Pneumonia

## Investigations

- Chest radiology
- Full blood count and differential white cell count
- Urea and electrolytes
- Sputum and blood culture: pneumococcus, mycobacterium tuberculosis

# Pleurisy

Inflammation of the pleura (visceral and parietal)

- Patients present with pleuritic chest pain, often with a pleural rub, but without a pleural effusion.



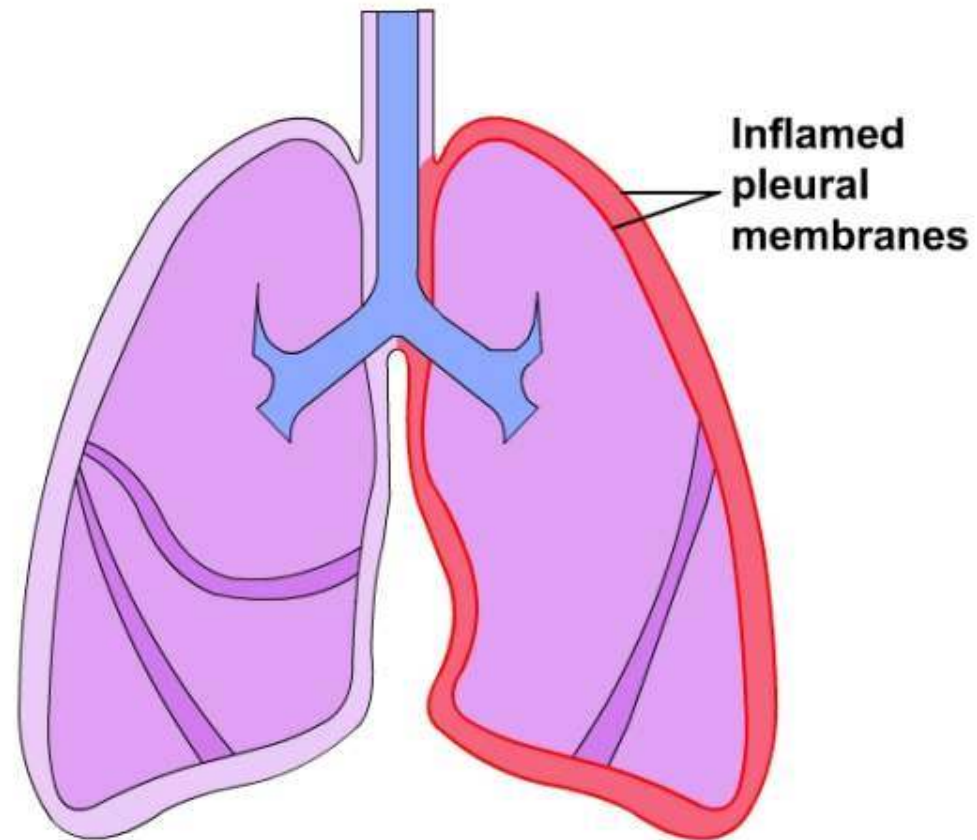
# Pleurisy

## Causes:

- Pneumonia especially pneumococcal pneumonia
- Pulmonary infarction
- Coxsackie B virus (bornholm disease)
- Malignancy e.G. Bronchogenic carcinoma
- Lung abscess
- Bronchiectasis
- Asbestos pleural disease, including mesothelioma
- Trauma

# Pleurisy

## Pleurisy



# Pleurisy

## Clinical features

- chest pain
  - Localized
  - Sharp
  - made worse by coughing or deep inspiration

# Influenza

- A viral infection of the upper respiratory tract infection.
- Epidemics of influenza occur mainly in the winter months.
- Influenza is usually a self-limiting

# Influenza

- After an incubation period an abrupt onset of:
- Malaise
- Headache
- Fever & Shivering
- Nasal congestion
- Myalgia and backache
- Cough, which is hacking and becomes more severe, but is usually unproductive
- Sweatiness
- Dizziness
- After two to five days the fever ceases and there is a slow recovery.

