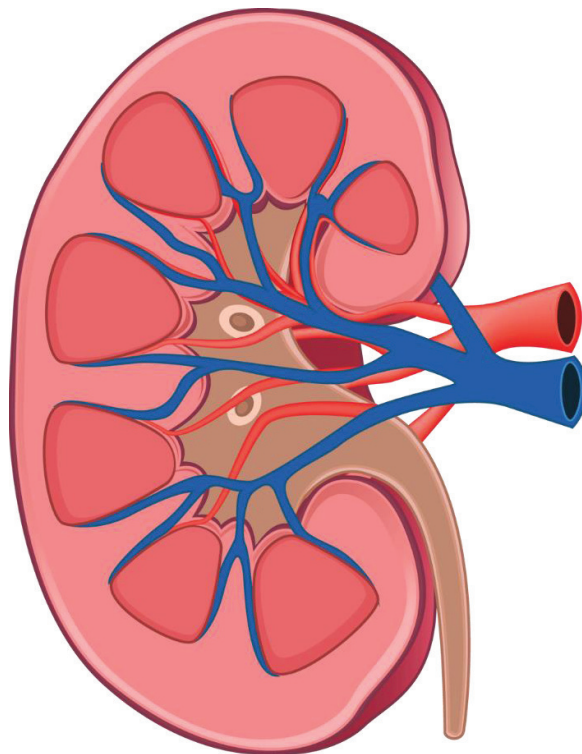


EXCRETORY PRODUCTS AND THEIR ELIMINATION



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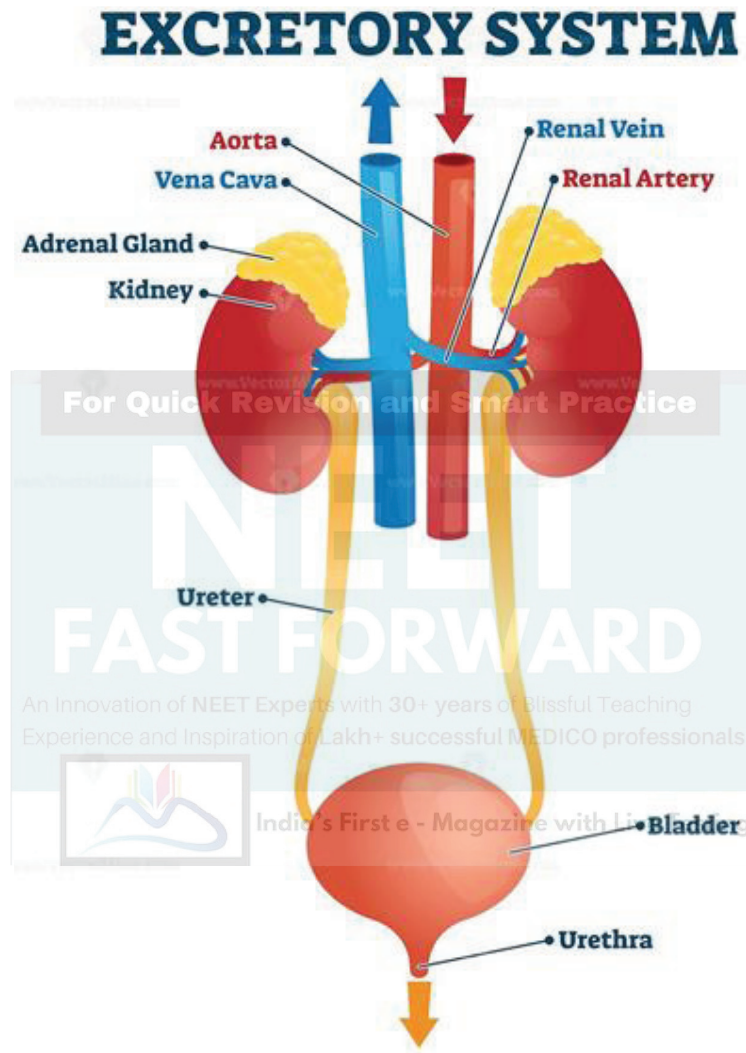


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EXCRETORY PRODUCTS AND THEIR ELIMINATION

Human Excretory System

Anatomically, the human excretory system consists of a pair of kidneys, a pair of ureters, urinary bladder and the urethra. The kidneys contain tiny, numerous structures called nephrons. These are termed as the functional unit of the kidneys and are responsible for the separation of water, filter toxins and replenish necessary elements back into the bloodstream.



