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**HUMAN RESPIRATORY SYSTEM**

*Function:* gas exchange between the organism and the environment

*Structure:* 1. **airway** - upper and lower respiratory tract

 2. **lungs** (pulmo)

*Airways*

* connect the lungs with the environment
* stacked with cartilage for support to prevent collapsing (narrowing)
* lined with mucosa – a mucous membrane with cilia to trap pathogens
* divided into upper (nasal cavity, nasopharynx) and lower (larynx, trachea, bronchi)

## Nasal cavity (cavum nasi)

* divided into 2 parts by the nasal septum, which made up of cartilage in the front and bone in the back
* the mucosa of the nasal cavity is covered by submucosal
* its function is to moisten, heat and clear the inhaled air
* its top is lined with olfactory epithelium

## Nasopharynx (nasopharynx)

* the upper part of the pharynx
* connected with the middle ear by the Eustachian tube

 ***Larynx (larynx)***

* is a pipe approx. 6 cm long
* made up of cartilages: paired (arytenoid, corniculate, cuneiform) and unpaired (thyroid, cricoid, epiglottis)
* houses vocal cords – voice formation = phonation
* the epiglottis has a special function of separating the pharynx and the larynx, preventing food from getting into the respiratory tract

## Trachea (trachea)

* a 12 cm tube in front of the oesophagus
* made up of 15- 20 cartilages in the shape of the letter C
* flanked by the lobes of the thyroid

***Bronchi (bronchus)***

* around T4-T5 the trachea branches into bronchi
* they enter the lungs and branch into secondary lobar bronchi, then tertiary segmental bronchi, then bronchioles which connect with pulmonary alveoli with surfactant

## Lungs (pulmo)

* human breathing organ
* have a sponge-like structure and consist of the right (55-60%) and left lobe (40-45%)
* outer structure of the lungs: the apexes reach up above the collar bones, the base sits on the diaphragm
* divided by fissures into lobes; the right lung has three and the left one two lobes

*Breathing:* gas exchange between the organism and the environment. It is an automatic process controlled by the central nervous system

It can be:

1. *‘external’* – exchange of oxygen and carbon dioxide between the air in the lungs and the blood in the capillaries
2. *cellular* – the exchange of gases between the blood and cells

*The mechanism of breathing*

## External breathing

* consists of 3 processes: *1. pulmonary ventilation*
	1. *distribution*
	2. *diffusion*

*Pulmonary ventilation* – the exchange of air between the lungs and the atmosphere by increasing and decreasing the volume of the thoracic cavity when inhaling and exhaling

inhalation: expansion of the lungs by contracting the external intercostal muscles

* + - the sternocleidomastoid muscle pulls the clavicle and sternum upwards
		- the scalene muscles lift the first 2 ribs
		- the pectoralis minor muscle pulls the 3rd, 4th and 5th ribs upwards
		- the diaphragm moves downwards
	+ *normal breathing* – respiration rate of 16-18 inbreaths, about 500 ml of air is exchanged per each
	+ the *minute volume* is 7-9 l of air
	+ v*ital capacity* is the amount of air expelled after a maximum inhalation. In women it is approx. 3.5 l, in men approx. 5 l.

## Distribution

* + dispensation of inhaled air

## Diffusion

* + the exchange of gases through alveolar-capillary membrane (from a place with higher pressure to a place with a lower pressure)

## Cellular breathing

* + transfer of gases by blood by haemoglobin in red blood cells
	+ oxygen is bound to the non-protein part – heme, forming oxyhaemoglobin

## Respiratory system diseases

* + *common cold* – viral infection, sneezing, runny nose, headache, fever
	+ *influenza* – infectious disease of the upper respiratory tract, fever, muscle pain, fatigue, headache, etc.
	+ *tonsillitis* – inflammation of the tonsils
	+ *pharyngitis* – inflammation of the pharynx
	+ *laryngitis* – inflammation of the larynx, loss of voice
	+ *bronchitis* – inflammation of the bronchi
	+ *pneumonia* – inflammation of the lungs
	+ *tuberculosis* – caused by Mycobacterium tuberculosis – fever, cough, fatigue, loss of appetite, etc.
	+ *asthma* – inflammatory disease, obstruction of the airways, wheezing, bronchospasms