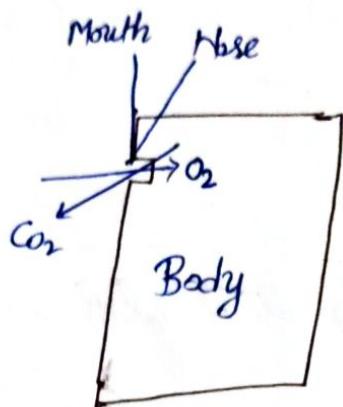


Unit - 3 Respiratory System

Breathing:

The process of exchange of gas through the lungs is called breathing.

The intake of O_2 from environment inside the lungs and removal of CO_2 from outside the body is called breathing.

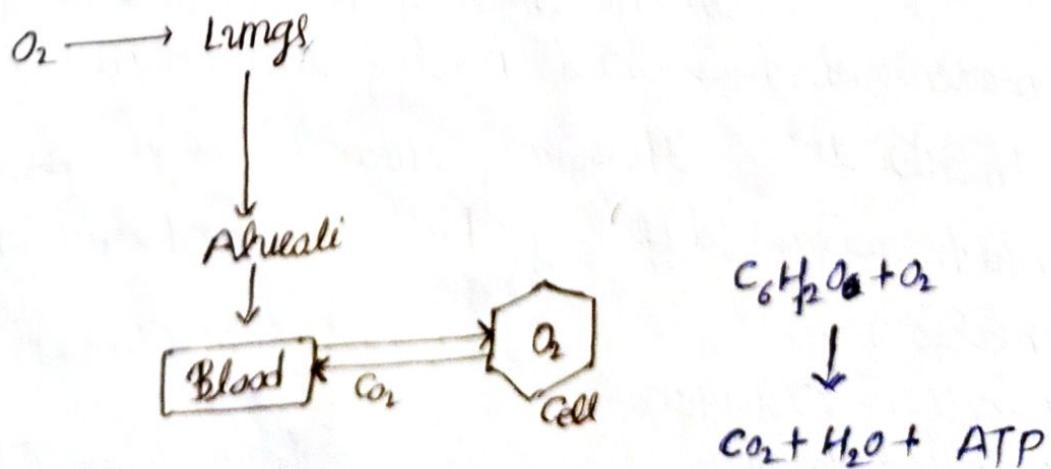


Cellular Respiration or Respiration

After the breathing process the oxygen comes in the blood and the process of exchange of gases through the cell is called cellular respiration.

or

The intake of O_2 inside the cell and removal of CO_2 from the cell is called cellular respiration.

