

EXERCISE QUESTIONS

CHAPTER -19 EXCRETORY PRODUCTS AND THEIR ELIMINATION

19.1 Define Glomerular Filtration Rate (GFR)

Ans - The amount of glomerular filtrate produced in each of the two kidneys' nephrons per minute is known as the glomerular filtration rate. In a healthy person, it is approximately 125 mL/minute. Glomerular filtrate is primarily composed of water, but it also includes glucose, amino acids, salt, potassium, urea, uric acid, and ketone bodies.

19.2. Explain the auto regulatory mechanism of GFR.

Ans - This process controls the kidney's glomerular filtrate rate.

1. The juxtaglomerular apparatus (JGA), a specific cellular area, is situated where the afferent arteriole and distal convoluted tubule meet.
2. A decrease in GFR can cause the JG cells to release renin, which operates via the renin-angiotensin-aldosterone system to promote blood flow and restore the GFR to normal.

19.3. Indicate whether the following statements are true or false :

(a) Micturition is carried out by a reflex.

(b) ADH helps in water elimination, making the urine hypotonic.

(c) Protein-free fluid is filtered from blood plasma into the Bowman's capsule.

(d) Henle's loop plays an important role in concentrating the urine.

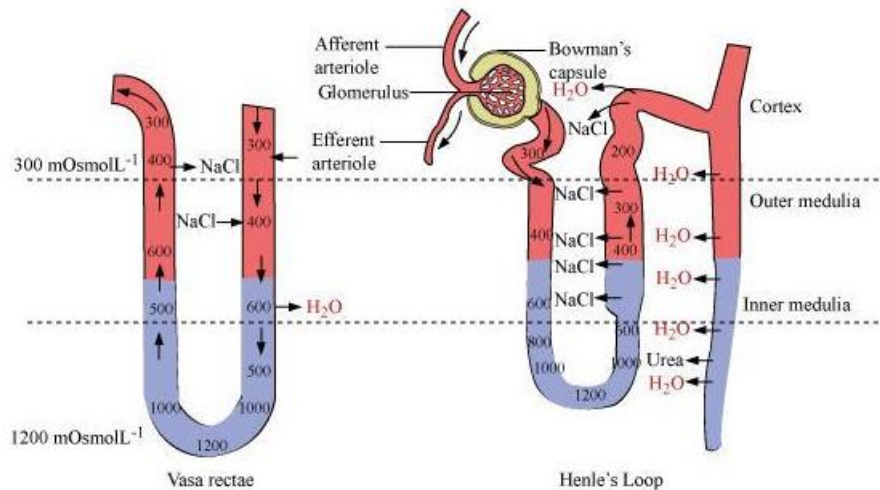
(e) Glucose is actively reabsorbed in the proximal convoluted tubule.

Ans - (a) True

- (b) False
- (c) True
- (d) True
- (e) True

19.4. Give a brief account of the counter current mechanism.

Ans - The primary adaptation for water saving is the internal countercurrent system of the kidney. The kidneys include two countercurrent processes. Henle's loop and vasa rectae are what they are. The nephron's Henle's loop is a U-shaped structure. Due to the opposing blood flow in the two arms of the tube, countercurrents are created. An efferent arteriole called the Vasa recta creates a capillary network around the tubules in the renal medulla. It is U-shaped and parallels Henley's loop. In the two arms of the vasa recta, blood flows in the opposing directions. As a result, the blood exiting the ascending limb and entering the renal medulla are in close proximity to one another.



By countercurrent process, the osmolarity rises from 300 mOsmolL⁻¹ in the cortex to 1200 mOsmolL⁻¹ in the inner medulla. It aids in preserving the gradient of concentration, which in turn facilitates the simple passage of water from collecting tubules. The migration of NaCl and urea produced the gradient.

19.5. Describe the role of liver, lungs and skin in excretion.

Ans - Role of the liver:

The biggest gland in vertebrates is the liver. It aids in the bile's elimination of waste products such as cholesterol, steroid hormones, vitamins, and medications. The ornithine cycle causes urea to be produced in the liver. The liver converts harmful ammonia into urea, which is subsequently swiftly excreted from the body. The degraded haemoglobin pigment is also converted by the liver into the bile pigments bilirubin and biliverdin.

Lungs:

Each day, the lungs expel huge amounts of water, roughly 18 litres, and a lot of CO₂.

Role of the skin:

Numerous glands in the skin aid in excreting waste materials through pores. It has sweat and sebaceous glands, two different types of glands.

Highly vascular and tubular glands called sweat glands remove waste materials from blood and expel them as perspiration. Excess salt and water are expelled from the body through sweat.

Branching glands called sebaceous glands release sebum, an oily substance.

19.6. Explain micturition.

Ans - The urinary bladder is where urine eventually generated by the nephrons is held until a voluntary signal is sent by the central nervous system (CNS). The straining of the bladder as it fills with urine causes this signal to be sent. Stretch receptors on the bladder's inner walls react by communicating with the central nervous system. When the urethral sphincter relaxes and the smooth muscles of the bladder contract, urine is released. The CNS transmits motor impulses to start these processes. The neural mechanisms that cause micturition are known as the micturition reflex. Micturition is the process of releasing urine.

