

RESPIRATION

ANATOMY, PHYSIOLOGY & RESPIRATORY MECHANICS

WHAT IS RESPIRATION?

Respiration is a vital function. The lungs take up oxygen (O_2) from the air we breathe, and release carbon dioxide (CO_2), as a metabolic waste product, into the air that is exhaled, thus removing it from the body.

DIVISION OF THE LUNGS

THE LUNGS FUNCTION

Air-conducting and gas-exchange system

ANATOMY

Upper and lower airways

UPPER AIRWAYS

- Terminates in the larynx area
- Clearing the upper airway using:

- Nasopharyngeal tube (inserted through the nose)
- Oropharyngeal tube (inserted through the mouth)

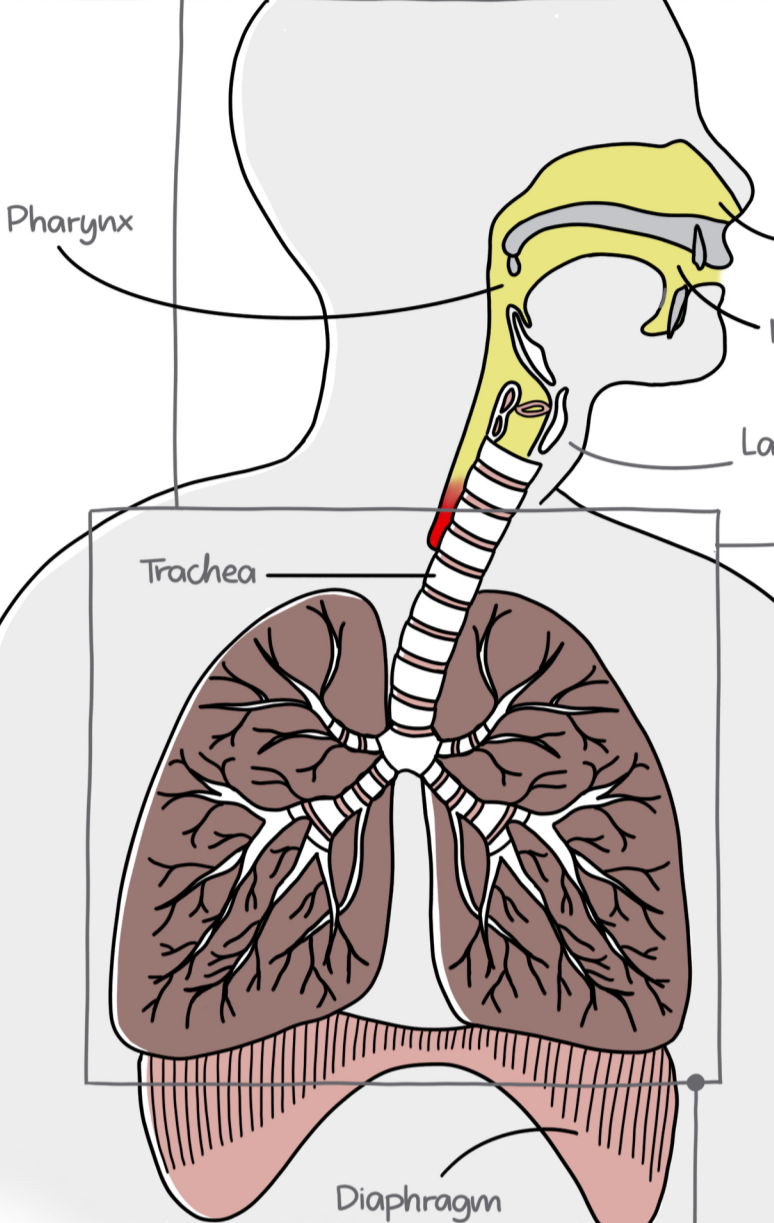
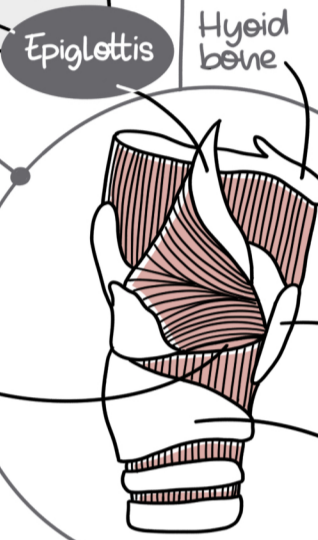
LARYNX forms the bridge between the upper and lower airways

comprises 3 cartilages

the upper **LARYNX** the lower airways

FUNCTIONS:

- Closure of the airways for swallowing and coughing
- Producing sounds
- Place for laryngeal mask and tube



Human beings have two lungs - one on the left and one on the right.

