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Subjective symptoms of bronchopulmonary diseases

- Dyspnoea
- Cough
- Sputum (haemoptysis)
- Chest pain
Characteristics of the normal breathing

- Inspiration is a result of the active muscle work (diaphragm, skalenes, sternomastoid muscle, and contraction of intercostale muscles).
- Expiration is a passive contraction of elastic lung tissue.
- Shorter inspiration, longer expiration
- The respiratory rate is about 14-20 per min.
- Stimulators of breathing centre: $pCO_2 \uparrow$, acidosis, hypoxia
Dyspnoea

• Uncomfortable awareness of breathing
  – Shortness of breath – „légszomjam van”
  – Smothering feeling – „fojtogató érzés”
  – Inability to get enough air – „nem kapok eléggé levegőt”

• How many steps can the patient climb without pausing for breath? – „Hány lépcsőt tud felfelé menni megállás nélkül?”

• Quantified according to the number of pillows on which the patient sleeps – „Hány párnát használ alvás alatt?”
Dyspnoea

Subjective feeling of breathing discomfort

Exertional dyspnoea is always more ominous, because it reflects hypoxia

Important characteristics are:
- timing
- setting
- aggravating and relieving factors

Orthopnoea: dyspnoea that is improving when the recumbent patient is sitting up; similarly to paroxysmal nocturnal dyspnoea it is usually a sign of heart failure, rather than pulmonary disease.
Causes of dyspnoea

- exogenous
  - pO₂↓
  - toxic inhalants (e.g. chloride)

- respiratory diseases
  - thorax deformities (impaired movements)
  - narrowing of airways → wheezing
    - compression
    - copious secretion
    - bronchoconstriction
  - reduction of alveolar surface
  - impaired pulmonary circulation

- cardiac diseases (heart failure)
- reduced O₂ binding capacity of blood
- nervous disorders
- palsy of respiratory muscles
- dysfunction of medullary centres
- hysteria (Charcot's disease)
Approach to the patient with dyspnoea 1.

- **History**: describe what the discomfort feels like, the effect of position, infections, and environmental stimuli on the dyspnoea
  - **Orthopnoea**: congestive heart failure or mechanical impairment of diaphragm (obesity)
  - **Nocturnal dyspnoea**: Congestive heart failure or asthma. It waken the patient from sleep.
  - **Acute, intermittent episodes of dyspnoea**: episodes of myocardial ischemia, bronchospasm, or pulmonary embolism
  - **Chronic dyspnoea**: COPD and interstitial lung disease
  - **Platypnoea** (dyspnoea in the upright position with relief in the supine position: left atrial myxoma)
Approach to the patient with dyspnoe 2.

• **Physical examination:**
  - Inability of patient to speak in full sentences before stopping to get a deep breath
  - Evidence for increased work of breathing: supraclavicular retraction, use of accessory muscles of ventilation, patient’s body position, nasal flares
  - Assessment of respiratory rate
  - Signs of anaemia
  - Examination of the thorax
  - Cardiac examination
    • Signs of elevated right heart pressure (jugular venous distension, oedema, accentuated P2)
    • Left ventricular dysfunction (S3 and S4 gallops)
    • Valvular disease
  - Investigation of the abdomen
    • Inward motion of the abdomen during inspiration (a sign a diaphragm weakness)
Approach to the patient with dyspnoea 3.

- **Chest radiograph**
  - Lung volume
  - Pulmonary parenchyma
  - Pulmonary vasculature
  - Cardiac silhouette
  - Pleural effusion

- **Computer tomography of the chest**
  - For further evaluation of lung parenchyma and possible pulmonary embolism

- **ECG, echocardiography**
  - Evidence of left ventricle hypertrophy and prior myocardial infarction
  - Evaluation of systolic and diastolic function of the heart
  - Valvular heart disease?, pulmonary hypertension?

- **Measurement of O2-saturation (and PCO₂, pH, etc.)**
Inspection of respiration

• Observation of the rate, rhythm, depth and effort of breathing: a normal resting adult breathes quietly and regularly about 14 to 20 times a minute.