# Bronchiectasis

- Dilatation of the bronchi, usually accompanied by recurrent bronchial suppuration
- Causes
  - Defective host defences
  - Localised bronchial obstruction
  - Post-infectious
  - Inflammatory disorders

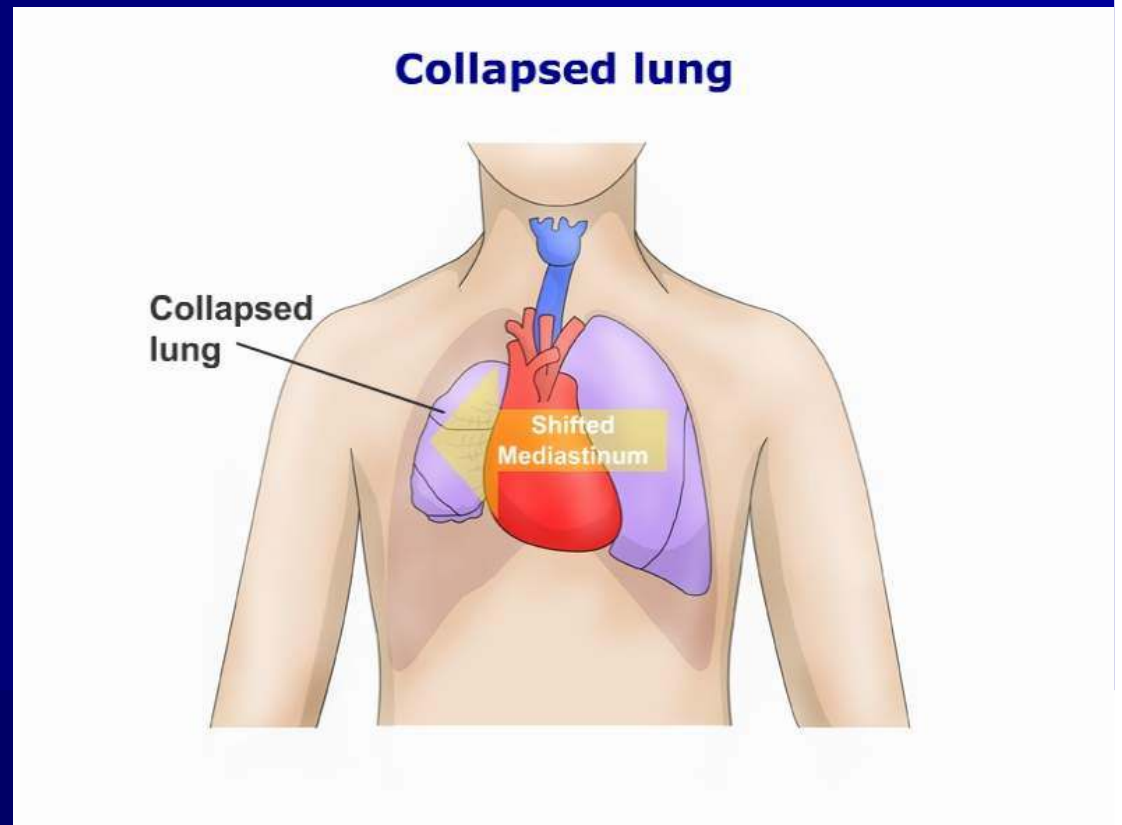
# Bronchiectasis

- Pathogenesis... (self study)
- Pathological features... (self study)
- **Clinical features**
  - Rattly cough
  - Green sputum
  - Haemoptysis
  - Bad breath
  - Clubbing is a rare finding unless severe
  - Crackles normally present

# Pneumothorax

The entry of air or gas in the pleural space

- A spontaneous
- The result of trauma
- The result of other pathological processes





# Pneumothorax

## ■ Symptoms & signs:

- Rapid onset pleuritic chest pain
- Breathlessness is seldom severe unless a tension pneumothorax develops
- Tachypnoea
- Examination of the chest:
  - Reduced expansion
  - Hyperresonance
  - Reduced breath sounds
- In a tension pneumothorax:
  - Breathlessness may increase rapidly
  - The shift of the mediastinum and apex beat is **away** from the side of the lesion

