Examination of the RS

Waseem Jerjes
Conducting zone

Number of branches
(1) Trachea
Primary bronchus
(2) Bronchial tree

(60,000) Terminal bronchioles

Respiratory zone

Terminal bronchiole

Respiratory bronchioles (500,000)

Alveolar sacs (8 million)

Alveolus
Respiratory diseases

• **Consolidation (lobar pneumonia):** inflammation of lung characterised by exudation into the alveoli

• **Collapse:** part of the lung collapses when a bronchus that supply air to that area of the lung become obstructed by tumour mass, retained secretions or a foreign body which leads to air absorption

• **Pleural effusion:** collection of fluid in the pleural space. Collection of blood, chyle, pus have specific names (haemothorax, chylothorax, empyema)

• **Pneumothorax:** leakage of air from the lung or a chest wall puncture into the pleural space
Respiratory diseases

- **Tension pneumothorax**: communication between the lung and the pleural space, with a flap acting as a valve; air enter during inspiration and can’t leave during expiration.

- **Bronchiectasis**: pathological dilatation of the bronchi, results in impaired clearance of mucus, and chronic infection.

- **Bronchial asthma**: paroxysmal recurrent attacks of wheezing (or in childhood of cough) due to the airways narrowing with changes in severity over short periods of time.

- **Chronic airflow limitation or COPD**: spectrum of abnormalities from emphysema (pathological increase in the size of air spaces distal to the terminal bronchioles) to chronic bronchitis (mucous glands hypertrophy, increase number of goblet cells, hypersecretion of mucus in the bronchial tree).
Respiratory diseases

• **Chronic bronchitis**: daily production of sputum for three months a year for at least two consecutive years

• **Pulmonary fibrosis**: diffuse fibrosis of the lung parenchyma impairs gas transfer and causes ventilation-perfusion mismatching; three types (focal fibrosis, tuberculosis, fibrosing alveolitis)

• **Tuberculosis**: primary (Ghon focus with hilar lymphadenopathy occurs in children), post-primary tuberculosis (reactivation of a primary lesion), miliary tuberculosis (widespread haematogenous dissemination of the bacilli causing multiple nodules in various organs)
Respiratory diseases

• **Mediastinal compression**: compression due to various pathological masses; components: SVC, trachea, recurrent LN, sympathetic (Horner’s syndrome), phrenic nerve

• **Lung carcinoma**

• **Sarcoidosis**: systemic disease, characterised by the presence of non-caseating granulomas which commonly affects the lungs, skin, eyes, LNs, liver, spleen and nervous system

• **Pulmonary embolism**: pulmonary artery embolism
Cough & sputum

- Deep inspiration followed by explosive expiration; clear the airways
- Cough (recent origin) + fever + RT infection symptoms = acute bronchitis or pneumonia
- Chronic cough + wheeze = asthma
- Irritating dry cough = oesophageal reflux and acid irritation in lungs or ACE inhibitors
- Chronic cough + large volume of purulent sputum = bronchiectasis
- Change of character of chronic cough = severe infection or cancer
- Cough of barking quality = epiglottitis
- Cough + tracheal compression (loud) = tumour
- Cough + hollow sound = recurrent laryngeal nerve palsy
- Cough worst at night = asthma or heart failure
- Cough immediately after eating or drinking = tracheo-oesophageal fistula or oesophageal reflux
Cough & sputum

- **Yellow or green** = acute bronchitis, acute on chronic bronchitis, asthma, cystic fibrosis, bronchiectasis (large volume), pneumonia (large volume)
- **White or grey** = smoking, asthma, chronic bronchitis
- **Foul-smelling dark-coloured** = lung abscess with anaerobes
- **Pink frothy** = pulmonary oedema
- **Clear** = saliva

- **Red (haemoptysis)**
  Bronchitis, bronchial carcinoma, pulmonary infarction, bronchiectasis, cystic fibrosis, lung abscess, pneumonia, TB, foreign body, Goodpasture’s syndrome, rupture of mucosal blood vessels after vigorous coughing
  Severe mitral stenosis, acute left ventricular failure
Lung abscess (dark green sputum)
SOB

Respiratory
Chest wall (flail chest, Guillain-Barre, poliomyelitis)
Diaphragm (paralysis, hernia)
Pleura (pneumothorax, pleural effusion, mesothelioma)
Lungs (pneumonia, emphysema, bronchiectasis)
Bronchi (asthma, chronic bronchitis, carcinoma)
Trachea (goitre, foreign body)
Wheeze

