AIR DISTRIBUTION

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- On inspiration, air is entering the lungs through the upper respiratory tract called nose and the mouth.
- The dust particles and bacteria in air are filtered by nasal hairs and mucus.
- In addition to this filtering effect, the air is warmed and moisturized when inspired through nose.
- On the way to lungs, the larynx further warms and humidifies the air.
- Filtering, warming and moisturzing will not happen when air is inspired through the mouth.
- At the throat two openings exist, one is the esophagus for passage of food, and the other is the larynx for passage of air.

- When Swallowed, the opening of the larynx closes to prevent from food entering the lungs.
- When air is inspired, the opening of the esophagus closes to prevent from air entering the stomach.
- The trachea, through which the air flows, branches into the right and left bronchi.
- The main bronchi is divided into smaller bronchi, then into bronchioles.
- The bronchioles have hair- like epithelial projections, called cilia.
- Cilia are beating rhythmically to sweep dust out of the lungs
- The air in the bronchioles is at body temperature and 100% humidified and is herely completely filtered.

- At the end of bronchioles a small, balloon like air sacs are there.
- These balloons are called alveoli they are arranged in clusters.
- During inspiration, the chest cavity enlarges and a Vacuum is created in each alveoli.
- Hence oxygen rich air is entered into the alveoli.
- Alveoli are covered by tiny blood vessels and capillaries.
- The higher concentration of dissolved oxygen is there in the trapped air in the alveoli.
- Similarly, higher concentration of dissolved carbon dioxide is in the capillaries filled with blood.

- Now, the oxygen diffuses across the alveolar walls into the blood plasma and carbon dioxide in the blood crosses from blood into the alveoli.
- On expiration, the alveoli relax and carbon dioxide rich air moves out of the lungs and breathed out.
- Naturally haemoglobin has more affinity to oxygen than carbon dioxide.
- Haemoglobin can carry 70 times more oxygen than the plasma alone can hold.

- The oxygen carrying capacity of the blood depends on the following factors:
- (i) The difference in oxygen concentrations of the blood in the capillaries of lungs and trapped air in the alveoli
- (ii) The efficient and healthy functioning of the alveoli
- (iii) The rhythm, rate and depth of respiration

PNEUMOTACHOGRAPHY

- This instrument can be used to measure either rate of air flow into the lungs or rate of volume.
- This transducer generally used to find respiration rate.
- The transducers include: thermistor placed in front of the nostril, displacement sensor put across the chest, impedance electrodes and signal from CO_2 transducer.
- The respiratory signal from any one of transducers and time duration are used to find the respiratory rate.

- The following are the various methods used to find the respiratory rate:
- Differential pressure transmitter method.
- Thermistor method.
- Impedance pnumotachograph.
- CO_2 method of respiratory rate measurement.