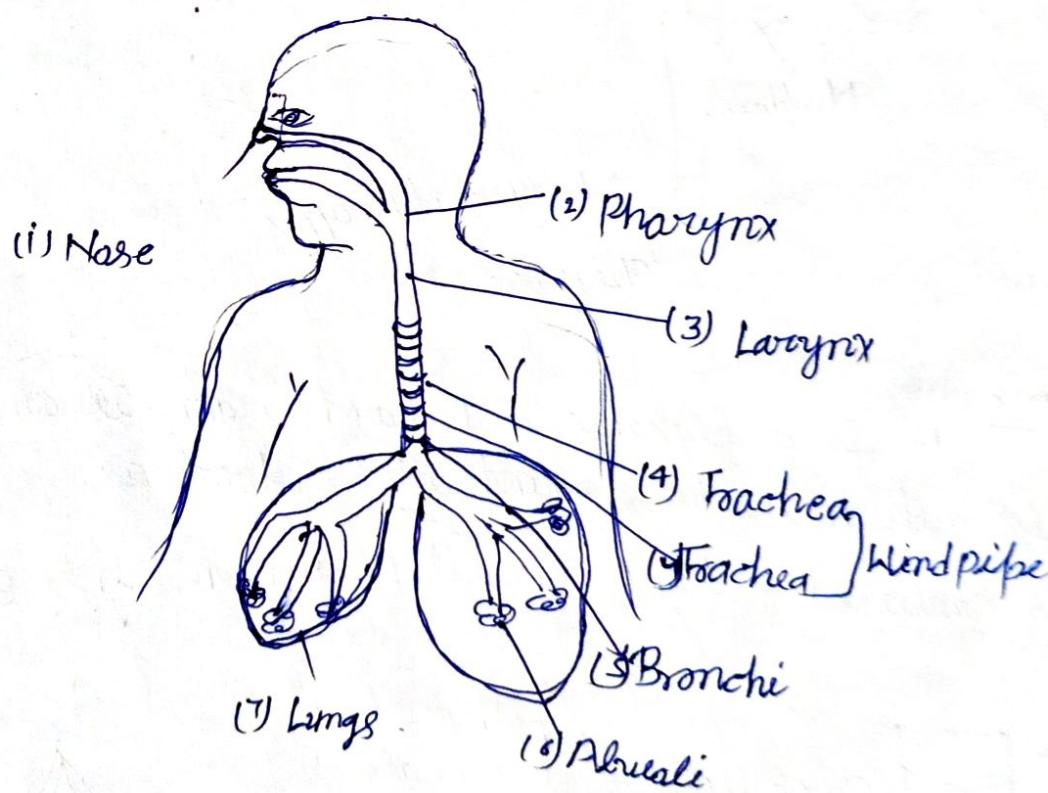


Respiratory tract :-

During the respiration process those series of organ through which air is passed is called respiratory tract.

There are following organ which are present in respiratory tract.

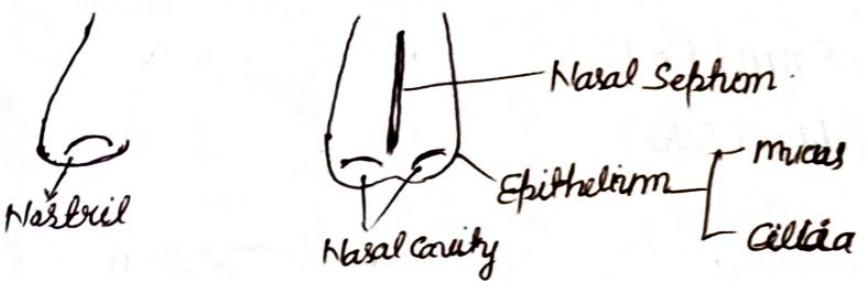
- 1) Nose.
- 2) Pharynx
- 3) Larynx [Sound box]
- 4) Trachea [Wind Pipe]
- 5) Bronchi
- 6) Alveoli
- 7) Lungs.



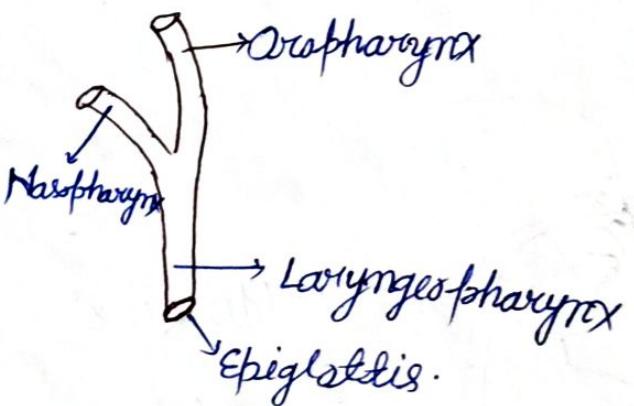
Nose/Nasal Cavity

It is the first and outer part of the respiratory track.

- The opening of nose is called nostril and the inner part is called Nasal cavity.
- A bone nasal septum is present which divides the nasal cavity into two part.
- The inner lining of nasal cavity is covered with nasal epithelium which contains mucous membrane and cilia.



