

The Gas Exchange System

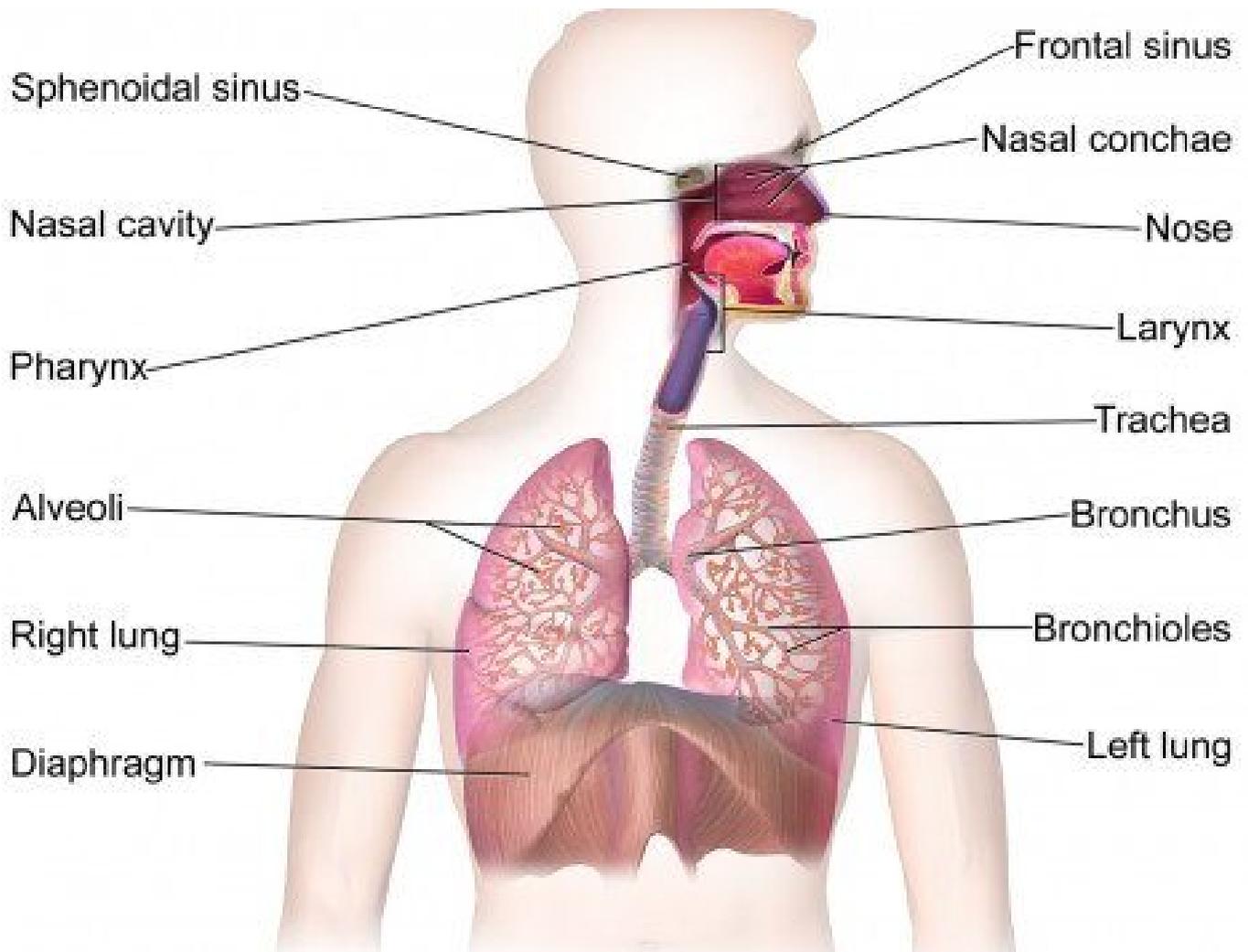
Animals inhale oxygen for aerobic respiration and exhale CO₂.