- Whistling noise during breathing
- Asthma
- COPD
- Airway obstruction by foreign body
- Airway obstruction by tumour

- Wheeze is usually maximal during expiration and accompanied by prolonged expiration
Chest pain

- **Intercostal muscles**: trauma, myositis
- **Ribs**: trauma, secondary deposits
- **Pleura**: pleurisy, pneumothorax
- **Lungs**: pneumonia, pulmonary infarction
- **Bronchi**: carcinoma, acute bronchitis
- **Trachea**: tracheitis
- **Pulmonary artery**: pulmonary embolus
Other presenting symptoms

- Fever at night: TB, pneumonia, mesothelioma
- Drenching sweating: TB
- Hoarseness: laryngitis (vocal cords), vocal cord tumours, recurrent laryngeal nerve palsy
- Obstructive sleep apnoea: chronic fatigue, morning headaches, personality disturbances
- Loud snoring: obesity, hypertension
- Anxiety: increase rate and depth of breathing = hyperventilation
# Abnormal patterns of breathing

<table>
<thead>
<tr>
<th>Abnormality</th>
<th>Cause(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep apnoea (cessation of airflow for more than 10 secs &gt;10 times a night)</td>
<td>Obstructive (obesity, enlarged tonsils, pharyngeal soft tissue changes in in acromegaly or hypothyroidism)</td>
</tr>
<tr>
<td>Cheyne-Stokes (periods of apnoea alternates with periods of hyperpnoea)</td>
<td>Left ventricular failure</td>
</tr>
<tr>
<td></td>
<td>Brain damage (trauma, cerebral haemorrhage)</td>
</tr>
<tr>
<td></td>
<td>High altitude</td>
</tr>
<tr>
<td>Kussmaul’s (deep rapid respiration due to stimulation of Res Cent)</td>
<td>Metabolic acidosis (diabetes mellitus, chronic renal failure)</td>
</tr>
<tr>
<td>Hyperventilation</td>
<td>Anxiety (results in alkalosis and tetany)</td>
</tr>
<tr>
<td>Ataxic (irregular in timing and depth)</td>
<td>Brainstem damage</td>
</tr>
<tr>
<td>Apneustic (post inspiratory pause in breathing)</td>
<td>Brain (pontine) damage</td>
</tr>
<tr>
<td>Paradoxical (abdomen sucks inward with inspiration)</td>
<td>Diaphragmatic paralysis</td>
</tr>
</tbody>
</table>
General

- Oxygen masks
- Nasal cannula
- Sputum pots
- Nebulizers
- Peak flow meter
- Ventilators

- General appearance of the patient

- Wash
- Introduce
- Permission
- Expose
'Pink Puffers' and 'Blue Bloaters'

Pink puffers and blue bloaters (some patients with chronic airflow limitation)

Blue bloaters are cyanosed from hypoxia and bloated from right-sided heart failure. Further investigation shows features of chronic obstructive bronchitis. Cough and sputum are common but breathlessness less so. CO₂ retention is a feature.

Pink puffers are not cyanosed and are thin. Investigation shows features associated with emphysema. Cough and sputum are less common, but the patients are breathless. CO₂ levels in the blood are normal or low.
The hands

- Tar staining: cigarette smoking
- Clubbing:
  - Bronchial carcinoma
  - Chronic lung suppuration (empyema, abscess, cystic fibrosis, bronchiectasis)
  - Mesothelioma
  - Fibrosing alveolitis

- Wasting and weakness: compression and infiltration of lower trunk of brachial plexus by peripheral nerve tumour
- Flapping tremor (CO$_2$ flap): severe COPD
- Peripheral cyanosis
- Pulse + Respiratory rate
The face

- Horner’s syndrome (constricted pupil, partial ptosis, loss of sweating)…apical lung tumour compressing the sympathetic nerves in the neck
- **Nose**: deviated septum (nasal obstruction), polyps (asthma), engorged turbinated (allergic conditions)
- **Tongue**: central cyanosis, mouth (reddenened pharynx, enlarged tonsils, pus coat)…respiratory tract infection
- Lymphadenopathy (H&N)
- JVP