# Pulmonary embolus

- Occurs when a clot from a vein from:
  - Venous sinuses of the calf
  - The femoral vein
  - The pelvis,
  - Occasionally the right side of the
- **Risk factors**
- Deep vein thrombosis,
- Extensive trauma or surgery
- Pregnancy - classically occurs day 10-14 post delivery; may occur antenatally or postnatally

# Pulmonary embolism

## Clinical features

- Acute breathlessness
- Pleuritic chest pain
- Haemoptysis
- Collapse
- Hypotension
- Tachycardia
- Dyspnoea
- Raised JVP
- Pleural rub
- Cyanosis

# Pulmonary embolism

## Investigations:

- ECG
- Chest radiography
- Blood gases
- CT pulmonary angiogram

## Diagnosis:

- **The diagnosis of pulmonary embolism is difficult.**

# Pulmonary embolism

## Treatment

- Oxygen
- A heparin infusion
- Warfarin later

## Prognosis & recurrence risk

- Cancer
- Having had a proximal DVT
- History of VTE (Venous thromboembolism)

# Lung cancer

- Lung cancer is common, accounting for one in eight cancer cases and 17% of cancer deaths.
- Smoking is the most important cause of lung cancer, being implicated in 90% of cases in men and 80% of cases in women

## UK Mortality 2002: Cancers which contribute one per cent or more to total cancer mortality

Lung	33,600	(22%)
Bowel	16,220	(10%)
Breast	12,930	(8%)
Prostate	9,940	(6%)
Oesophagus	7,250	(5%)
Pancreas	6,880	(4%)
Stomach	6,360	(4%)
Bladder	4,910	(3%)
Non-Hodgkin's lymphoma	4,750	(3%)
Ovary	4,690	(3%)
Leukaemia	4,310	(3%)
Brain and CNS	3,370	(2%)
Kidney	3,360	(2%)
Head and neck	3,000	(2%)
Multiple myeloma	2,600	(2%)
Liver	2,510	(2%)
Mesothelioma	1,760	(1%)
Malignant melanoma	1,640	(1%)
Cervix	1,120	(1%)
Body of Uterus	1,070	(1%)
Other	22,910	(15%)
Persons: all malignant neoplasms	155,180	(100%)

# Bronchial carcinoma

Bronchial carcinomata are so common that lung cancer and bronchial carcinoma may appear to be synonymous

**Bronchial carcinomata are classified into four groups:**

- Squamous cell carcinoma (40 % of all lung cancers)
- Small cell carcinoma (20-30 %)
- Adenocarcinoma (20%)
- Large cell carcinoma (10-15%)



# Bronchial carcinoma

## Clinical features

- Local effects
- Extra-thoracic metastases
- Non – metastatic
- Intra pulmonary
- Intra thoracic
- Extra thoracic

# Bronchial carcinoma

## Clinical features

- Endocrine (self study)
- Neuromuscular (self study)
- Dermatologic (self study)

# Bronchial carcinoma

- Investigations:
  - Chest X-rays
  - Cytology of sputum
  - Bronchobiopsy
  - Scans
- Treatments:
  - Surgical excision - lobectomy or pneumonectomy
  - Chemotherapy

# Bronchial carcinoma

## ■ Prognosis

- Small cell tumours carry the worst prognosis:
- untreated - 1-2 months median survival
- treated - 12 months median survival
- Untreated median survival times for other tumours include:
- adenocarcinoma: 12 months
- squamous carcinoma: 8 months

