

UNIT – 3

Respiratory System:

Anatomy of Respiratory System:

- The respiratory system consists of the nose, pharynx, larynx, trachea, bronchi, and lungs.
- The lungs are the primary organs for gas exchange, divided into lobes and enclosed in the pleural membrane.

Anatomy of Lungs:

- Lungs are paired, cone-shaped organs divided into lobes.
- Bronchi branch into bronchioles, which end in clusters of air sacs called alveoli.

Mechanism of Respiration:

- Respiration involves two processes: inspiration (inhalation) and expiration (exhalation).
- During inspiration, the diaphragm, and intercostal muscles contract, increasing the thoracic cavity volume.
- Air is drawn into the lungs due to decreased pressure.
- During expiration, these muscles relax, and air is expelled.

Regulation of Respiration:

- The respiratory center in the medulla oblongata controls breathing.
- It monitors CO₂ levels in the blood, adjusting breathing rate and depth accordingly.

Lung Volumes and Capacities:

- Lung volumes include tidal volume, inspiratory reserve volume, expiratory reserve volume, and residual volume.
- Lung capacities include vital capacity and total lung capacity.

Transport of Respiratory Gases:

- Oxygen is transported in the blood bound to haemoglobin in red blood cells.
- Carbon dioxide is carried as bicarbonate ions, dissolved gas, and carbaminohaemoglobin.

Artificial Respiration:

- Artificial respiration is a technique to support or replace spontaneous breathing.
- Methods include mouth-to-mouth, mouth-to-nose, and mechanical ventilation.

Resuscitation Methods:

- Cardiopulmonary resuscitation (CPR) is a life-saving technique used in cardiac arrest.
- It combines chest compressions and rescue breaths to maintain oxygen supply to vital organs.

Understanding the anatomy, mechanics, and regulation of the respiratory system is crucial for comprehending how the body obtains and transports oxygen for energy production and removes carbon dioxide. Additionally, knowledge of artificial respiration and resuscitation methods can be essential in life-saving situations.

Urinary System:

Anatomy of the Urinary Tract:

- The urinary tract includes the kidneys, ureters, bladder, and urethra.
- The kidneys are the primary organs responsible for urine formation.

Anatomy of the Kidney:

- The kidneys are bean-shaped organs located in the abdominal cavity.
- They are divided into the renal cortex and renal medulla.
- Each kidney contains approximately 1 million nephrons, the functional units for urine formation.

Functions of Kidney and Urinary Tract:

- The kidneys are essential for maintaining fluid and electrolyte balance, regulating blood pressure, and filtering waste products from the blood.
- The urinary tract stores and expels urine.

Physiology of Urine Formation:

- Urine formation involves glomerular filtration, tubular reabsorption, and tubular secretion.
- Filtration occurs in the glomerulus, where blood is filtered through the glomerular membrane into the renal tubules.
- Reabsorption involves the reabsorption of essential substances (e.g., glucose and electrolytes) from the filtrate back into the blood.
- Secretion is the active transfer of substances (e.g., drugs and excess ions) from the blood into the filtrate.

Micturition Reflex:

- The micturition reflex is the process of urination.
- Stretch receptors in the bladder wall signal the spinal cord and brain when the bladder is full, triggering the reflex.

Role of Kidneys in Acid-Base Balance:

- The kidneys help regulate the body's acid-base balance by excreting hydrogen ions and reabsorbing bicarbonate ions.
- They maintain a stable pH by controlling the concentration of these ions in urine.

Role of RAS (Renin-Angiotensin-Aldosterone System) in Kidney Function:

- RAS regulates blood pressure and fluid balance.
- When blood pressure falls, the kidney releases renin, which initiates the production of angiotensin II, a potent vasoconstrictor.
- Angiotensin II increases blood pressure and stimulates the release of aldosterone, which promotes sodium and water retention.

Disorders of Kidney:

- Common kidney disorders include urinary tract infections (UTIs), kidney stones, nephritis, and chronic kidney disease (CKD).

Understanding the anatomy, functions, and physiology of the urinary system is essential for comprehending how the body regulates fluid and electrolyte balance and eliminates waste products. It also plays a crucial role in maintaining overall health and homeostasis.