• Inspection of the patient for any signs of respiratory difficulty:
  – Asses the patient’s colour for cyanosis
  – Listen to the patient's breathing – audible wheezing?
  – Inspection of the neck – Is there contraction of sternomastoid muscle or other accessory muscles, or supraclavicular retraction during inspiration? These are signals of severe difficulty breathing.
Abnormalities in rate, depth and rhythm of breathing

**Normal**

- Inspiration
- Expiration

**Rapid shallow breathing** (pneumonia, pleuritic chest pain, elevated diaphragm)

**Rapid deep breathing** (metabolic acidosis, hypoglycaemia, coma, hypoxia, exercise).

Deep breathing + acidosis = Kussmaul-breathing

**Slow breathing** (Diabetic coma, increased intracranial pressure, drug-induced respiratory depression)
Abnormalities in rate, depth and rhythm of breathing, periodic breathing

**Cheine-Stokes breathing** (heart failure, uraemia, poisoning)

**Biot-breathing** (cerebral haemorrhage, typically at medullary level)

Respiration wakes and wanes cyclically. The periods of deep breathing alternate with apnoea

Irregularity and apnoea
Cyanosis

- Bluish colour of the skin and mucous membranes resulting from an increased quantity of reduced haemoglobin (exceeds 50 g/l) in the small blood vessels of those areas.
- It is usually most marked in the lips, nail beds, ears, and malar eminences.
- Central cyanosis can be detected reliably when arterial $O_2$ saturation has fallen to 85% (in dark-skinned persons 75%).
Cyanosis

- **Central (arterial) cyanosis**: the $\text{Sa O}_2$ is reduced or an abnormal haemoglobin derivative is present, and the mucous membranes and skin are both affected.
  - airway obstruction
  - reduction of alveolar surface
  - reduction of alveolar perfusion
  - reduction of alveolar diffusion
  - mixing with venous blood (shunts)

- **Peripheral (venous) cyanosis** is due to a slowing of blood flow and abnormally great extraction of $\text{O}_2$ from normally saturated arterial blood. In these conditions the mucous membranes of oral cavity may be often spared. It results from vasoconstriction and diminished peripheral blood flow.
  - Cold exposure
  - Congestive heart failure, shock
  - Peripheral vascular disease

- **Differentiation of two types of cyanosis**: Massage or gentle warming of a cyanotic extremity will increase peripheral blood flow and abolish peripheral, but not central cyanosis.
Cough

- Definition: an explosive expiration that provides a normal protective mechanism for clearing the tracheobronchial tree of secretions and foreign material.
- The abnormal cough is excessive and/or bothersome.
- Coughing may be initiated either voluntarily or reflexively.
- "Dry" cough - "productive" cough.
Cough

• **Causes:**
  – **exogenous** stimuli (gases, dusts, foreign bodies (aspiration), hot or cold air
  – **endogenous** stimuli:
    • Gastroesophageal reflux disease (partly vagally mediated reflex mechanism
    • Airway infection: viral or bacterial bronchitis. Viral bronchitis can produce prolonged cough long after resolution of acute symptoms.
    • Asthma with or without wheezing or dyspnoea
    • Bronchogenic carcinoma infiltrating the airway wall
    • Compression of airways results extrinsic masses such as lymph nodes or mediastinal tumour, or rarely from an aortic aneurysm
    • Parenchymal lung disease: pneumonia, lung abscess
    • Congestive heart failure (as a consequence of interstitial as well as peribronchial oedema)
    • ACE-inhibitors
Approach to the patient with cough 1.

- **History:**
  - Duration:
    - Acute (<weeks): most often upper respiratory infection
    - Subacute (between 3 and 8 weeks):
      - Postinfectious (viral, Chlamydia, Mycoplasma)
      - Postnasal drip (nasal discharge, frequent throat clearing)
    - Chronic (more than 8 weeks)
      - In a smoker COPD or bronchogenic carcinoma
      - In non-smoker ACE-inhibitor therapy
      - Postnasal drip
  - Is it associated with fever or sputum? If sputum is present, what is its characteristics?
Sputum

Important characteristics:
- volume
- colour
- odour
- consistency

Types of sputum:
- serous (frothy)
- mucous (translucent)
- mucopurulent
- purulent
- foetid (foul-smelling)
- rubiginous (red, sticky)
- Curshman's casts
- haemoptysis
  - blood-streaked
  - mixed evenly
- pure blood
Haemoptysis

• It is important to determine initially that the blood is not coming from nasopharynx or gastrointestinal tract
  – Blood from gastrointestinal tract: dark red appearance and acidic pH
  – Blood from respiratory tract: bright red and alkaline pH.