- Broken, rotten teeth…lung abscess, pneumonia
- Sinus tenderness: sinusitis…transillumination
- Facial plethora, cyanosis…SVCO
Inspection (anterior, posterior, axillary)

Shape and symmetry of the chest

- **Barrel chest**: AP diameter > lateral diameter
  
  Hyperinflation: severe asthma, emphysema

- **Pigeon chest (pectus carinatum)**: outward bowing of the sternum and costal cartilages
  
  Chronic childhood respiratory illness, rickets

- **Funnel chest (pectus excavatum)**: depression of the lower end of the sternum
  
  Usually aesthetic problem but lung capacity may be restricted

- **Harrison sulcus**: linear depression of the lower ribs
  
  Asthma in childhood, rickets

- **Kyphoscoliosis**: Idiopathic (80%), poliomyelitis, Marfan’s syndrome…may reduce lung capacity
Inspection (anterior, posterior, axillary)

Lesions of the chest wall
- **Scars**: thoracic operations, chest drains, thoracoplasty (TB)
- **Swelling**: subcutaneous emphysema, pneumothorax, pneumomediastinum
- **Prominent veins**: SVCO

Movement of the chest wall
- Asymmetry of chest wall
- Chest expansion
- Paradoxical breathing
Palpation (anterior, posterior, axillary)

- Examination of soft and hard tissue (#)

- Trachea (central)

  Towards the lesion: upper lobe collapse, upper lobe fibrosis, pneumonectomy
  
  Away from the lesion: massive pleural effusion, tension pneumothorax

  Upper mediastinal masses: retrosternal goitre

- The use of accessory muscles
  (supraclavicular fossa) = scalene; SCM

- Lymphadenopathy (axilla): infection, tumour
Palpation (anterior, posterior, axillary)

- Apex beat

  Towards the lesion: collapse of the lower lobe, localised pulmonary fibrosis

  Away from the lesion: pleural effusion, tension pneumothorax

- Impalpable: hyperinflation in COPD

- Chest expansion

  Anterior: upper & middle lobe expansion

  Posterior: lower lobe expansion

- Vocal fremitus “99” (palm of hand)
Percussion (anterior, posterior, axillary)

- Supraclavicular fossa (lung apex)
- Clavicle
- Upper lobe (upper anterior chest)
- Upper, middle, lower lobes (lateral chest)
- Upper, lower lobes (back)

- Don’t do liver or heart

- Resonant note: normal percussion
- Dull note: liver, heart, consolidated area of lung
- Stony dull (fluid filled area): pleural effusion
- Hyperresonant (hollow structures): bowel, pneumothorax
Percussion (anterior, posterior, axillary)

- **Liver dullness:** the upper level of the liver dullness is determined by percussing down the anterior chest in the mid-clavicular line...5\textsuperscript{th} rib

If chest is resonant below this level: hyperinflation (asthma, emphysema)

- **Cardiac dullness:** the area of cardiac dullness present on left side of the chest

Decrease in asthma or emphysema
Auscultation (anterior, posterior, axillary)

• Quality of breath sounds

Vesicular = normal (longer on inspiration, no gap between inspiratory and expiratory sounds) (patient need to breathe through mouth so no added sounds from nasopharynx will interfere)

Bronchial = turbulence in the large airways (equal, gap between inspiratory and expiratory sounds) (sounds over area of consolidation)
Auscultation (anterior, posterior, axillary)

- Intensity of the breath sounds (normal or reduced)

  Reduced:
  - Asthma, COPD, emphysema
  - Pleural effusion
  - Pneumonia
  - Pneumothorax
  - Large neoplasm
  - Pulmonary collapse
Auscultation (anterior, posterior, axillary)

- Added sounds

  Wheezes (continuous)(rhonchi): inspiration, expiration or both
  Implies significant airway narrowing
  Tend to louder on expiration (airways dilates during inspiration and narrows during expiration)

  High pitched (asthma)
  Low pitched (COPD)

Fixed bronchial obstruction + localized wheeze + doesn’t clear with cough = Carcinoma
Auscultation (anterior, posterior, axillary)

• Added sounds

Crackles (interrupted)(crepitations): inspiration
Implies loss of stability of peripheral airways

Early inspiratory crackles (disease of small airways)...COPD
Late or pan inspiratory crackles (disease of alveoli)
Fine crackles: pulmonary fibrosis
Medium crackles: left ventricular failure
Coarse crackles: bronchiectasis

