

Chapter 13: Respiratory System

Respiratory System: Overview

The respiratory system facilitates the exchange of gases (oxygen and carbon dioxide) between the body and the environment. It consists of organs and structures that help in breathing and tissue respiration.

Structure of the Respiratory System

1. **Nose and Nasal Cavity:** Air is filtered, warmed, and moistened.
2. **Pharynx:** Passage for both air and food.
3. **Larynx:** Contains vocal cords and produces sound.
4. **Trachea:** Windpipe that directs air to the bronchi.
5. **Bronchi and Bronchioles:** Branch into the lungs and distribute air.
6. **Lungs:** Contain alveoli for gas exchange.
7. **Diaphragm and Intercostal Muscles:** Help in the process of breathing by expanding and contracting the chest cavity.

Mechanism of Breathing

1. **Inhalation:** Diaphragm contracts and flattens, intercostal muscles lift the rib cage, increasing thoracic volume and drawing air in.
2. **Exhalation:** Diaphragm relaxes, intercostal muscles lower the rib cage, reducing thoracic volume and pushing air out.

Tissue Respiration

Oxygen from the alveoli diffuses into the blood, while carbon dioxide from the blood diffuses into the alveoli for exhalation. The cells utilize oxygen for energy production, releasing carbon dioxide as a byproduct.

Gaseous Transport

- **Oxygen Transport:** Hemoglobin in red blood cells binds with oxygen to form oxyhemoglobin.
- **Carbon Dioxide Transport:** Mainly transported as bicarbonate ions in the plasma.

Differences between Anaerobic Respiration in Plants and Humans

- **Plants:** Produce ethanol and carbon dioxide during anaerobic respiration.
- **Humans:** Produce lactic acid during anaerobic respiration, leading to muscle fatigue.

Respiratory Volumes

- **Tidal Volume:** Volume of air inhaled or exhaled in a normal breath.
- **Vital Capacity:** Maximum air volume expelled after a deep inhalation.
- **Residual Volume:** Air remaining in lungs after a forced exhalation.

Effect of Altitude on Breathing

- **Asphyxiation:** Lack of oxygen leading to suffocation.
- **Hypoxia:** Decreased oxygen availability, causing dizziness and breathlessness at high altitudes.

Conclusion

The respiratory system ensures the intake of oxygen and expulsion of carbon dioxide. Proper functioning of this system is essential for maintaining the body's energy levels and homeostasis.

