Life Processes

Respiration in Human

Respiration in human:

The function of respiratory system is to breathe in oxygen for respiration (producing energy from food), and to breathe out carbon dioxde produced by respiration. The gases exchanged between blood and air are oxygen and carbon dioxide.

(i) Human respiratory tract

External nostrils ⟶ Nasal cvity ⟶ Pharynx ⟶ Larynx ⟶ Trachea ⟶ Bronchi ⟶ Bronchioles ⟶ Alveolar sacs.

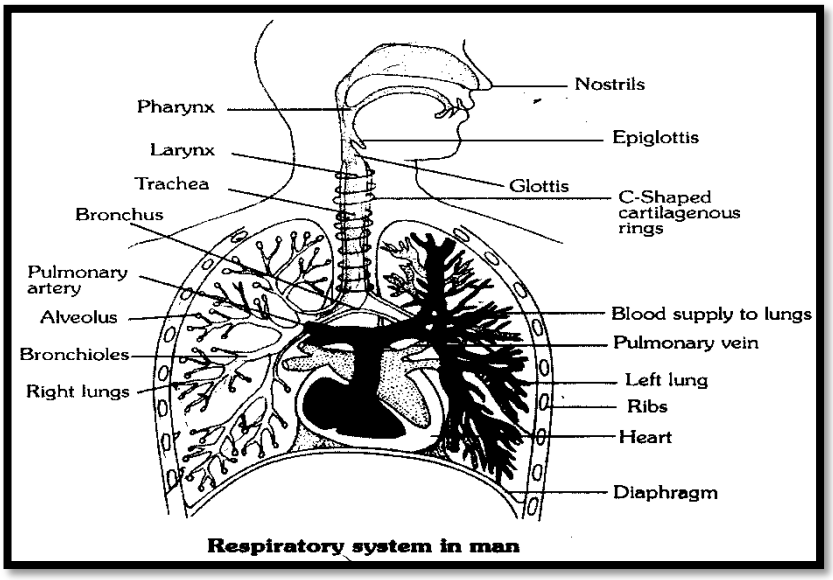
(I) External nostrils : First part of respiratory system. It opens into nasal cavity and is meant for inhalation of air from outside.

(II) Nasal cavity: The air enters through the nostrils and reaches into a pair of nasal cavities. The two nasal cavities are separated from each other by a nasal septum. The nasal passages are linked by ciliated epithelium and mucus secreting cells, so that the inspired air get warmed, moistened and becomes dust free. The dust particles are entrapped in the mucus secreted by mucus cells. Nasal cavity is also lined with **olfactory epithelium** which acts are organ of smell. The nasal chambers open into pharynx through internal nares.

(III) Internal nares: Nasal cavity opens into it and it leads to pharynx.

(IV) Pharynx: It is a common part between both alimentary canal and respiratory system.

(V) Larynx: It is an enlarged part of trachea which is also called as 'voice box'. It produces



Respiratory system in man

voice by passage of air between vocal cords. It contains four different types of cartilages among them a 'c' shaped thyroid cartilage protruding out in neck region is called Adam's apple. The glottis(opening of trachea) is guarded by a flaplike**epiglottis**. It does not allow anything other than air to enter into the larynx.

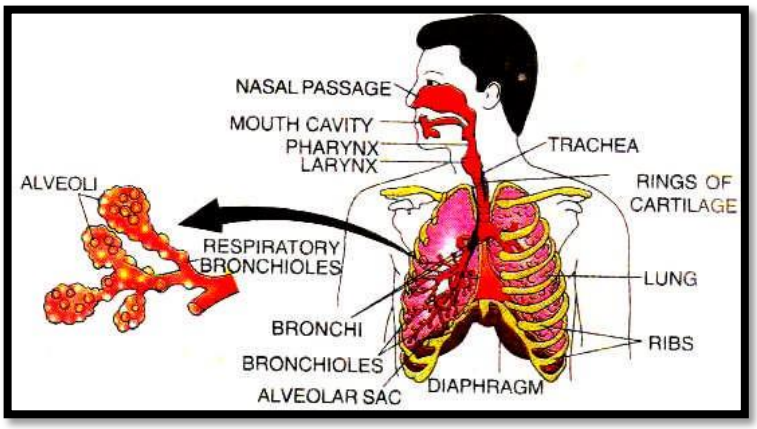
(VI) The trachea : The trachea or wind pipe is a long, narrow, whitish tube. It extends through the neck. It enters the thorax where it divides into a pair of branches called **primary bronchi**. The walls of trachea are supported by "C"-shaped cartilagenous rings that keepit always distended.

(VII) The primary bronchi: These are a pair of tubular structures formed as a result of bifurcation of the trachea. These are right and left primary bronchi that enter into the corresponding lung. These are also supported by cartilagenous rings.

RESPIRATORY ORGANS:

THE LUNGS:

The respiratory organs in man are a pair of lungs. These are thin walled, elastic, spongy, pinkish, triangular and highly distensible structures known as left and right lungs. The lungs occupy most of thethoracic cavity. They are well protected by bony thoracic cage.