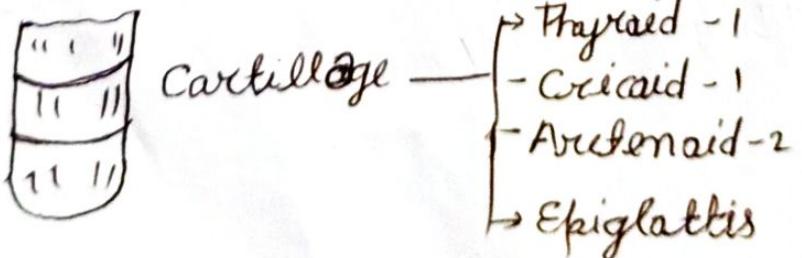
2. Pharynx



3. Larynx

It is a flexible and hard organ it contains vocal cords which produce sound after vibration.

It is composed of four cartilage and one into epiglottis.



Wind pipe / Trachea

It is a long and hard organ whose length is about 11 to 12 cm.

It is covered by 'C' shaped cartilage ring and which is incomplete in backside.

Bronchi

The last part of trachea is called bronchi.

Bronchiole

When bronchi is divided into two part then it is called bronchiole.

After further division it make primary and secondary bronchial.

Alveoli

It is a small circular structure.

It attached with the bronchial like a group of grapes.

It contain epithelial membrane by which they exchange the gas with blood.

Lungs

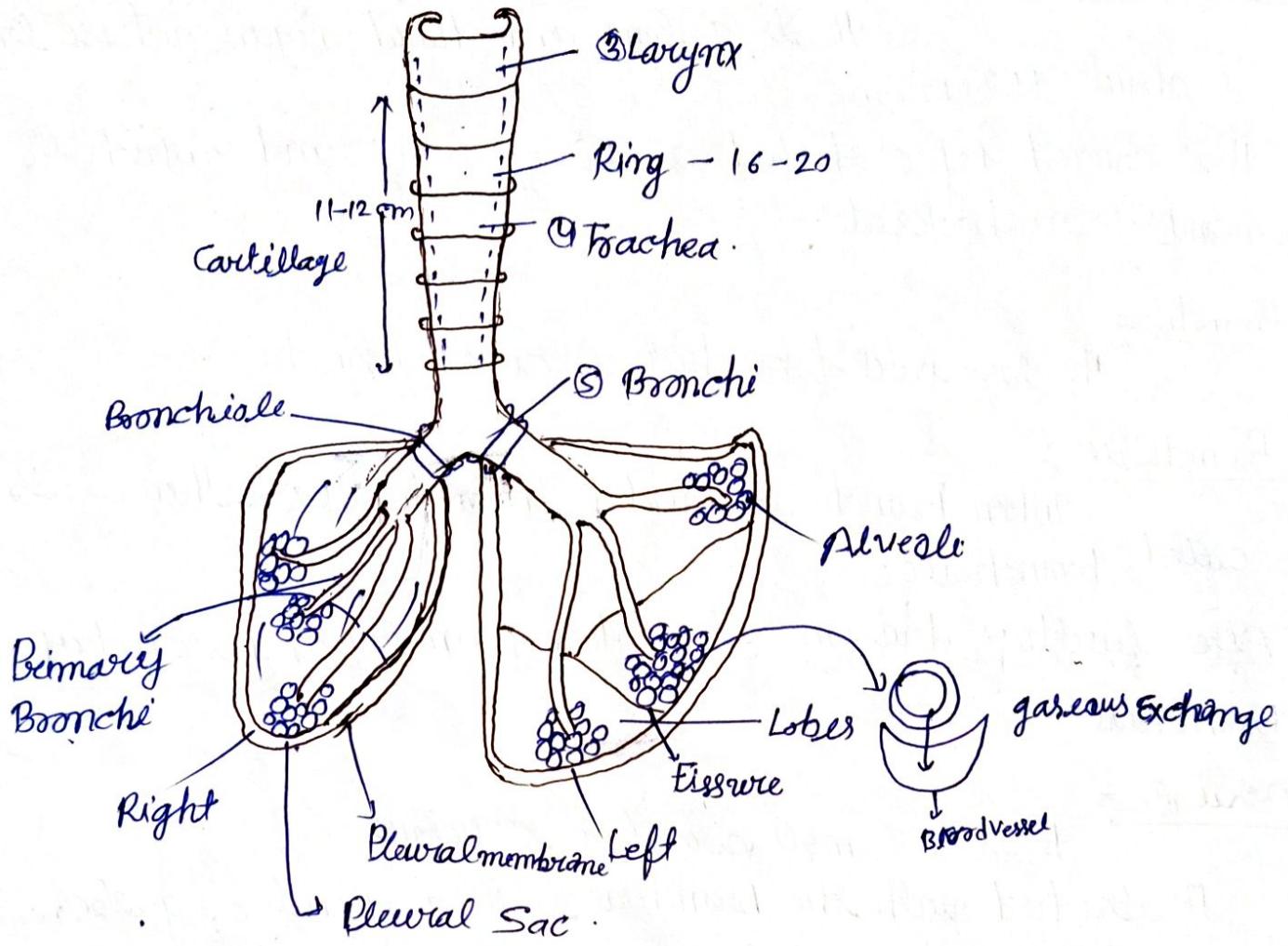
In human one pair of lungs is present. Left lung is slightly bigger than right lungs.