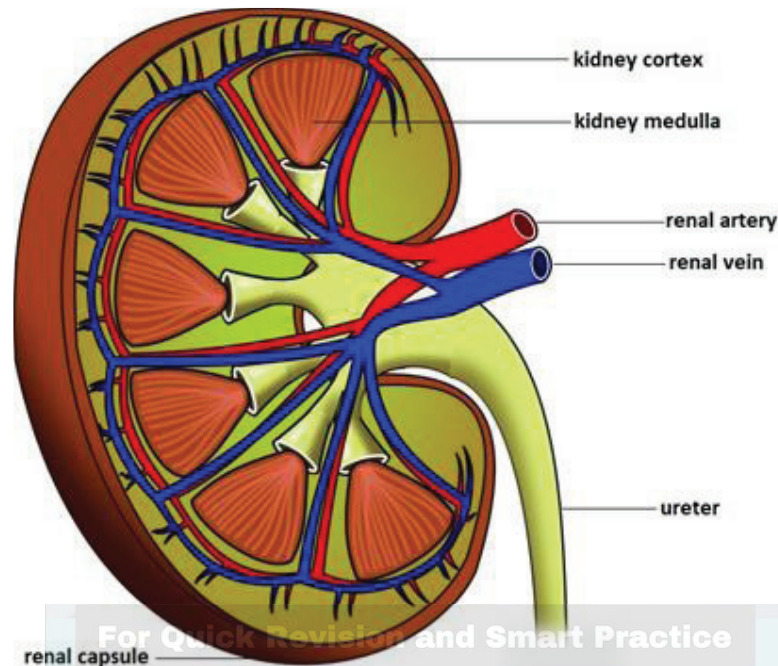
Ammonotelism: The animals which excrete ammonia are called ammonotelic and excretion of ammonia is known as ammonotelism eg. Amoeba, sycon, hydra, liver fluke, tapeworm, Leech, Prawn, bony fishes etc.

Ureotelism: Excretion of urea is known as ureotelism and the animals which excrete urea are ureotelic animals eg. mammals, many terrestrial amphibians and marine fishes and sting rays etc.

Uricotelism: Excretion of uric-acid is known as uricotelism and the animals are called uricotelic eg. most insects, land snails, lizards, snakes and birds.

