The Excretory System

Excretory system- The organ system that performs the function of excretion is known as the excretory system

- **Excretion** – It is the process of removing harmful waste products produced in the cells of living organisms.
- The excretory system in humans includes – a pair of kidneys, a pair of ureters, a urinary bladder and a urethra.

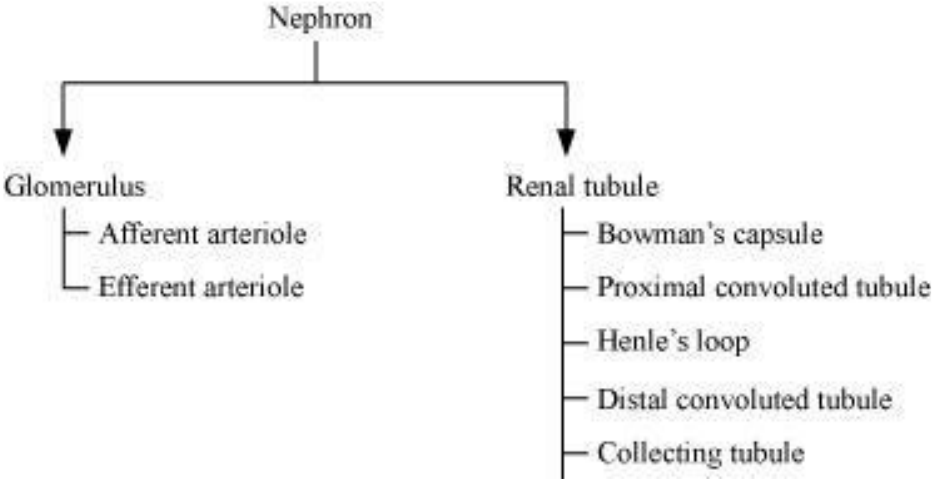
- **Kidney-** It is the main excretory organ of the human body. It plays an important role in the formation of urine. Human kidney produces about 1 – 1.8L of urine in a day. The urine consists of 95% water, 2.5% urea and 2.5% other waste products.
- It is divided into two layers - outer cortex and inner medulla.
- Nephrons are the basic filtering units of the kidneys.
- The main components of a nephron are the **glomerulus**, **Bowman's capsule,** and a long **renal tube**.
- **Ureter** carries urine to the bladder.
- **Urinary bladder** collects and stores urine.
- **Urethra** carries urine out of the body.

- **Dialysis-** The process of removing wastes using an artificial kidney is called dialysis.

- **Kidney** is divided into outer cortex and inner medullary region.

- The cortical portion that projects between the medullary pyramids are known as **columns of Bertini.**

- **Nephrons** are basic functional units of kidney.



- **Malpighian body or renal corpuscle** comprises of Bowman's capsule and glomerulus.
- **Malpighian body, Proximal Convoluted Tubule (PCT), and Distal Convoluted Tubule (DCT)** are located in the **cortical region** of kidney.
- **Loop of Henle's** is found in the medullary region of kidney.
- **Vasa recta** – It is a loop of capillaries that runs parallel to Henle's loop.
- **Afferent arteriole:** The arterioles that breaks into numerous capillaries to form glomerulus present inside the Bowman's capsule.
- **Efferent arteriole:** Emerging from the Bowman's capsule these capillaries combines together and travels a short distance and break up into the secondary capillary network.

- **Urine formation**
- **It involves three process:**

- **(i) Glomerular filtration -** Filtration of water and dissolved substances out of the blood in the glomeruli and into Bowman's capsule
- **(ii) Reabsorption -** Reabsorption of water and dissolved substances out of the kidney tubules back into the blood. This process prevents substances required by the body from being lost in the urine.
- **(iii)Secretion -** Secretion of hydrogen ions (H+), potassium ions (K+), ammonia (NH3), and certain drugs out of the blood and into the kidney tubules, where they are eventually eliminated in the urine

- **Glomerular filtration rate:** It is the amount of glomerular filtrate formed in all nephrons of both kidneys per minute.
- It is about 125 mL/ minute in a healthy individual.
- Regulation of glomerular filtration rate is auto regulative. It is carried out by **juxtaglomerular apparatus.**
- About 99% of filtrate is reabsorbed by renal tubule.
- Glucose, amino acids, and sodium are actively absorbed.
- Nitrogenous wastes and water are reabsorbed passively from filtrate.
- **Descending limb of Henle's loop** is permeable to water and impermeable to electrolytes.
- **Ascending limb of Henle's loop** is impermeable to water.
- **Distal convoluted tubule** involves reabsorption of sodium ions.
- **Counter current mechanism**
  - It is an adaptation for conservation of water.
  - Two current mechanisms operating in kidney are – Henle's loop and vasa rectae. They both help in maintaining a concentration gradient in the medullary interstitium.

Regulation of Urine

The **posterior lobe of Pituitary gland** controls the **Diuresis** (increases production of urine)and concentration of urine by water reabsorption with the help of **antidiuretic hormone (ADH).**

Osmoregulation

The process of regulation of water and salts by the kidney when removing wastes like urea is called osmoregulation. In other words the regulation of osmotic pressure of the blood is known as osmoregulation.

Disorders of the excretory system

There are certain disorders that affect the excretory system. These include kidney stones, urinary infections, presence of glucose or blood cells in the urine, etc.