

Week 10: The respiratory system

1. The respiratory system is responsible for the exchange of gases between the atmosphere and the body. It consists of the trachea, bronchi, bronchioles, and alveoli. The trachea is the main airway, branching into bronchi and then bronchioles, which terminate in alveoli. The alveoli are small sacs where gas exchange occurs. The respiratory system is lined with a mucous membrane that traps dust and pathogens. The cilia in the trachea and bronchi help to move mucus and trapped particles out of the respiratory tract. The diaphragm and intercostal muscles are involved in the mechanics of breathing. The diaphragm contracts and moves down, increasing the volume of the thoracic cavity and drawing air in. The intercostal muscles contract, pulling the rib cage out and up, also increasing the volume of the thoracic cavity. This process is known as inspiration. Expiration is the reverse process, where the diaphragm relaxes and moves up, and the intercostal muscles relax, pulling the rib cage in and down, decreasing the volume of the thoracic cavity and pushing air out.

2. The respiratory system is also involved in the regulation of blood pH. The partial pressure of carbon dioxide (PCO₂) in the blood is a key factor in determining the pH of the blood. When PCO₂ is high, the blood becomes more acidic (lower pH). When PCO₂ is low, the blood becomes more alkaline (higher pH). The respiratory system can regulate blood pH by changing the rate and depth of breathing. Hyperventilation (breathing too fast) leads to a decrease in PCO₂ and an increase in pH. Hypoventilation (breathing too slow) leads to an increase in PCO₂ and a decrease in pH.

3. The respiratory system is also involved in the regulation of blood oxygen levels. The partial pressure of oxygen (PO₂) in the blood is a key factor in determining the oxygen saturation of hemoglobin. When PO₂ is low, hemoglobin releases oxygen to the tissues. When PO₂ is high, hemoglobin binds oxygen. The respiratory system can regulate blood oxygen levels by changing the rate and depth of breathing. Hyperventilation leads to an increase in PO₂ and an increase in oxygen saturation. Hypoventilation leads to a decrease in PO₂ and a decrease in oxygen saturation.