

12. List 6 types of nutrients.
13. Speak briefly about two types of digestion.
14. What is metabolism?
15. What disorders of the gastro-intestinal system do you know?

Translate:

trávicí soustava; přídatné orgány; zažívací ústrojí; trávit jídlo; vylučovat zbytky; lícni dutina; tvrdé patro; měkké patro; čípek; nosohltan; patrový oblouk; chuťové pohárky; kyselý; slaný; hořký; polykací mechanismus; peristaltický pohyb; částečně strávené jídlo; tenké střevo; trvá to asi šest hodin; voda se vsřebává; pokud se tyče délky, je tlusté střevo kratší; leží v horní části dutiny břišní; produkují hormony, uchovávají výměšky; přinášejí chemikálie; klínovitý orgán; játra jsou pokryta pobříšnicí; podstatný pro život; ničí toxické látky; uchovává glukózu; produkuje žluč; vsřebávání tuků; tukové zásoby v těle; rozštěpit na tukové kyseliny; přidání pyalínu do potravy; anabolické a katabolické procesy; reguluje hladinu glukózy v krvi; přeměnit glukózu na glykogen; špatné trávení; nevolnost; průjem; zvracení; zácpa; žaludeční vředy; to může být chirurgicky odstraněno; zánět slepého střeva; pooperační období je bolestivé; nahradit zničené buňky; nereaguje na lékovou terapii; zotavení bude vyžadovat celý měsíc

## 12. THE RESPIRATORY SYSTEM

The respiratory system is associated with the exchange of gases between man and his environment and also between the tissue cells and the blood. All body cells need a continuous supply of oxygen and also need to be able to get rid of carbon dioxide, which is produced by cell metabolism. These functions are achieved by **ventilation** that involves the passage of air from the atmosphere to the alveoli and from the alveoli back to the atmosphere. This consists of two acts:

- a) **Inspiration** – or taking air into the lungs, because of the negative interpleural pressure created by enlarging of the thoracic cavity,
- b) **Expiration** – or exhaling air out of the lungs during which the muscles of respiration return to their former position.

The movement of gases from a region of high tension to a region of low tension takes place through the capillary/alveolar membrane.

This process is termed **diffusion**. When blood passes through the lung capillaries, the tension of oxygen in the alveoli is higher than that of the blood and it passes through the membrane to a region of lower tension. Respiration consists of two phases; external and internal.

**External respiration** involves the exchange of oxygen and carbon dioxide in the capillaries and alveoli of the lungs.

**Internal respiration** is the exchange of oxygen and carbon dioxide between cells and capillaries through the body.

The structures concerned with ventilation are the upper and lower respiratory tracts, respiratory muscles, thorax and portions of the nervous system.