Pleural friction rub: pleurisy 2nd to pulmonary infarction or pneumonia
Auscultation (anterior, posterior, axillary)

- Vocal resonance

Auscultation + 99

**Silent chest:** occurs in life-threatening asthma and is due to severe bronchospasm which prevents adequate air entry into the chest
Vesicular breathing

Bronchial breathing

Bronchial breathing in the upper lobes

upper lobe bronchial breathing transmitted from trachea

down lobe no bronchial breathing
Don’t forget

- **The abdomen**: ptosis of liver (emphysema, enlargement from secondary deposits from lung CA)

- **Pemberton sign**: lift arms over head and wait for 1 min. In SVCO: facial plethora, cyanosis, inspiratory stridor, non-pulsatile elevation of JVP

- **Feet**: oedema, cyanosis...cor pulmonale, DVT

- **Temperature**
Bedside assessment of lung function

• Forced expiratory time (FET)

The time taken by the patient to exhale forcefully and completely through the open mouth after taking maximum inspiration
Note any audible wheeze or cough

Normal <3secs
>3secs indicates airway obstruction (chronic airflow limitation)

Peak flow meter or spirometer provide more accurate measurements
Bedside assessment of lung function

• Peak flow meter
  Simple gauge used to measure maximum flow rate of expired air

  Forced and quick expiration… PEFR (peak expiratory flow rate)
  Normal 600 L/min (male), 400 L/min (female)
  Usually reduced with asthma or chronic airflow limitation

  The values depend on age, sex and height
### Peak flow recordings in asthma

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Cough</th>
<th>Flow (L/min)</th>
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</thead>
<tbody>
<tr>
<td>25/10</td>
<td>8</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>26/10</td>
<td>9</td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>26/10</td>
<td>10</td>
<td></td>
<td>300</td>
</tr>
<tr>
<td>26/10</td>
<td>11</td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>26/10</td>
<td>12</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td>26/10</td>
<td>13</td>
<td></td>
<td>600</td>
</tr>
</tbody>
</table>

The line graph shows the flow measurements over the day, with cough episodes marked by arrows.
Bedside assessment of lung function

• Spirometry…PFT

Records graphically or numerically the forced expiratory volume (FEV) and forced vital capacity (FVC)

FEV: The maximum volume of air that can be expired from the lungs in a specific time interval when starting from maximum inspiration

\[ \text{FEV}_1 = \text{FEV after 1 second} \]

FVC: The maximum volume of air that can be expired from the lungs after maximum inspiration

\[ \frac{\text{FEV}_1}{\text{FVC}} \]

Normal value 80%, elderly 60%
Also vary with sex and race
Bedside assessment of lung function

• Spirometry…PFT

• Obstructive defect: \( FEV_1, FVC, \frac{FEV_1}{FVC} \) reduced
  Causes: loss of elastic recoil or airways narrowing as in asthma, chronic airflow limitation

• Restrictive defect: \( FEV_1, FVC \) reduced; \( \frac{FEV_1}{FVC} \) normal or high
  Parenchymal lung disease as in pulmonary fibrosis, sarcoidosis
  Reduced lung expansion as in pneumonia, chest wall abnormalities
Bedside assessment of lung function

- Flow volume curve
  Alternative to spirometry
  Measure inspiratory and expiratory flow as a function of exhaled volume rather than against time

  The FVC, FEV₁ and various flow measurement (e.g. peak flow) can be calculated from the curve

[Diagram showing flow volume curve with labels for TLC, PEF, and RY]
Lung volumes

- Total lung capacity
- Vital capacity
- Residual volume
- Functional residual capacity
- Tidal volume

The expiratory spirogram

Volume (litres)

- VC = 4.01
- FEV₁ = 3.01
- FEV₁% = 75
**SPIROMETRY**

**PERSONAL INFORMATION**
- Last Name: [ ]
- Given names: [ ]
- Date of Birth: [ ]
- Age and Gender: [ ]
- Personal ID: [ ]
- Patient Code: [ ]
- Height: 5 ft 10.1 in
- Weight: 148.9 lb
- BMI: 21.4
- Ethnic Group: [ ]