Both lungs are divided into lobes by help of fissure (प्रस्त्र)

→ Lungs is covered with a membrane which is called pleural membrane.

→ The liquid filled in side the pleural cavity is called pleural sac.

→



Mechanism of Breathing (Respiration)

Breathing consists of two types.

i) Inhalation:

The movement of Air from External environment to inside the lungs is called inhalation

ii) Exhalation:

The movement of Air from the lungs to outside of body is called Exhalation.

Mechanism: Breathing is a mechanical process which depends on the formula - Pressure is inversely proportional to volume

And the air moves from high pressure to low pressure.

The breathing process depends upon the contraction and relaxation of the ribs and diaphragm muscle.

1. Inspiration =

When diaphragm and ribs muscle is contract then the volume of thoracic cage is increase and the pressure inside the chest is decrease.

So to balance the air pressure air comes to inside from outside. This is called inspiration.

2. Expiration =

When both ribs and diaphragm muscle relax then volume of thoracic cage is decrease and the pressure inside is increase so to balance the air pressure air goes out side from inside this is called Expiration.

mechanism of Breathing

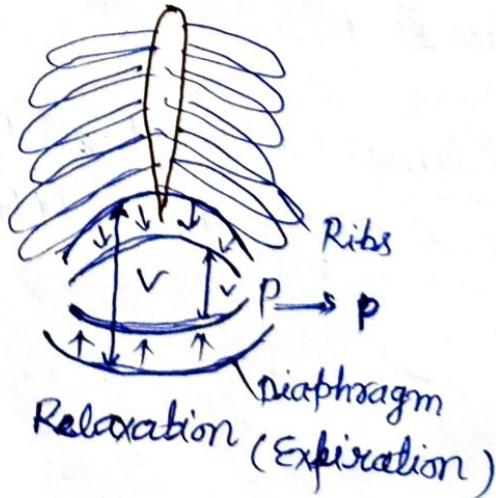
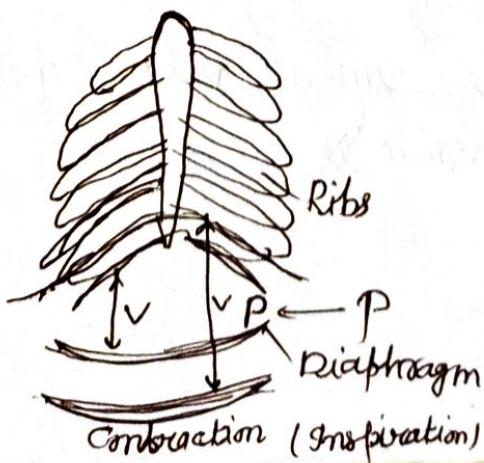
Diaphragm
Ribs } Contract → Inspiration.

