



SNS COLLEGE OF ALLIED HEALTH SCIENCES
SNS Kalvi Nagar, Coimbatore - 35
Affiliated to Dr MGR Medical University, Chennai



DEPARTMENT : PHYSICIAN ASSISTANT

COURSE NAME : NEPHROLOGY

UNIT : GENITO URINARY SYSTEM

TOPIC : RENAL FUNCTION



RENAL FUNCTION



Filtration and Excretion:

- **Glomerular Filtration:** The kidneys filter waste products, toxins, excess ions, and water from the bloodstream through the glomerular filtration barrier, forming a filtrate in Bowman's capsule.



- **Tubular Reabsorption:** Essential substances like glucose, amino acids, and electrolytes are reabsorbed from the filtrate back into the bloodstream through the renal tubules.
- **Tubular Secretion:** Certain substances, including hydrogen ions, potassium ions, and drugs, are actively transported from the bloodstream into the renal tubules for excretion in the urine.



Renal function/Genito Urinary system/Nephrology/SNSCAHS/Ms.Sineka M



Fluid and Electrolyte Balance:

- **Water Balance:** The kidneys regulate water reabsorption in response to changes in hydration status, helping to maintain appropriate blood volume and osmolarity.
- **Electrolyte Balance:** Regulation of electrolyte levels, including sodium, potassium, chloride, bicarbonate, and calcium, is crucial for maintaining cellular function, nerve transmission, and muscle contraction.



Acid-Base Balance:

- The kidneys play a pivotal role in maintaining acid-base homeostasis by regulating the excretion of hydrogen ions and reabsorption of bicarbonate ions, thus stabilizing blood pH within a narrow range.



Blood Pressure Regulation:

- The renin-angiotensin-aldosterone system (RAAS) and the secretion of vasodilatory prostaglandins help regulate blood pressure by modulating renal blood flow, sodium reabsorption, and fluid volume.



Erythropoiesis Regulation:

- The kidneys produce erythropoietin, a hormone that stimulates the production of red blood cells in the bone marrow, thereby regulating oxygen transport and maintaining tissue oxygenation.



Metabolic Waste Excretion:

- Metabolic waste products, such as urea, creatinine, and uric acid, are filtered by the kidneys and excreted in urine, preventing their accumulation in the bloodstream and maintaining metabolic balance.



Hormone Metabolism:

- The kidneys play a role in the metabolism of hormones such as insulin, glucagon, and parathyroid hormone, contributing to their clearance from the bloodstream.



Detoxification:

- The kidneys filter and excrete various toxins, drugs, and foreign substances, thereby aiding in detoxification and protecting the body from harmful compounds.



Immune Function:

- The kidneys contribute to immune function by producing cytokines, chemokines, and antimicrobial peptides, and by participating in the clearance of immune complexes and pathogens from the bloodstream.



Gluconeogenesis:

- During prolonged fasting or starvation, the kidneys can synthesize glucose through gluconeogenesis, helping to maintain blood glucose levels and provide energy to the body.



Osmoregulation:

- The kidneys adjust the concentration of urine to regulate body fluid osmolality, ensuring appropriate water retention or excretion in response to changes in water intake or loss.



Neuroendocrine Communication:

- The kidneys communicate with the central nervous system and other endocrine organs through various signaling pathways, influencing hormonal secretion, blood pressure regulation, and metabolic processes.



ASSESSMENT



- What is Acid base regulation ?
- What is Filtration and Excretion ?