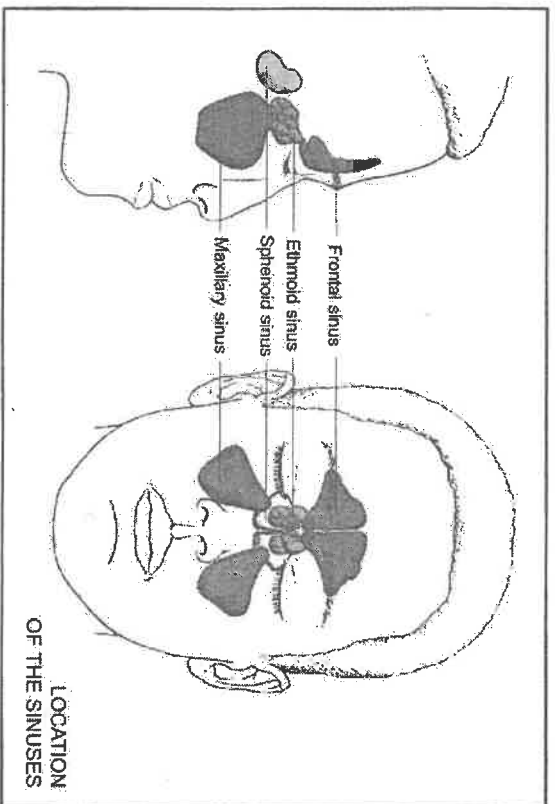
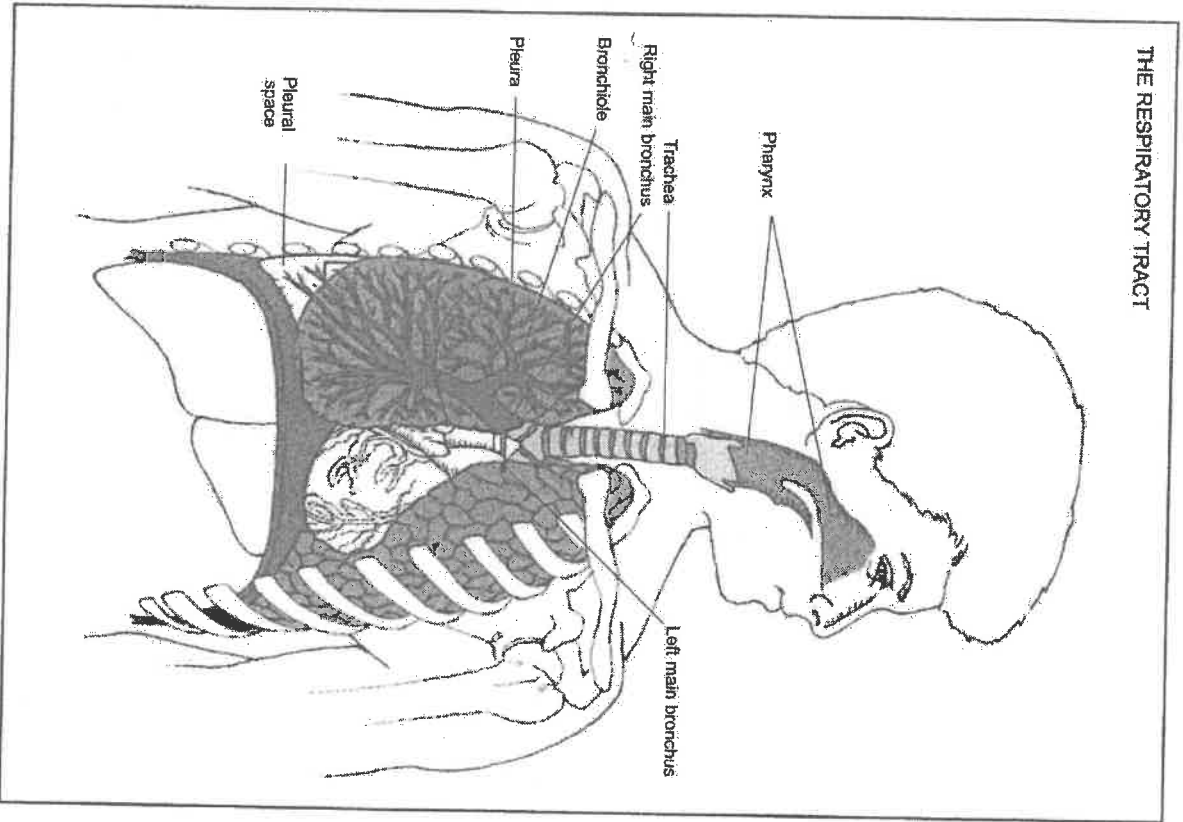
### Upper Respiratory Tract

The upper airway is formed by the nose, mouth, pharynx and larynx. Air passes through the two nostrils (nares) into the nasal cavities, which are separated by the nasal septum. There is a moist mucous membrane lining and an abundance of capillaries.

The cavities have three bony protuberances called **conchae**, where the air is warmed and moistened. Thousands of tiny hairs called **cilia** protrude from the lining of the nasal cavity; their purpose is to filter dust particles from the air.

Several small cavities known as **sinuses** are located in the skull near the nasal cavities: ethmoidal sinus, sphenoidal sinus, maxillary sinus and

THE RESPIRATORY TRACT



frontal sinus. Each connects with the nasal cavities by a narrow passageway. These air spaces serve as resonating chambers and their size and shape affects the quality of the voice.

From the nasal cavities the air passes into the pharynx, or throat, which is separated into three portions:

- a) Nasopharynx – portion behind the nasal cavities,
- b) Oropharynx – portion behind the mouth,
- c) Laryngopharynx – lower section that joins the larynx.

The **adenoids** are located in the nasopharynx and the **tonsils** in the oropharynx. These two pairs of lymphoid tissue protect the body against infection by trapping bacteria that enter the nose and throat.