Respiratory surface:

The surface through which diffusion of gases occurs is called the respiratory surface. The following are the conditions that make a surface good for respiration.

- Large surface area.
- Thin
- Wet or moist.

Human Gas Exchange System



The Respiratory System

The human respiratory system is composed of the following structures.

- **External Nares**

Air enters the body through the nostrils or mouth. The cilia present in the nose filter the air.

- **Pharynx**

The air from the nose enters the pharynx.

- **Larynx**

The larynx is a tube made up of cartilage that receives the air and transfers it to the trachea. The opening of larynx is guarded by cartilage called epiglottis. During swallowing the epiglottis is pushed over larynx to prevent food from entering the trachea.

- **Trachea**

The trachea is also made up of C shaped cartilage.

- **Bronchi**

The trachea then bifurcates into two tubes called bronchi. Right bronchus enters the right lung the same for left bronchus.

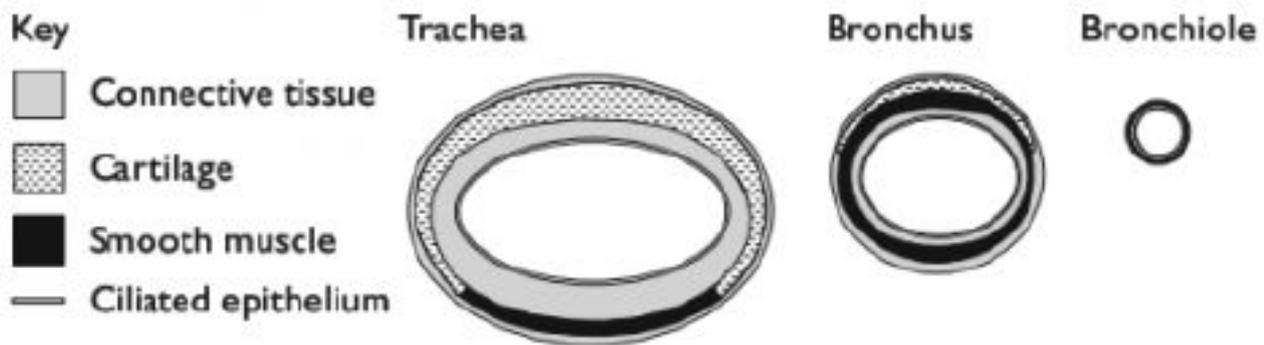
- **Bronchioles**

Bronchi then further divide into small branches called bronchioles.

- **Alveoli**

At the end of bronchioles is a sac-like structure called alveoli. Alveoli is the respiratory surface in humans. It is supplied by a rich network of capillaries.

Cross sections of airways to show the distribution of tissues (not to scale)



Lungs

The lungs are the respiratory organ. It is surrounded by a sac-like structure called a pleural. The space between the pleura is called the pleural cavity which is filled with pleural fluid.

Cartilage

The wall of trachea and bronchi is made up of cartilage. It prevents the walls from collapsing during expiration.

Elastic fibres

The walls of all airways and alveoli are made up of elastic fibres. It helps the wall to expand during inspiration and recoil during expiration.

Smooth muscles

They are present in the wall of the trachea bronchi and bronchioles. They can contract and relax changing the diameter of the airway.

Ciliated epithelium

It is a single-cell layer that has numerous hair-like structures on it. These cilia beat to keep the dust and other particles out of the airway.

They line the trachea bronchi and bronchioles.

Goblet cells

These cells are present in the lining of the airway. They produce mucus. This mucus traps foreign particles and bacteria.

Gas Exchange At The Alveolar Surface

The blood reaching alveoli are high in CO₂ concentration and low in O₂. This is because this blood is coming from the body. The air in alveoli has higher O₂ and low Co₂. Thus, a diffusion gradient is formed.

Oxygen diffuses from alveoli into blood and Co₂ diffuses from blood to alveoli. This gradient is maintained by breathing action.