Aim: Study of Respiratory system and organs with the help of charts, models, and specimens.

Introduction:

The respiratory system is a complex network of organs and structures responsible for the exchange of gases, primarily oxygen and carbon dioxide, between the body and the external environment. This crucial physiological process ensures oxygen delivery to tissues and carbon dioxide removal, supporting cellular respiration and overall metabolic functions. The main organs of the respiratory system include the nose, pharynx, larynx, trachea, bronchi, and lungs.

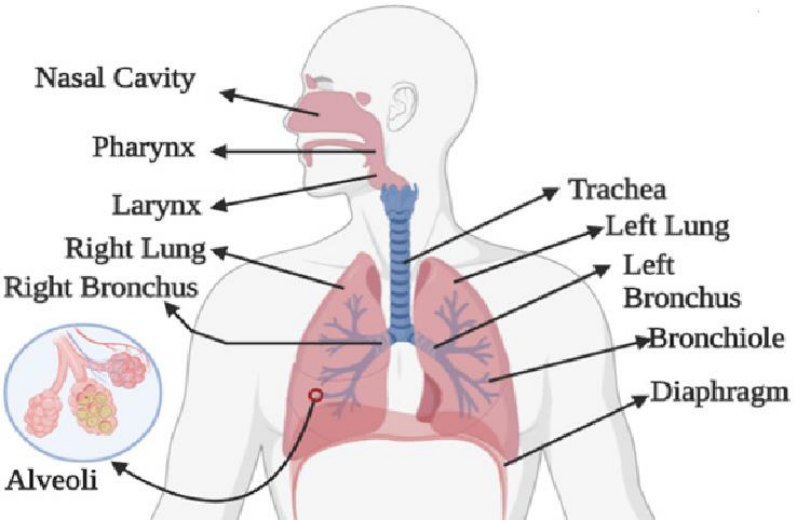
Organs of the Respiratory System:

1. Nose (Nasal Cavity):

The nose acts as the primary entrance for air into the respiratory system. It filters, warms, and moistens the incoming air. The nasal cavity also contains olfactory receptors for the sense of smell.

2. Pharynx (Throat):

The pharynx serves as a common passage for both air and food. It is divided into three regions: nasopharynx, oropharynx, and laryngopharynx. During swallowing, the epiglottis prevents food from entering the trachea.



3. Larynx (Voice Box):

The larynx houses the vocal cords, which play a crucial role in speech production. It also acts as a protective mechanism, closing during swallowing to prevent food or liquid from entering the trachea.

4. Trachea (Windpipe):

The trachea is a tubular structure made of cartilage rings, providing rigidity and preventing collapse. It extends from the larynx into the chest.

The trachea conducts air to and from the lungs, branching into the left and right primary bronchi.

5. Bronchi (Bronchial Tree):

Structure: The bronchi further divide into smaller bronchioles, forming the bronchial tree. These structures are lined with smooth muscle and contain cartilage. The bronchi and bronchioles distribute air throughout the lungs, where gas exchange occurs.

6. Lungs:

The lungs are paired, cone-shaped organs located in the thoracic cavity. They are divided into lobes—three in the right lung and two in the left lung. Lungs are the primary sites for gas exchange. Oxygen from inhaled air diffuses into the bloodstream, while carbon dioxide is expelled during exhalation.

Respiratory Processes:

1. Ventilation (Breathing):

Inhalation: The diaphragm contracts and the ribcage expands, causing a decrease in air pressure. Air is drawn into the lungs.

Exhalation: The diaphragm relaxes, and the ribcage returns to its resting position, increasing air pressure. Air is pushed out of the lungs.

2. Gas Exchange (External Respiration):

Takes place in the alveoli, tiny air sacs in the lungs.

Oxygen diffuses into the bloodstream, while carbon dioxide moves from the blood into the alveoli.

3. Transport of Gases:

Oxygen is transported in the bloodstream bound to hemoglobin in red blood cells.

Carbon dioxide is transported in the blood, mostly as bicarbonate ions.

4. Internal Respiration:

At the cellular level, oxygen is used for cellular respiration, producing energy (ATP), and carbon dioxide is a byproduct.

Regulation of Respiration:

- Controlled by the Respiratory Center:

- Located in the brainstem, the respiratory center regulates breathing based on factors such as oxygen and carbon dioxide levels in the blood.

- Chemoreceptors:

- Specialized cells sense changes in blood gas levels and signal the respiratory center to adjust the rate and depth of breathing.

Understanding the respiratory system and its organs is crucial for appreciating the intricate mechanisms that sustain life by exchanging respiratory gases. A well-functioning respiratory system is essential for maintaining homeostasis and supporting overall health and vitality.