Mechanical Work

$$P \propto \frac{1}{V}$$

Diaphragm
Ribs } Relax → Expiration.

P_{exp}



Respiratory Volume :- It is of following type.

(Normal Respiratory Volume)

1) Tidal Volume - 500 ml (TV)

2) Inspiratory Reserve Volume - 2.5 ltrs (IRV)

3) Expiratory Reserve Volume - 1 ltr (ERV)

4) Vital Capacity - 4 ltrs (VC)
$$VC = TV + IRV + ERV$$

5) Residual Volume - 1 ltr (RV)

6) Total Lung Capacity - 5 ltrs (TLC)
$$TLC = VC + RV$$

(i) Tidal Volume (Air) :- It is the volume of air passing in and out of the lungs with ordinary quiet breathing (Normal Value 0.5 ltrs)

(ii) Inspiratory Reserve Volume :- It is the additional volume of air than can be taken in by forced inspiration (Normal value is 2.5 ltrs)

(iii) Expiratory Reserve Volume :- It is the volume of air that can be expelled by forced expiration after normal inspiration. (Normal value is 1 ltrs)

(iv) Vital Capacity :- It is defined as the volume of air that can be expelled by a forced expiration after a forced inspiration (Normal value is 4 ltrs)

(v) Residual Volume :- It is the volume of air which remains in the lungs on forced expiration after normal inspiration (Normal value is 1 ltrs)

(vi) Total Lung Capacity :- It is the sum of vital capacity and residual volume. (Normal value is 5 ltrs)

Gaseous Exchange

During the process of Respiration Oxygen moves from Alveoli to blood from blood to tissue by gaseous exchange.

The mechanism of gaseous exchange is based on the diffusion and osmosis.

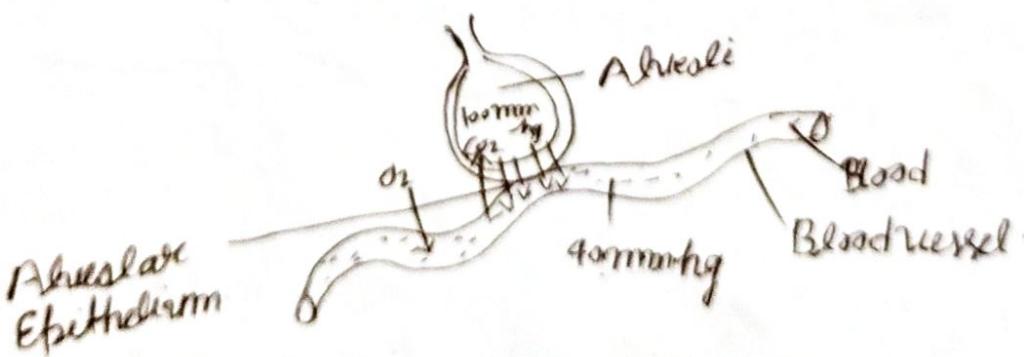
Environment or lungs \rightarrow Alveoli $\xrightarrow[\text{Exchange}]{\text{O}_2}$ Blood $\xrightarrow[\text{Exchange}]{\text{O}_2}$ Tissue

It is of two type.

A) Gaseous Exchange b/w Alveoli to blood : (External Exchange)

After inspiration when concentration of oxygen is increase in Alveoli then by the diffusion process oxygen diffuse from Alveoli to blood by passing Alveolar Epithelium.

The conc. of O_2 is high (100mmhg) in Alveoli & conc. of CO_2 is less so oxygen moves from Alveoli to blood and CO_2 moves from blood to Alveoli



B) Gaseous Exchange b/w blood & tissue (Internal Exchange)

After ~~External~~ exchange the conc of O_2 is increase in blood and conc of CO_2 its decrease in blood. blood comes in contact with tissue then by diffusion process O_2 move from blood to cell. And CO_2 move from cell to blood.