**SMOKING**
- Yes

**CLINICAL INFORMATION**
- Co-operation: Good
- Problem: [ ]

**TEST RESULTS**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Abbr.</th>
<th>Unit</th>
<th>Value</th>
<th>Pre test abs %Ref</th>
<th>Post test abs %Ref</th>
<th>Difference abs %Ref</th>
<th>Normal range ≤ 10%</th>
<th>Pre (c) &amp; Post (t) Results</th>
<th>95% range %Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tidal volume</td>
<td>TV</td>
<td>L</td>
<td>0.76</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Breathing frequency</td>
<td>FR</td>
<td>1 min</td>
<td>11.16</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minute ventilation</td>
<td>MV</td>
<td>L/ min</td>
<td>8.49</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Slow vital capacity</td>
<td>VC</td>
<td>L</td>
<td>5.01</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Forced vital capacity</td>
<td>FVC</td>
<td>L</td>
<td>5.06</td>
<td>5.41103</td>
<td>5.67104</td>
<td>0.16 0.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Forced exp. volume at 1.0s</td>
<td>FEV1</td>
<td>L</td>
<td>4.44</td>
<td>4.73107</td>
<td>4.84109</td>
<td>0.11 0.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Forced exp. volume at 6.0s</td>
<td>FEV6</td>
<td>L</td>
<td>5.96</td>
<td>5.41103</td>
<td>5.57104</td>
<td>0.15 0.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FEV1/VC</td>
<td>FEV1%VC</td>
<td>%</td>
<td>82.68</td>
<td>90.88113</td>
<td>88.65105</td>
<td>0.45 -1.1</td>
<td>-</td>
<td>-</td>
<td>88-115</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>FEV1%VC</td>
<td>%</td>
<td>82.68</td>
<td>87.40106</td>
<td>86.35105</td>
<td>0.45 -1.1</td>
<td>-</td>
<td>-</td>
<td>88-115</td>
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<tr>
<td>Forced exp. flow 75% VC</td>
<td>FEF75</td>
<td>L/s</td>
<td>2.65</td>
<td>2.5998</td>
<td>2.98113</td>
<td>0.38 14</td>
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<td>-</td>
<td>52-198</td>
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<tr>
<td>Forced exp. flow 25-75% VC</td>
<td>FEF2575</td>
<td>L/s</td>
<td>5.07</td>
<td>6.55129</td>
<td>7.14141</td>
<td>0.59 12</td>
<td>-</td>
<td>-</td>
<td>52-198</td>
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<tr>
<td>Forced exp. vol. at 1.0s</td>
<td>FIV1</td>
<td>L</td>
<td>5.30</td>
<td>5.43</td>
<td>5.43</td>
<td>0.05</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Forced exp. vol. at 1.0s</td>
<td>FVC</td>
<td>L</td>
<td>5.30</td>
<td>5.43</td>
<td>5.43</td>
<td>0.05</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FEV1/VC</td>
<td>FEV1%VC</td>
<td>%</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>0.00</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>FEV1%VC</td>
<td>%</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>0.00</td>
<td>-</td>
<td>-</td>
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</tr>
</tbody>
</table>

**BEST CURVES**

**TRENDS**

**INTERPRETATION**
- Ventilation Function: Normal
- Bronchodilatation test: No significant change
- Manual interpretation: **M0124-3-1.7-multi.htm**
<table>
<thead>
<tr>
<th>Pathology</th>
<th>Chest wall movement</th>
<th>Tracheal deviation</th>
<th>PN</th>
<th>BS</th>
<th>Vocal resonance</th>
<th>Added sounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consolid. (pneumo.)</td>
<td>Reduced</td>
<td>None</td>
<td>Dull</td>
<td>Bronchial</td>
<td>Increased</td>
<td>Crackles</td>
</tr>
<tr>
<td>Collapse (major)</td>
<td>Reduced</td>
<td>Towards lesion</td>
<td>Dull</td>
<td>Diminish/ absent</td>
<td>Reduced/ absent</td>
<td>None</td>
</tr>
<tr>
<td>Fibrosis (generali)</td>
<td>Reduced</td>
<td>None</td>
<td>Normal</td>
<td>Vesicular</td>
<td>Increased</td>
<td>Crackles</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>Reduced</td>
<td>Away if massive</td>
<td>Stony dull</td>
<td>Diminish/ absent</td>
<td>Reduced/ absent</td>
<td>None</td>
</tr>
<tr>
<td>Pneumoth (large)</td>
<td>Reduced</td>
<td>Away</td>
<td>Normal or hyper-res</td>
<td>Diminish/ absent</td>
<td>Reduced/ absent</td>
<td>None</td>
</tr>
<tr>
<td>COPD</td>
<td>Reduced</td>
<td>None</td>
<td>Normal</td>
<td>Prolonged expiration</td>
<td>Normal</td>
<td>Expirat. Wheezes</td>
</tr>
<tr>
<td>Asthma</td>
<td>Reduced</td>
<td>None</td>
<td>Normal</td>
<td>Prolonged expiration</td>
<td>Normal</td>
<td>Exp whee/crac</td>
</tr>
</tbody>
</table>
The oxygen dissociation curve