An adult human excretes 1.5 litres of pee on average each day. The urine produced is a light yellow, watery fluid with a pH of 6.0, a distinctive odour, and a light yellow tint. Every day, 25–30 grammes of urea are excreted on average. Urine properties can be impacted by a number of circumstances. The clinical diagnosis of numerous metabolic disorders

and kidney dysfunction is assisted by urine analysis. For instance, ketonuria (the presence of ketone bodies in the urine) and glycosuria (the presence of glucose in the urine) are signs of diabetes mellitus.

19.7. Match the items of column I with those of column II :

Column I	Column II
(a) Ammonotelism	(i) Birds
(b) Bowman's capsule	(ii) Water reabsorption
(c) Micturition	(iii) Bony fish
(d) Uricotelism	(iv) Urinary bladder
(d) ADH	(v) Renal tubule

- Ans -** (a) – (iii) Bony fish
(b) – (v) Renal tubule
(c) – (iv) Urinary bladder
(d) – (i) Birds
(e) – (ii) Water reabsorption

19.8. What is meant by the term osmoregulation?

Ans - A homeostatic mechanism called osmoregulation controls the ideal temperature of water and salts in tissues and bodily fluids. By using water and ionic concentration, it keeps the body's internal environment stable.

19.9. Terrestrial animals are generally either ureotelic or uricotelic, not ammonotelic, why ?

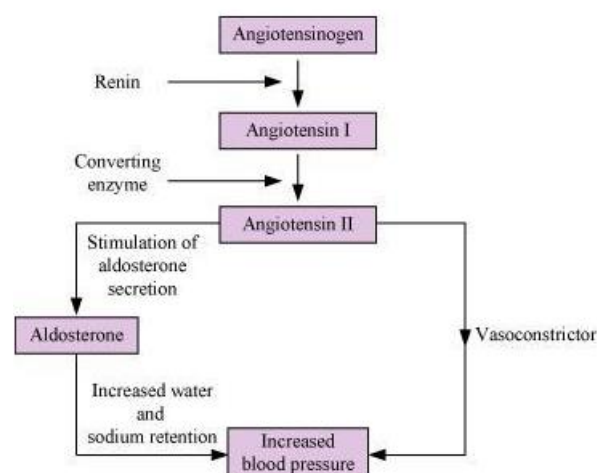
Ans - Instead of being ammonotelic, terrestrial animals are either ureotelic or uricotelic. The two main causes for this are as follows:

- (a) In nature, ammonia is quite harmful. It must therefore be changed into a less dangerous form, like urea or uric acid.

(b) Animals living on land must conserve water. Since ammonia dissolves in water, it cannot be continually expelled. It is consequently changed into urea or uric acid. These versions are insoluble in water and less poisonous. This promotes water conservation in terrestrial animals.

19.10. What is the significance of juxta glomerular apparatus (JGA) in kidney function?

Ans - A few glomerular cells, a distal tubule, and afferent and efferent arterioles make up the complex structure known as the juxtaglomerular apparatus (JGA). It is situated in a specific area of the nephron where the distal convoluted tubule (DLT) and the afferent arteriole (DA) are in close proximity to one another. Specialized afferent arteriole cells called juxtaglomerular cells are found in the juxtaglomerular apparatus. Renin, an enzyme that can measure blood pressure, is present in these cells. Juxtaglomerular cells become activated and release renin when glomerular blood flow, glomerular blood pressure, or glomerular filtration rate drops. Angiotensinogen in the blood is changed by renin into angiotensin I and then angiotensin II. A potent vasoconstrictor, angiotensin II raises glomerular blood pressure and filtration rate. The adrenal cortex of the adrenal gland is stimulated by angiotensin II to create aldosterone. Aldosterone speeds up the absorption of sodium ions and water from the collecting duct and distal convoluted tubule. Additionally, the blood pressure and glomerular filtration rate rise as a result of this. The renin-angiotensin system is the mechanism that ultimately raises blood pressure.



19.11. Name the following:

(a) A chordate animal having flame cells as excretory structures

(b) Cortical portions projecting between the medullary pyramids in the human kidney

(c) A loop of capillary running parallel to the Henle's loop.

Ans - (a) Amphioxus is an illustration of a chordate with flame cells serving as excretory organs. A form of excretory and osmoregulatory mechanism is the flame cell.

(b) The Bertini columns are the cortical sections of the human kidney that protrude between the medullary pyramids. They stand in for the cortical tissues that are found in the medulla.

(c) Vasa rectae refers to a capillary loop that crosses Henle's loop. Henle's loop and the vasa rectae work together to keep a concentration gradient in the medullary interstitium.

19.12. Fill in the gaps :

(a) Ascending limb of Henle's loop is _____ to water whereas the descending limb is _____ to it.

(b) Reabsorption of water from distal parts of the tubules is facilitated by hormone _____.

(c) Dialysis fluid contain all the constituents as in plasma except _____.

(d) A healthy adult human excretes (on an average) _____ gm of urea/day

Ans - (a) impermeable and permeable

(b) Vasopressin

(c) the nitrogenous wastes

(d) 25 - 30