The **pharynx** provides a common passageway for air entering the larynx and food entering. The presence of food or fluid stimulates a reflex contraction of the tube. The posterior nares (openings into the nasal cavity) are then blocked off and the larynx is closed off by a lowering of the leaf-shaped structure – the **epiglottis**. These closures prevent the entrance of food and fluid into the nose and lower respiratory tract and the contents are directed into the oesophagus as a result of the contraction.

The **larynx** is a tube-like structure made up of muscles and a series of cartilage rings that can be felt through the skin over the throat; the largest ring is called Adam's apple. It contains the **vocal cords**, which are responsible for the sound production, and is continuous with the trachea below. The laryngeal passageway is narrowed in one area by membranous folds; reflected over the vocal cords. The slit-like space between these two folds is referred to as the **glottis** and is varied in size to produce the different levels of pitch in voice production. In normal quiet inspiration and expiration the vocal cords are relaxed and the glottis is open.

#### Lower Respiratory Tract

The lower tract consists of the trachea, bronchi and two lungs.

The **trachea** enters the chest cavity and connects with the bronchi. Its function is to provide a passage for air to reach the lungs. It is also lined with cilia and the mucous membrane that prevent dust from entering the lower tract.

The **bronchi** and lungs are situated in the thoracic cavity, which is lined with a moist membrane called the **pleura**. The trachea branches as it enters the thoracic cavity to form the left bronchus and the principal bronchus, which is shorter and more vertical. Each bronchus enters a lung where it branches like a tree to form many smaller tubes called **bronchioles**. At the end of each bronchiole there is a microscopic **alveolus**, or air-sac.

The **lungs** are two large organs covered with visceral pleura and are separated by the mediastinum, which contains the heart and great vessels, the oesophagus, trachea, bronchi and lymphatic ducts and nodes.

The **respiration** is under the control of the respiratory centre in the medulla of the brain and is affected by many factors such as exercise, emotional reactions, pain, elevated temperature, haemorrhage, shock and certain drugs. The normal rate of respiration varies with age; for an adult it is about 14 to 20 respirations per minute, for children from 25 to 30. A respiratory rate below 9 is dangerous and should be reported immediately. Normally the thoracic cavity acts as an airtight box; here there is no space between the inside of the thorax and the outside of the lungs. When air enters this box from a chest wound or from a ruptured bulla, it is drawn in between the pleural layers, the potential space then becomes a real one and the lungs collapse and ventilation is inadequate. The presence of air in the pleural cavity is called the pneumothorax; the presence of clear

fluid is given a term hydrothorax and the blood there is referred to as haemothorax. Pus in this cavity causes empyema.

There are several common **conditions affecting the respiratory system** as bronchitis, asthma, pneumonia, pulmonary embolism, and carcinoma of the lungs.

**Acute bronchitis** is an inflammation of the trachea and bronchial tubes and frequently follows an upper respiratory tract infection or influenza. Factors predisposing the development of the infection include a dusty, damp and foggy atmosphere and smoking. It is characterised by a persistent dry cough that may last several weeks, especially in winter when artificial heat dries the air. Diagnosis of the disease is made up from the symptoms and chest X-ray examination that may show bronchiale hypertrophy. The components of treatment are antibiotics, humidifying the air at night, medication to suppress coughing and increased fluid intake.

**Chronic bronchitis** results from recurrent attacks of acute bronchitis or prolonged exposure to chemical irritation from cigarettes, exposure to smoke and dust. It is incurable, but early treatment prevents progression and lung damage.

**Asthma** is a chronic disorder manifested by attacks of dyspnoea in which air in the alveoli becomes trapped (cannot be exhaled) and entrance of fresh air is prevented. The pathological mechanism may be due to bronchial spasm, oedema of the bronchial lining and collection of abnormal thick mucus in the alveoli or bronchi. The main cause of asthma is allergy, such as hay fever, or hypersensitivity to certain drugs, food or substances inhaled. It most commonly begins in childhood or middle age, but can start at any age. The second leading cause is emotional stress.

**Pneumonia**, which has many different types, is an acute inflammation of the lungs usually due to streptococcus, pneumococcus or staphylococcus pneumoniae. Bacterial disease has a sudden onset of symptoms: fever, chills, chest pain, increased pulse and respiration and painful coughing; viral pneumonia develops gradually. Antibiotic therapy such as penicillin, tetracycline or erythromycin is begun immediately. Also an analgesic is given to relieve the chest pain, codeine is often prescribed. If the patient is dyspnoeic, hospitalisation and oxygen administration are necessary.