• Causes:
  – Bronchitis and bronchogenic carcinoma are the two most common causes
  – Tuberculosis, bronchiectasias
  – Pneumonia, lung abscess
  – Pulmonary embolism
  – Mitral stenosis (elevated pulmonary venous pressure)
  – Autoimmune disorders (SLE, Wegener’s granulomatosis, Goodpasture’s syndrome)
Approach to the patient with haemoptysis 1.

- **History:**
  - Blood-streaking mucopurulent or purulent sputum: bronchitis
  - Bloody sputum with putrid smell – lung abscess
  - Chronic and large amount of sputum: bronchiectasias
  - Acute onset and pleural chest pain – pulmonary embolism
  - Smoking and asbestos exposure – bronchogenic carcinoma
  - In AIDS patients – endobronchial or pulmonary parenchymal Kaposi’s sarcoma
Approach to the patient with haemoptysis 2.

- **Physical examination:**
  - Pleural friction rub – pulmonary embolism
  - Localized crackles – pneumonia
  - Evidence of air flow obstruction – bronchitis
  - Prominent ronchi with or without wheezing or crackles – bronchiectasis
  - Cardiac examination – heart failure (mitral stenosis, pulmonary hypertension
  - Skin examination – lupus erythematosus, Kaposi’s sarcoma

- **Diagnostic evaluation:**
  - Chest X-ray, CT, bronchoscopy, complete blood count, coagulation profile, assessment of renal disease – urine analysis, serum creatinine, and urea nitrogen. Sputum Gram and acid-fast stains, along with the corresponding cultures
CHEST PAIN

One of the most common symptoms

Benign
Life threatening

thorough and detailed history

Note: Patients behaviour

- Physical examination has limits (often normal)
- Diagnostic tests might be expensive
## Classification of chest pain:

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<tr>
<th>Pulmonary Disorders:</th>
<th>Pleural Diseases:</th>
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<tr>
<td></td>
<td>Pulmonary embolism</td>
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<td></td>
<td>Pneumothorax</td>
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<td>Pulmonary hypertension</td>
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<tr>
<th>Cardiac Disorders:</th>
<th>Ischemic:</th>
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<tr>
<td></td>
<td>Angina pectoris</td>
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<td>Myocardial infarction</td>
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<td>Non-ischemic:</td>
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<td>Mitral valve prolapse</td>
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<td>Dissecting aortic aneurysm</td>
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<tr>
<th>Gastrointestinal Disorders:</th>
<th>Oesophageal reflux</th>
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<td>Peptic ulcer</td>
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<td>Biliary colic</td>
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<td>Pancreatitis</td>
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<th>Costochondritis</th>
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<td>Cervical spine disease</td>
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<td>Thoracic outlet syndrome</td>
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<th>Functional:</th>
<th>Anxiety</th>
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<td>Exhaustion</td>
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<td>Psychic stress</td>
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<td>Panic syndrome</td>
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Pulmonary disorders

Pleural diseases: - usually inflammation ("dry" pleurisy)
- exacerbated by
  - inspiration
  - coughing
  - movement of the thorax

Pneumothorax: - sharp, sudden pain
- associated with dyspnoea

Pulmonary embolism: - severity of pain and other symptoms depend on size of occluded pulmonary artery
  - dyspnoea, tachypnoea
  - tachycardia, right ventricular failure
  - haemoptysis
  - cyanosis

Pulmonary hypertension: - stable pain
- right ventricular ischemia?