Each lung is enclosed in a double–walled pleural sac. In between the two layers is present a space called pleural fluid. The pleural fluid is secreted by the pleural sac and performs the following functions:

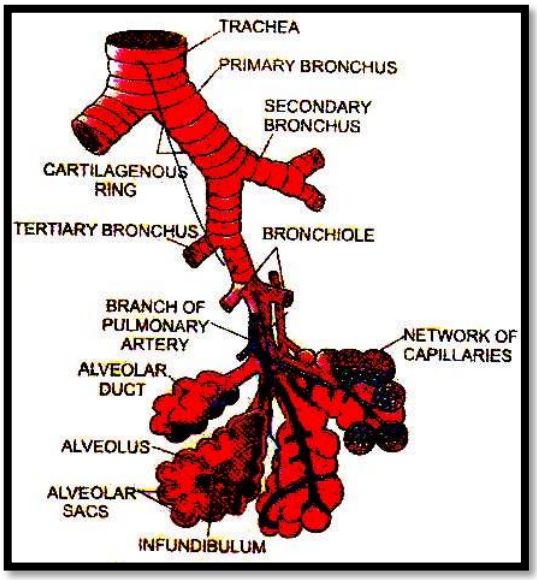
(i) It protects the lungs from any kind of mechanical injury and shock.

(ii) It lubricates the lungs for free expansion and relaxation.

(iii) It keeps the lungs moist for proper functioning.

Each lung is a conical triangular structure. The upper pointed side is called apex and the lower broadside is called base. The left lung is slightly smaller than the right lung.

The left lung is differentiated intotwo lobes with the help of furrows. Each primary bronchus, after entering into the corresponding lung, divides repeatedly to form a networkof very fine tubes. The primary bronchus divides into **secondary bronchi** that give rise to **tertiary bronchi**. The tertiary bronchi divide into bronchioles which give rise to alveolar ducts that open into blind end sacs called alveoli.



Alveoli are functional units of as these are **actual site of respiratory exchange.** There are about 750 million of alveoli present in lungs which have a total surface area of about 80 m^2. Alveoli are covered with a network of capillaries.

Breathing

Mechanism of breathing: It includes two processes inhalation and exhalation-

(I) Inhalation: When air is breathed in, the diaphragm and muscles attached to the ribs contract thus ribs move outward and diaphragm move downward (flat) due to which there occurs expansion of chest cavity, it results increase in volume of chest cavity thus the air pressure decreases and air from outside rushes into the lungs and alveolar sacs get filled with air containing oxygen. The oxygen present in air diffuses into the blood and CO_2 from blood diffuse out into alveolar sac.

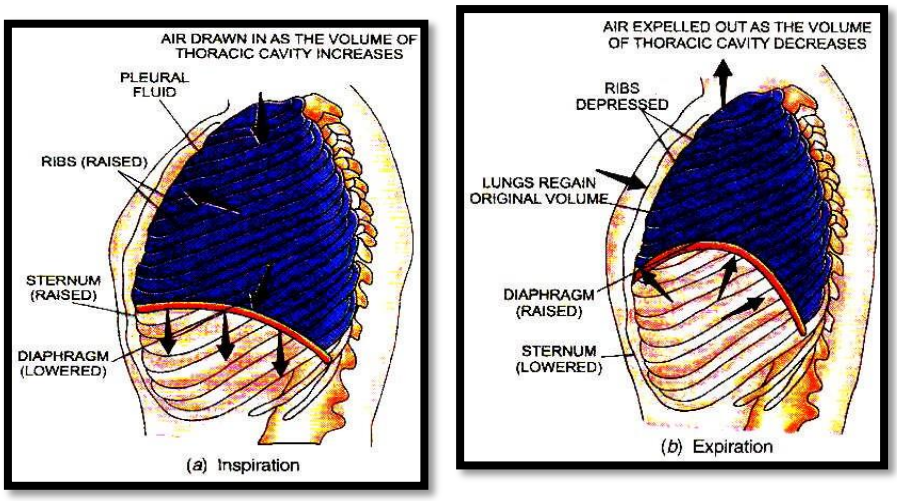


Figure. Process of breathing in man.

(II) Exhalation: When air is breathed out the diaphragm and muscles attached to ribs relax thus ribs move inward and diaphragm move upward (Dome shaped) which brings about contraction in chest cavity, its volume gets reduced and CO_2 is pushed out from lungs into the air nostrils.

Differences between inspiration and expiration

S.No.	Characters	Inspiration [inhalation]	Expiration [exhalation]
1	Definition	Process of inhaling of fresh air in the lung alveoli	Process of exhaling of foul air out of lung alveoli

2	EICM (External inter costal muscles)	Contraction	Relaxation
3	Ribs	Moves Outward	Moves inward
4	Sternum	Moves forward	Moves backward
5	Movement of diaphragm	Towereds abdominal cavity	Away from abdominal cavity
6	Shape of diaphragm	Flat	Dome shaped
7	Size of thoracic cavity	Increases	Decreases
8	Lungs	Decompression	Decreases
9	Pressure of air in lungs as compared to atmosphere	Deceases	Increases
10	Movement of air	From atmosphere to lungs	From lungs to atmosphere