They are further divided into:

- 3 lobes in the right lung
- 2 lobes in the left lung

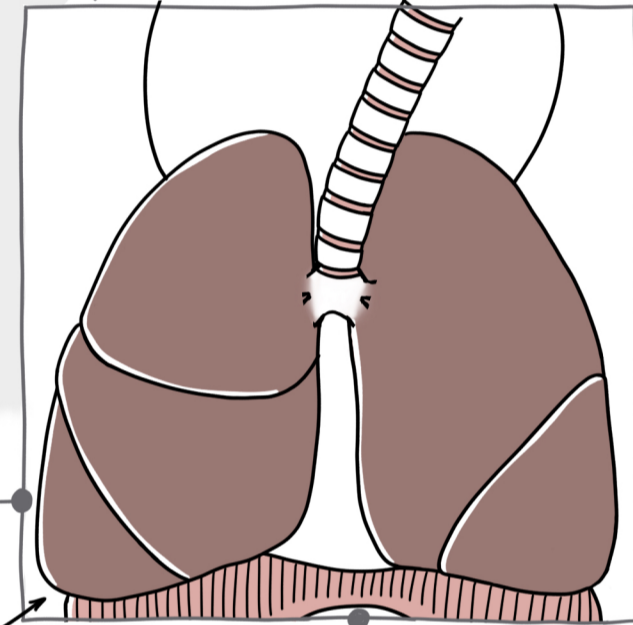
AIR-CONDUCTING FUNCTION

TASK: Warming, humidifying, cleaning and transporting the air in the upper and lower airways

MEDULLA OBLONGATA

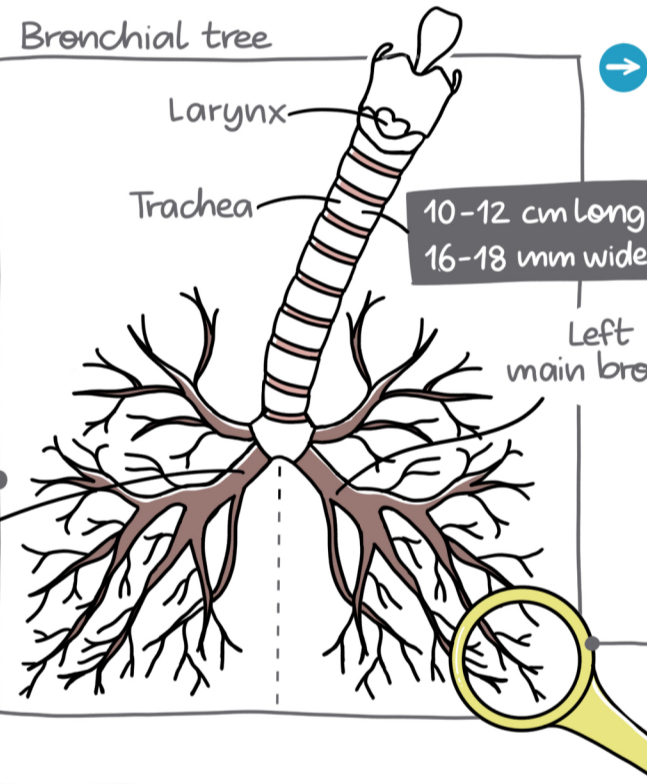
- is the continuation of the spinal cord into the brain stem.
- Location of important regulatory centers (e.g. for respiration and reflex centers (swallowing, coughing, sneezing, gagging) as well as the vomiting center)

Right Lung (pulmo dexter) Left Lung (pulmo sinister)