Nerve compression: - pleural tumour, pulmonary neoplasia
Cardiac and extracardiac causes of chest discomfort

- **CARDIOVASCULAR DISEASES**
  - Ischemic heart disease
  - Pericarditis
  - Aortic dissection
  - Congestive heart failure
  - Aortic stenosis and regurgitation
  - Hypertrophic cardiomyopathy
  - Pulmonary hypertension

- **LUNG DISEASES**
  - Pulmonary embolism
  - Pneumothorax
  - Pleuro-pneumonia
  - Pleuritis

- **GASTROESOPHAGEAL DISEASES (42%)**
  - Gastroesophageal reflux
  - Esophageal motility disorders
  - Peptic ulcer
  - Gallstones

- **NEUROMUSCULOSKELETAL DISEASES**
  - Fracture of sternum or rib
  - Spondylarthrosis
  - Periarthritis humeroscapularis
  - Intercostal muscle cramp
  - Tietze’s syndrome

- **MISCELLANEOUS**
  - Subphrenic abscess
  - Herpes zoster
  - Splenic infraction
  - Psychiatric disease
The epidemiology of chest discomfort in primary care and in patient who present to emergency department

<table>
<thead>
<tr>
<th>Condition</th>
<th>Primary Care (%)</th>
<th>Emergency Department (%)</th>
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<tr>
<td>Neuro-musculoskeletal conditions</td>
<td>29</td>
<td>7</td>
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<tr>
<td>Gastrointestinal conditions</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Serious cardiovascular conditions (stable and unstable angina, acute myocardial infarction, pulmonary embolism, heart failure)</td>
<td>13 (more common is the stable angina)</td>
<td>54 (more common is the unstable angina)</td>
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<tr>
<td>Emotional and psychiatric conditions</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>Pulmonary disorders (PTX, lung cancer, pneumonia)</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>Non-specific chest discomfort</td>
<td>11</td>
<td>15</td>
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Differential diagnosis of chest discomfort

• Acute myocardial infarction
  – The duration of the pain often more than 30 min
  – Often more severe than angina
  – Unrelieved by nitro-glycerine
  – May be associated with evidence of heart failure or arrhythmia

• Aortic dissection
  – Tearing, ripping pain with abrupt onset
  – Associated with hypertension, and/or connective tissue disorder
  – Depending on the location of dissection:
    • Loss of peripheral pulse
    • Pericardial tamponad
    • Murmur of aortic insufficiency
Differential diagnosis of chest discomfort

- **Pericarditis**
  - The duration of the pain is hours to days
  - Sharp, retrosternal pain that is aggravated by coughing, deep breath, or changes in body position (relieved by sitting and leaning forward)

- **Pulmonary embolism**
  - Abrupt onset of the pain. Location is often lateral
  - Associated symptoms are dyspnoea, tachycardy, and occasionally haemoptysis

- **Pneumothorax**
  - Sudden onset of pleuritic chest pain. Location: lateral to side of pneumothorax
  - Dyspnoea, decreased breath sounds, tympanic percussion sound.

- **Pneumonia or pleuritis**
  - Localized sharp, knifelike pain
  - Pain is aggravated by inspiration and coughing
  - Dyspnoea, fever, rales, occasionally pleural rub
Differential diagnosis of chest discomfort

- **Oesophageal reflux**
  - Deep burning discomfort that may be exacerbated by alcohol, aspirin, or some foods.
  - Worsened by postprandial recumbence, relieved by antacids

- **Ulcer disease**
  - Symptoms do not associated with exertion
  - Prolonged burning pain
  - Typically occurs 60 to 90 min after meals, when postprandial acid production is no longer neutralized by food in the stomach

- **Gallbladder disease:**
  - Prolonged colic pain
  - Occurs an hour or more after meals
Differential diagnosis of chest discomfort

• **Neuro-musculoskeletal diseases**
  – Cervical disk disease: compression of nerve roots – dermatomal distribution (pain in dermatomal distribution can also be caused by intercostal muscle cramp and herpes zoster)
  – The pain is aggravated by movement
  – Costochondral and chondrosternal syndromes (Tietze’s syndrome)
    * direct pressure on the costochondral-costosternal junctions may reproduce the pain.

• **Psychiatric conditions**
  – The symptoms are frequently described as visceral tightness or aching that last more than 30 min.