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## 1.11 Tumours of the lung and bronchi

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**Tumours of lungs and bronchi can have origin in any structure.** Their structural classification as tumours of lungs and bronchi is not decisive. The tumours of bronchi gradually obturate the bronchi and cause alterations in the pulmonary parenchyma. It is not possible to find later the site of the tumour origin. The classification as benign, primary malignant and metastatic tumours is principal.

### 1.11.1 Benign tumours of lungs and bronchi

They are usually characterized by a limited alteration of the pulmonary parenchyma, slow growth and by consequences of compression developed upon the neighbouring bronchi. The most frequent is the **bronchial adenoma**. It grows from the bronchial mucous membrane into the lumen of bronchi, but also extrabronchially. The manifestations reside in the consequences of mechanical impact of the tumour. Cough and haemoptysis occur. If an obturation of bronchus is present, atelectasis develops in the pertinent area of lungs; or a poststenotic bronchopneumonia and bronchiectasis may occur. Sometimes an abscess develops. Bronchial adenoma can be combined with an overproduction of serotonin. In this case abdominal spasms and asthmatic attacks occur.

Histologically the benign adenoma of lungs resembles the adenoma of the salivary glands. Benign tumours of bronchi include fibroma, lipoma, myxoma, angioma and other rare types.

**Chondrohamartoma** also belongs to the benign pulmonary tumours. It is usually localized in the distal lobes. It grows slowly.

### 1.11.2 Primary malignant tumours of lungs bronchi

**Bronchogenic carcinoma.** It is the most frequent malignant tumour in men. In Europe it is in the first place as cause of mortality of malignant tumours. Several factors participate in its etiology.

There are endogenous factors (genetic, immunologic, hormonal) and exogenous factors (mutagens, ionizing radiation, asbestos, asphalt, chrome, arsenic, iron oxides and nickel). It often occurs in scars after tuberculosis. 95 per cent of the involved patients are smokers.

The bronchogenic cancer arises in **the basal layer of the bronchial mucous membrane**. In this stage it could be detected merely by cytologic examination of the sputum. Histologically it can be classified as epidermoid carcinoma, small cell carcinoma, adenocarcinoma, and large cell carcinoma. The histologic classification of malignant tumours is the domain of pathologists. Carcinomas occur more often in right lung and in the superior than in the inferior lobes. It arises usually from the mucous membrane of segmental and subsegmental bronchi. It grows into the surrounding tissues infiltrating and destructing them. If it is localized centrally near to the hilus it penetrates the mediastinum, attacks the pericardium, the phrenic an recurrent nerves, vena cava superior and the oesophagus. If it is localized in peripheral areas it penetrates the pleural cavity. If it is localized in the apical region it spreads into the upper thoracic aperture, destroys the ribs, cervico-brachial plexus and the sympathetic trunk. **It has the tendency to metastize** via lymphatic or haematogenous ways. Most often it metastizes into the lymphatic nodes, pericardium, brain, suprarenal glands and kidneys. Yet it can metastize into any organ of the human body.

**The manifestation of cancer is very multiform.** It depends on its localization, histological type, relation to the lumen of bronchus, and on the consequences of infiltration. In other cases the metastatic symptoms occur. **At the beginning is the bronchogenic cancer completely symptomless.** An accidental examination reveals roentgenographic abnormalities. The cough, pain in the chest, dyspnoea, haemoptysis, and repeated bronchopulmonary infections occur later. **The cough** is irritant, dry and unproductive. **The pain in the chest** can resemble that of angina pectoris. Dyspnoea is a late symptom. **Haemoptysis** is not a standard symptom. The mentioned symptoms are often accompanied by **weakness, weight loss, fatigue, anorexia and fever.** The growth of tumour is manifested later by variable clinical picture. All depends on the structures which are affected. The hoarseness is the manifestation of n. recurrens pare-

sis. Dysphagia is due to the compression and infiltration of oesophagus. Paresis of the phrenic nerve with elevation of the diaphragm can lead to dyspnoea. Involvement of pericardium can be manifested by arrhythmias or heart failure.

Carcinomas, invading the pleura from the apical parts into the upper thoracic aperture are the cause of the **Pancoast's syndrome**. They infiltrate the brachial plexus, the thoracic and cervical parts of sympathetic nervous system, the ribs and vertebrae. A cruel pain in the shoulder is present, later paresis of the hand, with muscle atrophy, loss of sensibility and the Horner's syndrome (constriction of the pupil, ptosis, anhidrosis on the affected side of the head and neck) occur.

The compression of superior vena cava leads to **the vena cava superior syndrome** development. Cyanosis and oedema of the head and neck are present, accompanied with oedema of upper extremities and the trunk. The veins are congested and winding. The patient suffers from headache and disturbances of vision.

The extrapulmonary symptoms form the **paraneoplastic syndromes**. They are usually present in bronchogenic carcinoma, yet they occur also in other malignant tumours. Their cause is not well known. Sometimes they precede the primary tumour, or they disappear following its removal, and during the relapse they reappear. The **manifestation of the bone and joint involvement** includes the clubbing and hypertrophic osteopathy with pain in joints imitating the rheumatoid arthritis. Pains in long bones, profuse sweating and myastenic syndrome are also present. Peripheral neuropathies (manifested by paresis of the fibular nerve) are observed. Sometimes also **endocrine disturbances** are present. Cushing's syndrome develops due to extreme hyperproduction of a peptide similar to ACTH. Because of overproduction of a peptide imitating the effects of pituitary hormones which stimulate the ovaries, gynecomastia develops. Hyponatraemia is due to the production of a peptide with effects of ADH. The cancer cells often produce calcitonin. The endocrine changes can be associated with the resemblance of the cancer cells with those of the APUD system.

Phlebitis migrans, anaemias, leucocytosis and thrombopenia are commonly occurring **extrapulmonary manifestations**. A nonbacterial thrombotic endocarditis can develop. The prognosis in patients

with bronchogenic carcinoma is in spite of application of the most proven therapeutic methods not satisfactory. Since the diagnosis has been established merely 10 per cent of patients survive the period of five years.

**Sarcoma of the lungs.** It is a rarely occurring malignant tumour. It occurs in older persons. The prognosis is bad.

### 1.11.3 Metastatic malignant tumours of the lungs

Metastatic malignant tumours of the lungs constitute 20–30 per cent of all malignant tumours. Direct penetration of tumours arising from the adjacent organs (breast carcinoma, tumours of the thymus, of the thyroid gland, oesophagus and tumours of the mediastinum) can be involved. Osteosarcoma, malignant tumours of testes, kidneys, suprarenal glands, stomach, large intestine, prostata and breast metastasize into the lungs by blood vessels.

**Solitary metastases** are not accompanied with clinical symptomatology. Clinical manifestations of **disseminated metastases** include an irritant cough and progressive dyspnoea. Solitary metastases are resected. The patients with disseminated metastases are treated by chemotherapy or radiotherapy. The prognosis is bad.

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## 1.12 Disorders of the diaphragm, thorax, pleura and mediastinum

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### 1.12.1 Disorders of the diaphragm

The diaphragm is the most important respiratory muscle. It separates *hermetically* the thoracic cavity from the abdominal cavity. The central part is tendinous and not contractile. The peripheral part consists of muscle fibres attached to the distal osseous part of thorax. Some formations and structures pass the diaphragmatic openings from the thoracic into the abdominal cavities. The muscles are governed