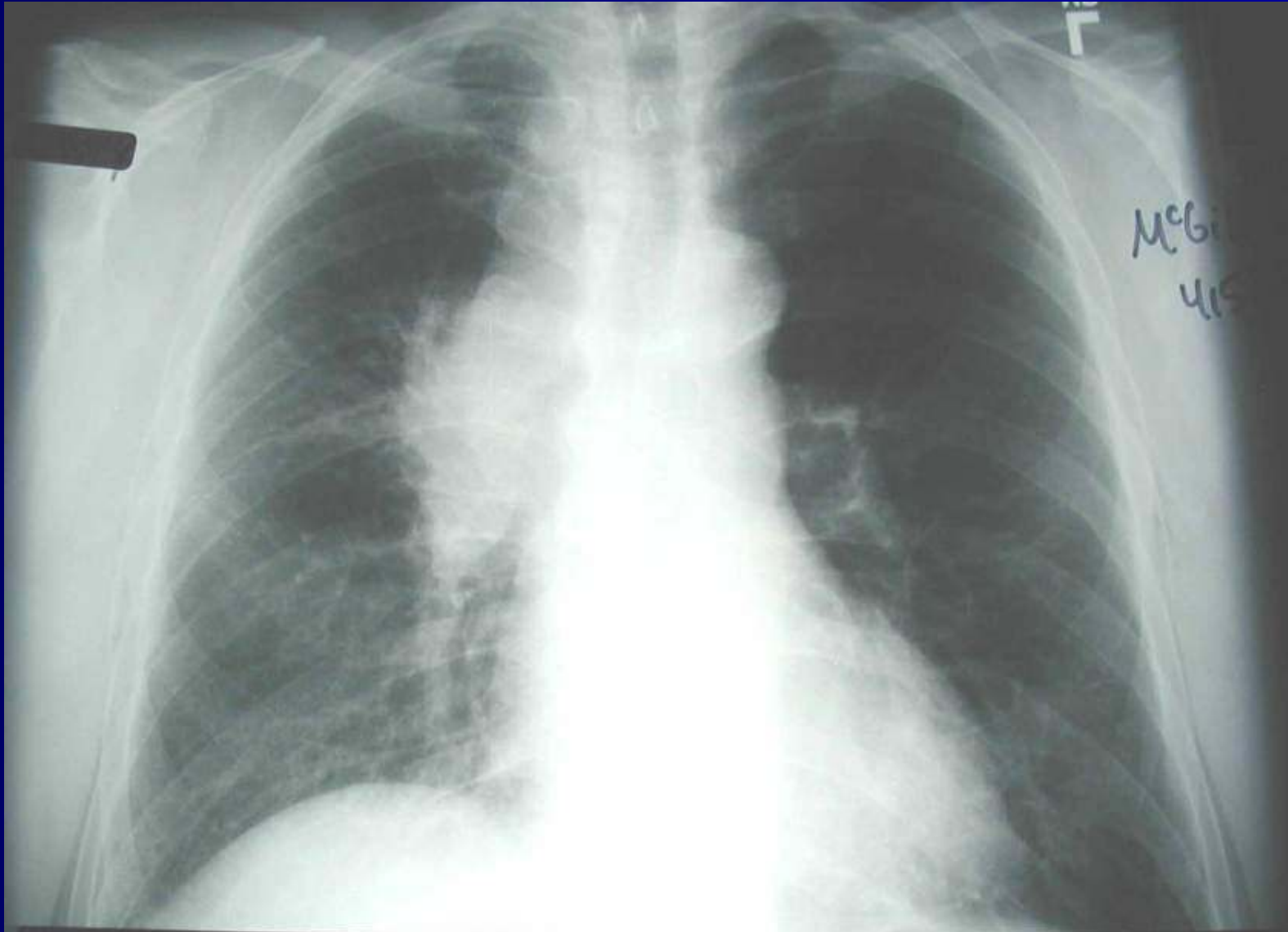
# Bronchial carcinoma

- Indications for an urgent referral for a chest x-ray include:
- Haemoptysis, or
- Any of the following unexplained or persistent (that is, lasting more than 3 weeks) symptoms or signs:
  - Cough
  - Chest/shoulder pain
  - Dyspnoea
  - Weight loss
  - Chest signs
  - Hoarseness
  - Finger clubbing
  - Features suggestive of metastasis from a lung cancer (for example, in brain, bone, liver or skin)
  - Cervical/supraclavicular lymphadenopathy

# Bronchial carcinoma

- **Urgent referral to a chest physician**
  - Chest x-ray suspicious/suggestive of lung cancer (including slowly resolving consolidation and pleural effusion)
  - Persistent haemoptysis in exsmokers/smokers over 40 years of age
  - Signs of superior vena caval obstruction (swelling of neck/face with fixed elevation of jugular venous pressure)
  - Stridor

# Bronchial carcinoma



**End**

**The Respiratory System**