Respiratory System

Introduction to the Respiratory System

The respiratory system is responsible for the exchange of gases (oxygen and carbon dioxide) between the body and the environment. It ensures that oxygen reaches the bloodstream and carbon dioxide is expelled.

Major Functions of the Respiratory System

1. **Oxygen Supply** – Delivers oxygen to the blood for distribution to tissues.
2. **Carbon Dioxide Removal** – Expels CO2, a waste product of metabolism.
3. **Acid-Base Balance** – Regulates pH through CO2 levels.
4. **Phonation (Sound Production)** – Air passing through the vocal cords produces sound.
5. **Olfaction (Smell)** – The nasal cavity contains receptors for detecting odors.
6. **Defense Mechanisms** – Mucus, cilia, and immune cells help trap and eliminate pathogens.

Anatomy of the Respiratory System

The respiratory system is divided into two main parts:

1. Upper Respiratory Tract

- **Nose and Nasal Cavity** – Filters, warms, and humidifies incoming air.
- **Pharynx (Throat)** – Connects the nasal cavity to the larynx; shared with the digestive system.
- **Larynx (Voice Box)** – Contains vocal cords and prevents food from entering the airways via the epiglottis.

2. Lower Respiratory Tract

- **Trachea (Windpipe)** – A tube lined with cilia and mucus to trap particles.
- **Bronchi and Bronchioles** – Branching airways that conduct air into the lungs.
- **Lungs** – Contain alveoli for gas exchange.
- **Alveoli** – Tiny air sacs where oxygen enters the blood and CO2 is removed.

Physiology of the Respiratory System

1. Mechanism of Breathing

Breathing involves two phases:

- **Inhalation (Inspiration)** – Diaphragm contracts, expanding the lungs, allowing air to flow in.
- **Exhalation (Expiration)** – Diaphragm relaxes, decreasing lung volume, pushing air out.

2. Gas Exchange

- Occurs in **alveoli** through **diffusion**.
- Oxygen moves from alveolar air to blood; CO2 moves from blood to alveoli for exhalation.

3. Control of Respiration

- The **medulla oblongata** in the brainstem regulates breathing rate.
- **Chemoreceptors** in the brain and blood detect CO2 levels to adjust breathing.

Mnemonics for Easy Memorization

Parts of the Respiratory System (Upper & Lower Tract)

"Never Let People Take Big Lungs Away"

- N - Nose
- L - Larynx
- P - Pharynx
- T - Trachea
- B - Bronchi
- L - Lungs
- A - Alveoli

Functions of the Respiratory System

"Old Cats Always Purr On Rugs"

- O - Oxygen supply
- C - Carbon dioxide removal
- A - Acid-base balance
- P - Phonation
- O - Olfaction

- R - Respiratory defense

Mechanism of Breathing

"I Eat Donuts, Except Vegetables"

- I - Inhalation
- E - Expansion of lungs
- D - Diaphragm contracts
- E - Exhalation
- V - Volume decreases

Conclusion

The respiratory system is essential for life, providing oxygen to the body and removing waste gases. Understanding its structure and function helps in recognizing respiratory diseases and their treatments