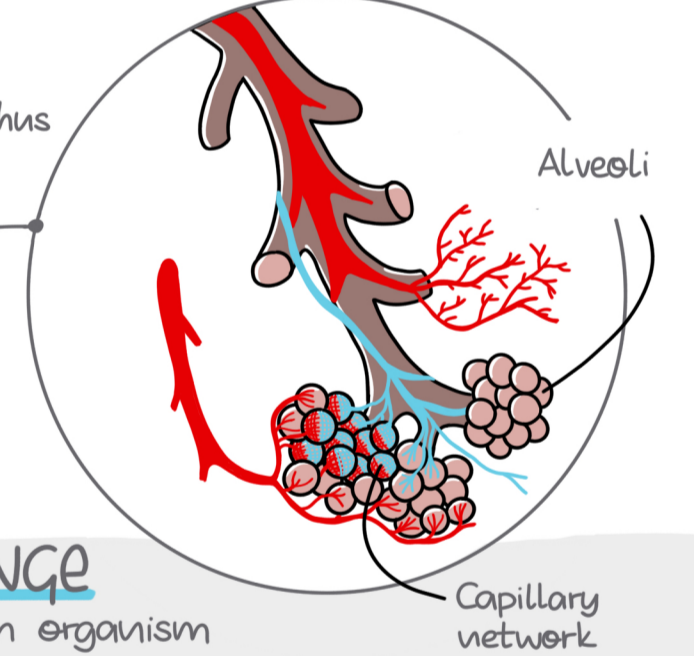
LOWER AIRWAYS

- Begins below the epiglottis and extends to the alveolar level
- Contains trachea, main and segmental bronchi
- Place for endotracheal tubes



GAS-EXCHANGE FUNCTION

- TASK:
- Take-up of O_2 into the blood
 - Removal of CO_2 from the lungs



PHYSIOLOGY + RESPIRATORY MECHANICS



Energy is released and provided to cells in the form of ATP (adenosine triphosphate).

Prerequisites for a functioning respiratory system:

- Functioning respiratory drive/respiratory muscles
- Intact gas exchange unit
- Sufficient O_2 -transport

SPONTANEOUS BREATHING is an unconscious reflex process.

The respiratory stimulus is provided by the medulla oblongata for:

$CO_2 \uparrow$

$O_2 \downarrow$

Shift in pH value in the blood

Disturbance of gas exchange due to:

- No/peer circulation/perfusion
- Impaired diffusion
- No ventilation of the alveoli