<table>
<thead>
<tr>
<th>$\text{O}_2 \text{ content (ml/L)}$</th>
<th>saturation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>160</td>
<td>90</td>
</tr>
<tr>
<td>120</td>
<td>80</td>
</tr>
<tr>
<td>80</td>
<td>60</td>
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<td>20</td>
<td>20</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
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</table>

Arterial oxygen pressure

The carbon dioxide dissociation curve

<table>
<thead>
<tr>
<th>$\text{CO}_2$ content (ml/L)</th>
<th>arterial carbon dioxide pressure (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>12 kPa</td>
</tr>
<tr>
<td>500</td>
<td>10 kPa</td>
</tr>
<tr>
<td>400</td>
<td>8 kPa</td>
</tr>
<tr>
<td>300</td>
<td>6 kPa</td>
</tr>
<tr>
<td>200</td>
<td>4 kPa</td>
</tr>
<tr>
<td>100</td>
<td>0</td>
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</tbody>
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Arterial carbon dioxide pressure
Disorders
Duration of breathlessness

**Immediate (minutes)**
- Pulmonary embolism
- Pneumothorax
- Pulmonary oedema
- Asthma

**Short (hours to days)**
- Pulmonary oedema
- Pneumonia
- Asthma
- Pleural effusion
- Anaemia

**Long (weeks to years)**
- Chronic airflow limitation
- Cryptogenic fibrosing alveolitis
- Extrinsic allergic alveolitis
- Anaemia

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Disorders
Some occupational causes of lung disease

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Agent</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>Coal dust</td>
<td>Pneumoconiosis</td>
</tr>
<tr>
<td>Quarrying</td>
<td>Silica dust</td>
<td>Silicosis</td>
</tr>
<tr>
<td>Foundry work</td>
<td>Silica dust</td>
<td>Silicosis</td>
</tr>
<tr>
<td>Asbestos</td>
<td>Asbestos fibres</td>
<td>Asbestosis, Mesothelioma</td>
</tr>
<tr>
<td>(Mining, heating,</td>
<td></td>
<td>Lung cancer</td>
</tr>
<tr>
<td>building, demolition)</td>
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<tr>
<td>Farming</td>
<td>Actinomycetes</td>
<td>Alveolitis</td>
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<tr>
<td>Paint spraying</td>
<td>Isocyanates</td>
<td>Asthma</td>
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<tr>
<td>Plastics manufacture</td>
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<tr>
<td>Soldering</td>
<td>Isocyanates</td>
<td>Asthma</td>
</tr>
<tr>
<td></td>
<td>Colophony</td>
<td></td>
</tr>
</tbody>
</table>
Some causes of pleural fluid

**Transudates**
- Congestive cardiac failure
- Cirrhosis
- Nephrotic syndrome

**Exudates**
- Tumours - primary, secondary, and lymphomas
- Pneumonia
- Tuberculosis
- Rheumatoid arthritis and other connective tissue disorders
- Pulmonary embolism and infarction

**Blood**
- Trauma
- Pulmonary embolism
- Tumours

**Pus**
- Pneumonia
- Trauma

**Lymph**
- Tumours, especially lymphoma
References

- Epstein “Clinical Examination”
- Kumar & Clark “Saunders’ Pocket Essentials of Clinical Medicine”
- Kumar & Clark “Clinical Medicine”
- Oxford Handbook of Clinical Medicine
- Oxford Handbook of Clinical Dentistry
- Clinician’s Manual of Oral & Maxillofacial Surgery
- Scully “Oral & Maxillofacial Medicine”
- Talley & O’Connor “Clinical Examination”