

High Yield Hints- Excretion and Osmoregulation

EXCRETION

1. Excretion involves removal of waste materials such as Carbon dioxide, Ammonia, and Water etc. It may be Ammonotelism (Aquatic invertebrates, Frog's tadpole, Bony fishes), Ureotelism (Cartilage fishes, Amphibians, Mammals) or Uricotelism (Reptiles, Birds, Cockroach)
2. Urea is produced in the liver from CO₂ and Ammonia through Ornithine cycle (Krebs-Henseleit cycle). Creatinine is a waste product of muscle metabolism.
3. Human kidney is Metanephric. It is bean shaped and consists of an outer cortex and inner medulla. Pelvis is a funnel shaped tube arising from the kidney, which continues as Ureter.
4. Nephrons form the functional units of the kidney. These are coiled tubular structure divisible into Bowman's capsule, Proximal convoluted tubule (PCT), Loop of Henle, Distal convoluted tubule (DCT) and Collecting tubule. Collecting tubules unite to form Collecting ducts. Many collecting ducts are joined together to form the Duct of Bellini.
5. Urine formation involves Ultra filtration in the Bowman's capsule, Tubular reabsorption in the PCT, Tubular secretion or Augmentation in the DCT and water reabsorption in the Collecting tubule. Ultra filtration (Pressure filtration) is a non-selective process since both essential and non-essential materials are filtered. Normal glomerular filtration rate in adult man is 120 ml / minute. Glucose, Amino acids, Vit. C etc are actively re absorbed in the PCT while Water and Chloride ions are reabsorbed passively.
6. Loop of Henle maintains Sodium - Potassium balance through Counter current Exchange. Ascending limb of Henle's loop is impermeable to water but actively absorbs Potassium ions. Descending limb is not permeable to sodium but allows a small quantity of water to pass through. Urine becomes Hypertonic in the Henle's loop due to this counter current exchange. Vasa recta are the system of blood vessels running parallel to Henle's loop for counter current exchange.
7. Tubular secretion is the removal of additional wastes from the blood into the filtrate. Potassium ions, Uric acid, Creatine, Antibiotics like Penicillin etc. are added to the filtrate.
8. Collecting tubule is the site of water reabsorption and urine formation under the control of ADH. Deficiency of ADH leads to Diabetes insipidus (excretion of dilute urine).
9. Renin- Angiotensin system functions as an " Auto regulatory system " to control the rate of glomerular filtration. Renin is secreted from the Juxta glomerular apparatus when the pressure falls. It stimulates the activation of Angiotensin to Angiotensin II. This causes Aldosterone secretion, which reabsorbs sodium and excretes potassium.

Additional points

1. Bright's disease (Nephritis) is caused due to the infection of Streptococcus bacteria. It leads to inflammation of kidney.
2. Haematuria is the appearance of blood in the urine.
3. Gout is a hereditary disease characterized by high uric acid content in the blood.
4. Salt glands of marine birds excrete Na Cl to maintain osmotic balance.
5. Kangaroo rat never drinks water and it has long Loop of Henle in the kidney.
6. Erythropoietin is produced from the kidney. It stimulates stem cells of bone marrow for Erythropoiesis (RBC formation).
7. Urochrome is the yellow pigment in the urine. It is a breakdown product of Hemoglobin.
8. Ketosis refers to the appearance of Ketone bodies in the urine. It indicates fat metabolism.
9. Normal pH of urine is around 6. It is slightly acidic.
10. Mammals are the only group excreting hypertonic urine.