**Pulmonary embolism** commonly arises from a deep vein thrombosis, and if it is large, it may cause sudden death — otherwise the patient complains of pain in the chest, difficulty in breathing and a sudden need to

have their bowels opened. He may be cyanosed, pale and sweaty, with a rapid pulse and a low blood pressure.

**Tuberculosis** is an infectious disease caused by a bacillus and can invade almost any of the body's tissues: bone, joints, kidneys, lungs, spine and other organs. Pulmonary tuberculosis is the most prevalent form. Until recent times it was one of the world's most dreaded diseases. Mycobacterium is difficult to destroy, it can live in dust for many years; symptoms develop gradually and the disease requires long-term treatment with combined antibiotics (so a toxic reaction is a danger).

The incidence of **lung carcinoma** is greater in males than females and cigarette smoking is considered to be an important causative factor, as well as atmospheric pollution and exposure to dust and chemical gases. The types of tumour frequently found are squamous cell carcinoma, adenocarcinoma and pulmonary blastoma. Treatment may be surgical removal of the lobe or the lung (pneumectomy), radiotherapy, cytotoxic drugs and prognosis depends on the location of the tumour, on the amount of metastases and early recognition.

## VOCABULARY

<b>airways</b> [eəweɪz]	dýchací cesty
<b>air-sack</b> [eəseɪk]	plicní sklípek
<b>airtight</b> [eətaɪt]	vzduchotěsný
<b>alveolus, pl. alveoli</b> [æl'vi:ələs]	alveol, plicní sklípek
<b>asthma</b> [æsmə]	záducha, astma
<b>biopsy</b> [baɪəpsɪ]	biopsie
<b>breath</b> [breθ]	dech
<b>breathing</b> [brɪ:θɪŋ]	dýchání
<b>breathless</b> [bri:θləs]	dušný, bez dechu
<b>bronchiolus, pl. bronchioles</b>	průdušinka
<b>bronchus, pl. bronchi</b> [brɒŋkəs, -kaɪ]	průduška
<b>cilia</b> [sɪliə]	řasa, řasinky
<b>concha, pl. conchae</b> [kɒŋkə, kɒŋki:]	skořepa
<b>cyanosis</b> [saɪə'neʊsɪs]	kyanoza
<b>damp</b> [dæmp]	vlhký
<b>dust</b> [dʌst]	prach
<b>dreaded</b> [dri:ded]	obávaný

<b>dyspnoea</b> [dɪs'pi:nə]	dušnost
<b>empyema</b> [em'pi:tɪmə]	hnis v tělních dutinách
<b>epiglottis</b> [epɪ'glɒtɪs]	hrtanová příklopka
<b>expiration</b> [eks'pi'reɪʃn]	výdech
<b>fog</b> [fɒg]	mlha
<b>gas</b> [ɡæs]	plyn
<b>glottis</b> [glɒtɪs]	hlasivková štěrbinna
<b>inhale</b> [ɪn'heɪl]	vděchovat
<b>inspiration</b> [ɪn'spi'reɪʃn]	nádech
<b>lining</b> [lɪnɪŋ]	vystelka
<b>lobe</b> [ləʊb]	lalok, lalůček
<b>meningitis</b> [menɪ'n'dʒaɪtɪs]	zánět mozkových blan
<b>moisture</b> [mɔɪstʃə]	vlhkost
<b>mucus</b> [mju:kəs]	hlen, sliz
<b>nasopharynx</b> [næ'zəʊ'færɪŋks]	nosohltan
<b>pleura, -ae</b> [plɛərə]	pohrudnice
<b>pneumonia</b> [nju:'mɔ:niə]	zápal plic
<b>protuberance</b> [prə'tju:bərəns]	výčnělek
<b>pulmonary</b> [pʌl'mɔ:nəri]	plicní
<b>ruptured bulla</b> [rʌpəd bʊlə]	protržená cysta
<b>sinus</b> [saɪnəs]	dutina
<b>ethmoidal sinus</b> [eθ'mɔɪdɪl]	dutina čichová
<b>frontal sinus</b> [frʌntl]	dutina čelní
<b>maxillary sinus</b> [mæ'ksɪləri]	dutina čelistní
<b>sphenoidal sinus</b> [sfi:'nɔɪdɪl]	dutina klinová
<b>sweat</b> [swet]	pot, potit se
<b>throat</b> [θrəʊt]	hrdlo, krk
<b>uptake</b> [ʌpteɪk]	vydechávání
<b>ventilation</b> [ven'tɪleɪʃn]	vytřena plynů
<b>vocal cords</b> [vəʊkl kɔ:dz]	hlasivky