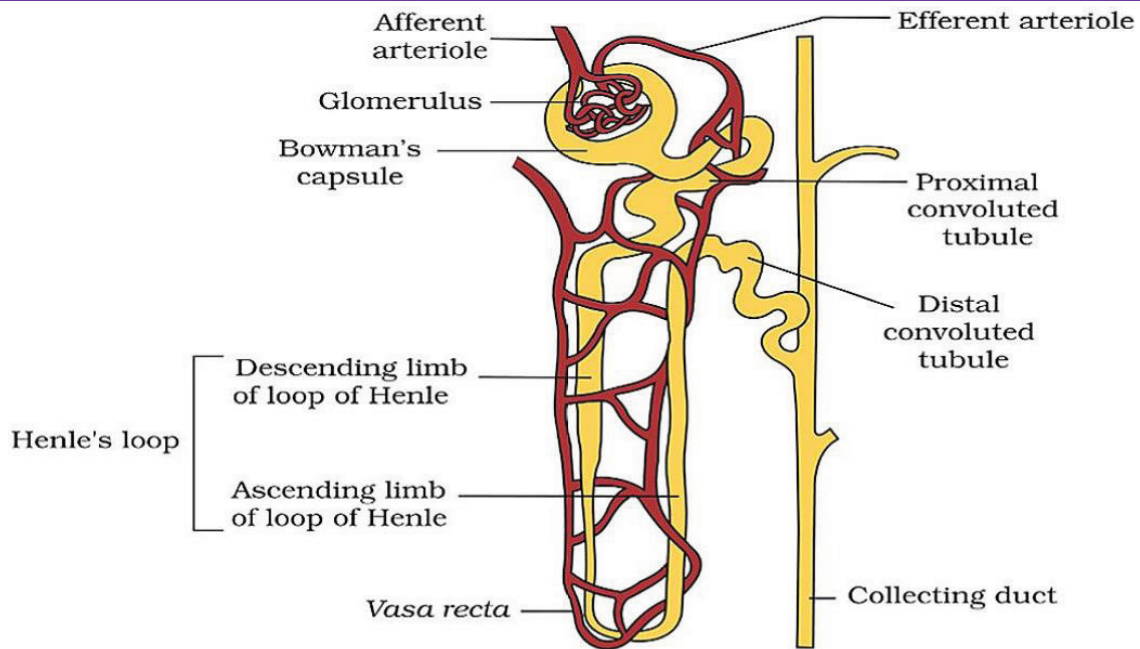
Kidneys

Kidneys are reddish brown bean shaped structure situated between last thoracic and lumbar vertebra. Each kidney has a notch on its inner side called hilum through which ureter, blood vessels and nerves enter.



- Inside the hilum has broad funnel shaped space called renal pelvis with projection called calyces.
- Inside the kidney are two zone- outer cortex and inner medulla. Medulla is divided into medullary pyramids projecting into calyx.
- Cortex extends between medullary pyramids as renal column called Columns of Bertini.
- The functional unit of kidney is nephron. Each kidney contains about one million nephrons.
- Each nephron has two parts- the glomerulus and renal tubules. Glomerulus is the tuft of capillaries formed by afferent arteriole. Blood from glomerulus is carried away by efferent arteriole.
- Renal tubules starts with Bowman's capsule continue with tubular parts divided into Proximal Convoluted tubules, Henle's loop and Distal Convoluted tubule.
- The malpighian tubules, PCT and DCT of nephron are situated in cortical region where as loops of Henle's into medulla.

Types of Nephrons



Juxtamedullary Nephron: About 15% of total nephrons, Glomeruli are found in inner region of cortex, large in size, long loop of Henle and found deep in medulla, associated with vasa recta control plasma volume when water supply is short.

Cortical Nephron: About 85% of total nephron mainly lie in renal cortex, glomeruli found in outer cortex, short loop of Henle, extends very little in medulla. They do not have vasa recta or vasa recta is highly reduced.

Urine formation

- Glomerular Filtration (Filtration of blood by glomerulus).
- Reabsorption (Reabsorption by renal tubules).
- Secretion (Tubular cells secrete H^+ , K^+ ammonia into filtrate).

Glomerular capillaries: Glomerular capillaries blood pressure cause filtration of blood through 3 layers (endothelium of glomerular blood vessels, epithelium of Bowman's capsule and basement layer between two membranes as ultra-filtration).

glomerular filtration rate (GFR): The amount of filtrate formed by kidneys per minute is called glomerular filtration rate (GFR) which is 125 ml/minute.

Glomerular Filtration rate: Glomerular Filtration rate is controlled by Juxta glomerular apparatus (JGA).

Reabsorption: 99% of filtrate has to be reabsorbed by renal tubules called reabsorption.

Function of Tubules

- **Proximal Convoluted Tubules (PCT):** All the important nutrients, 70-80% electrolytes and water are reabsorbed.
- **Henle's Loop:** Maintains high osmolarity of medullary interstitial fluid.



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