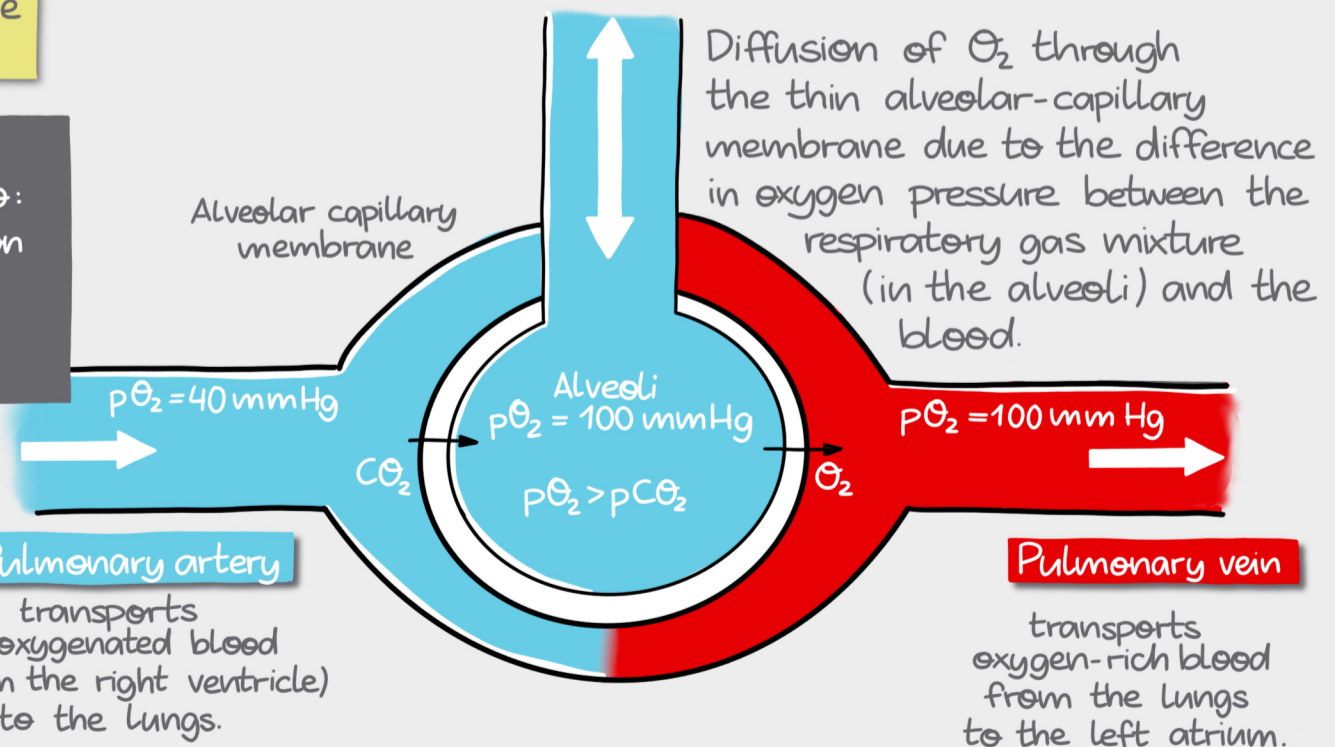
GAS EXCHANGE

takes place between organism and environment.

EXTERNAL RESPIRATION (ALVEOLAR LEVEL)

- Transfer of O_2 from the alveoli into the blood and CO_2 from the blood into the alveoli
- is a prerequisite for internal respiration.

Diffusion of O_2 through the thin alveolar-capillary membrane due to the difference in oxygen pressure between the respiratory gas mixture (in the alveoli) and the blood.

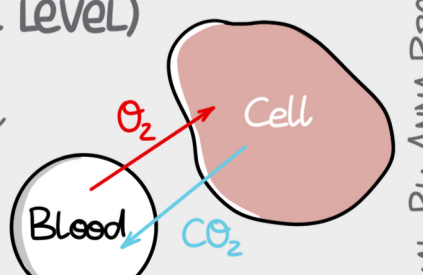


Pulmonary artery transports deoxygenated blood (from the right ventricle) to the lungs.

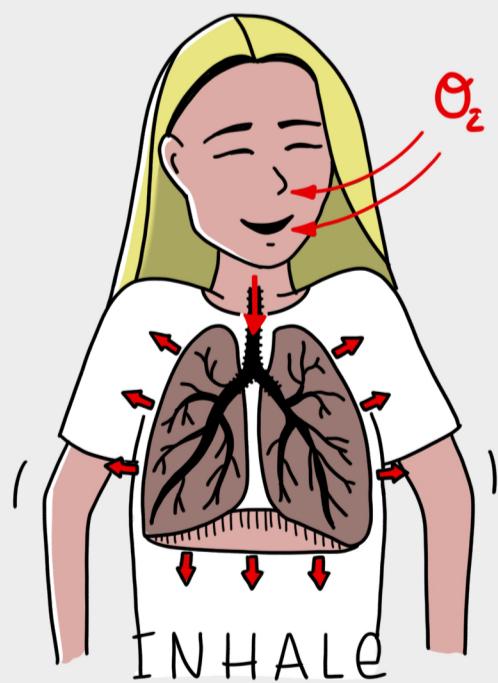
Pulmonary vein transports oxygen-rich blood from the lungs to the left atrium.

INTERNAL RESPIRATION (CELL LEVEL)

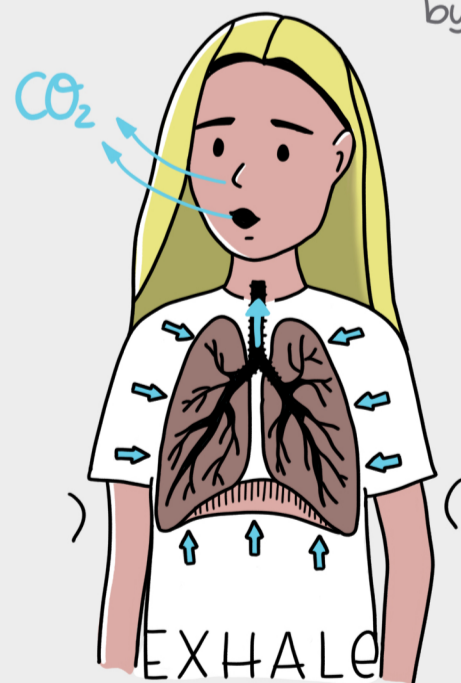
- is the transfer of O_2 and CO_2 between the blood and the cell after the oxygen has been transported to the cell via the red blood cells.



- Important for energy production



INHALATION is an active process: The respiratory muscles create a negative pressure and air flows in.



EXHALATION is a passive process: The muscles slacken and the air is squeezed out.

Intrapulmonary pressure < atmospheric pressure

Intrapulmonary pressure > atmospheric pressure

The tidal volume of a healthy adult is approx. 500 ml,

with a lung capacity of 6,000 ml.