## QUESTIONS AND EXERCISES

Answer:

1. What do all body cells need?
2. What does ventilation consist of?
3. Explain inspiration.
4. Explain expiration.

5. What is diffusion?
6. Explain the external and internal respiration.
7. List the parts of the upper respiratory tract.
8. List the parts of the lower respiratory tract.
9. What is the purpose of cilia?
10. List four sinuses located in the skull.
11. Explain the whole process of respiration.
12. What is the function of tonsils and adenoids?
13. Why does not food enter the air passages during swallowing?
14. Explain the function of lungs.
15. Talk briefly about common disorders of the respiratory tract.

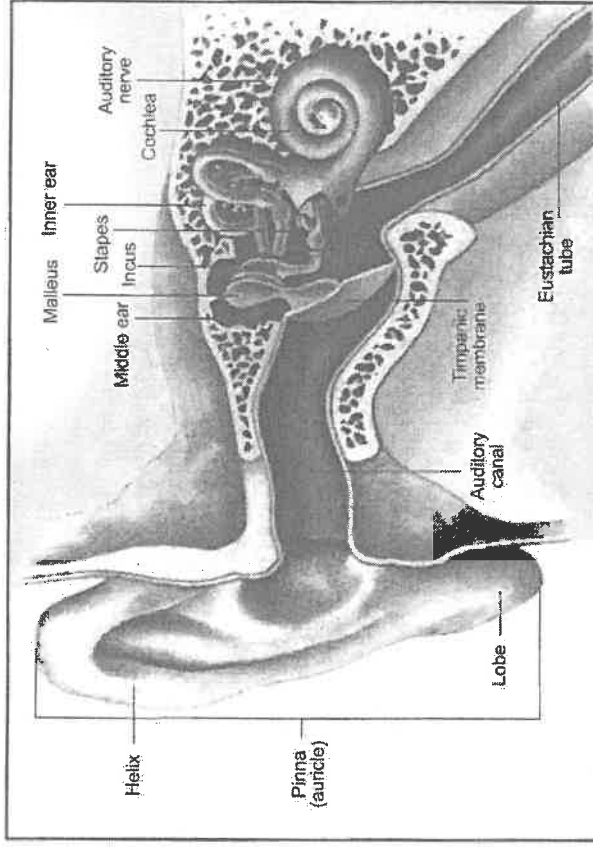
Translate:

dýchací soustava; potřebuje nepřetržitou zásobu kyslíku; schopen zbavit se škodlivých látek; výměna plynů; tlak; vytvořený zvětšením dutiny hrudní; skládá se ze dvou fází; vnitřní a vnější dýchání; horní dýchací cesty; dolní dýchací cesty; nosní dutiny; nosní přepážka; má mnoho výčnolků; výstelka dutiny nosní; filtrovat částičky prachu; vzduchový prostor; ovlivňuje kvalitu hlásku; chrání tělo před infekcí; zachycuje bakterie; zabránit vstupu do hrtanu; poskytnout cestu pro vzduch; průdušnice se rozvětluje; vzdušný vak; levá plíce má dva laloky; dechová frekvence kolísá; funguje jako vzduchotěsná komora; často následuje po infekci horních cest dýchacích; chřipka; vlhké a mlhavé ovzduší; rentgenové vyšetření hrudníku; vlhčení vzduchu v noci; je to nevyléčitelné; dušnost; precitlivlost na určité léky; začíná to v dětství; zápal plic

### 13. OTOLARYNGOLOGY

Otolaryngology is a medical branch that deals with diseases of parts of the respiratory tract (nose, throat) and with the diseases of the ears. The department is also called the ENT department (ears, nose and throat).

#### The Ear



The ear is concerned with the special science of hearing as well as the maintenance of equilibrium. It has three divisions: the external ear, the middle ear and the internal ear, which is a complicated cavity.

The external part consists of the auricle (also called pinna) and the external auditory meatus. The pinna is an immobile cartilaginous framework covered with skin and may contribute slightly to the collection of sound waves. The external auditory meatus is an S-shaped tube approximately 2.5 cm long ending at the tympanic membrane separating the external and middle ears. The skin lining of the canal is covered with hairs and has special glands producing a yellow waxy secretion for protection against insects and dust.