

The urinary system :

This system is composed of :

Two kidneys , ureters , urinary bladder & urethra . The kidney is consist of renal cortex & medulla .

The functional unit of the kidney is called nephron which is consist of :

- 1- Glomerulus which encased in Bowman's capsule .
- 2- Tubules : including :
 - a. Proximal convoluted tubules (P)
 - b. Loop of Henle (L)(thin descending limb & thick ascending limb)
 - c. Distal convoluted tubule (D)
- 3- Collecting ducts (C) which is terminate renal pelvis that lead to the ureter .

The kidneys serve multiple functions, including the following:

- 1- Excretion of metabolic waste products , foreign chemicals , drugs & hormones metabolites as :
 - a- *urea (from the metabolism of amino acids)*
 - b- *creatinine (from muscle creatine)*
 - c- *uric acid (from nucleic acids)*
 - d- *end products of hemoglobin breakdown (such as bilirubin)*
 - e- *end metabolites of various hormones.*
 - f- *The kidneys also eliminate most toxins and other foreign substances that are either produced by the body or ingested, such as pesticides, drugs, and food additives.*
- 2- Regulation of water and electrolyte balances
- 3- Regulation of body fluid osmolality and electrolyte concentrations
- 4- Regulation of acid - base balance
- 5- Gluconeogenesis : The kidneys synthesize glucose from amino acids and other precursors during prolonged fasting, a process referred to as *gluconeogenesis*.

6- Secretion of hormones as :

- a. *Erythropoietin, which controls erythrocyte production*
- b. *Renin, which controls the blood pressure and sodium balance .*
- c. *1,25-dihydroxyvitamin D3, which influences calcium balance*

7- Regulation of arterial pressure :

- a. *long-term regulation of arterial pressure by excreting variable amounts of sodium and water.*
- b. *short-term arterial pressure regulation by secreting vasoactive factors or substances, such as renin*

