

19

Excretory Products and Their Elimination

TOPIC 1

Modes of Excretion

- 01** Match the items in Column-I with those in Column II

[NEET (Odisha) 2019]

Column I	Column II
1. Podocytes	i. Crystallised oxalates
2. Protonephridia	ii. Annelids
3. Nephridia	iii. Amphioxus
4. Renal calculi	iv. Filtration slits

Select the correct option from the following

1 2 3 4

- (a) (iii) (iv) (ii) (i)
(b) (iii) (ii) (iv) (i)
(c) (iv) (iii) (ii) (i)
(d) (iv) (ii) (iii) (i)

Ans. (c)

The correct matches are

1. Podocytes	(iv)	Filtration slit
2. Protonephridia	(iii)	Amphioxus
3. Nephridia	(ii)	Annelids
4. Renal calculi	(i)	Crystallised oxalates

Podocytes are cells in Bowman's capsule in kidneys. They have filtration slits through which the blood is filtered. Protonephridia help in osmoregulation. Nephridia in annelids help in osmoregulation and excretion. Renal calculi are kidney stones which mainly consist of crystallised oxalates.

- 02** Uricotelic mode of passing out nitrogenous wastes is found in
[CBSE AIPMT 2011]

- (a) birds and annelids
(b) amphibians and reptiles
(c) insects and amphibians
(d) reptiles and birds

Ans. (d)

Reptile, birds, land snails and insects excrete nitrogenous waste as uric acid in the form of pellet of paste with a minimum loss of water and are called uricotelic animals.

- 03** Which one of the following is not a part of a renal pyramid?
[CBSE AIPMT 2011]

- (a) Convoluted tubules
(b) Collecting ducts
(c) Loop of Henle
(d) Peritubular capillaries

Ans. (a)

Convoluted tubule is the highly convoluted segments of nephron in the renal labyrinth of the kidney.

It is made up of the proximal tubule leading from the Bowman's capsule to the descending limb of Henle's loop and the distal tubule leading from the ascending limb of Henle's loop to a collecting tubule.

- 04** Uric acid is the chief nitrogenous component of the excretory products of
[CBSE AIPMT 2009]

- (a) man
(b) earthworm
(c) cockroach
(d) frog

Ans. (c)

Cockroach excretes uric acid as the chief nitrogenous excretory product. Man excretes urea as the chief nitrogenous excretory product. Earthworm excretes 40% urea, 20% ammonia and 40% amino acids. Frog excretes urea as the chief nitrogenous product.

- 05** Consider the following four statements (A–D) about certain desert animals such as kangaroo rat

- A. They have dark colour and high rate of reproduction and excrete solid urine.
B. They do not drink water, breathe at a slow rate to conserve water and have their body covered with thick hairs.
C. They feed on dry seeds and do not require drinking water.
D. They excrete very concentrated urine and do not use water to regulate body temperature.

Which two of the above statements for such animals are true?
[CBSE AIPMT 2008]

- (a) C and D (b) B and C
(c) C and A (d) A and B

Ans. (a)

Kangaroo rat is a desert rodent. Its body is covered by hairs. Its urine is more than 20 times concentrated as its plasma. This concentrated waste enables it to live in dry or desert environment where little water is available for him to drink.

Most of its water is metabolically produced from the oxidation of carbohydrates, fats and proteins in the seeds that it eat. The animal remains in cool burrow during day time and the respiratory moisture condensed in nasal passages.

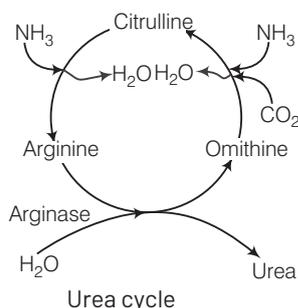
06 In Ornithine cycle which one pair of the following wastes are removed from the blood?

[CBSE AIPMT 2005, 06]

- (a) CO_2 and urea
- (b) CO_2 and ammonia
- (c) Ammonia and urea
- (d) Urea and sodium salts

Ans. (b)

CO_2 and ammonia are the pair of wastes removed from the blood in Ornithine cycle. Urea is formed in Ornithine cycle or urea cycle and urea is formed of two molecules of ammonia and one molecule of CO_2 . Urea cycle is represented as follows



Most of the urea is produced in the liver. The liver cells continuously release urea into the blood and kidneys withdraw it from the blood to excrete it in urine.

07 Uricotelism is found in

[CBSE AIPMT 2004]

- (a) mammals and birds
- (b) fishes and freshwater protozoans
- (c) birds, reptiles and insects
- (d) frogs and toads

Ans. (c)

The animals which excrete mainly uric acid are uricotelic and this phenomenon is called uricotelism. Uric acid is excreted by terrestrial reptiles (lizard, snakes, etc) birds and insects to conserve water in their body.

Frog and mammals excrete urea and so they are called as ureotelic animals and this phenomenon is known as ureotelism.

08 In living beings, ammonia is converted into urea through

[CBSE AIPMT 2000]

- (a) ornithine cycle
- (b) citrulline cycle
- (c) fumarine cycle
- (d) arginine cycle

Ans. (a)

Ornithine combines with one molecule of NH_3 and CO_2 to produce citrulline. Citrulline combines with another molecule of NH_3 to form arginine. Arginine is broken down into urea and ornithine which repeats the cycle. This is called Ornithine cycle or urea cycle or Krebs-Henseleit cycle.

09 The enteronephric nephridia of earthworms are mainly concerned with

[CBSE AIPMT 2000]

- (a) digestion
- (b) respiration
- (c) osmoregulation
- (d) excretion of nitrogenous wastes

Ans. (d)

Enteronephridia is concerned with excretion of nitrogenous waste. In annelids, the nephridia are the excretory organs. In earthworm, three types of nephridia are found (a) septal (b) pharyngeal and (c) integumentary. The septal nephridia do not discharge the excretory fluid to the exterior. Instead, these pour it into the intestine. Hence, these are also called enteronephric nephridia.

10 Aquatic reptiles are

[CBSE AIPMT 1999]

- (a) ammonotelic
- (b) ureotelic
- (c) ureotelic in water
- (d) ureotelic over land

Ans. (b)

Ureotelic animals include, *Ascaris*, earthworm, cartilaginous fishes, semiaquatic amphibians aquatic or semiaquatic reptiles like turtles and alligators.

11 In ureotelic animals, urea is formed by

[CBSE AIPMT 1997]

- (a) Ornithine cycle
- (b) Cori cycle
- (c) Krebs' cycle
- (d) EMP pathway

Ans. (a)

Urea is the main nitrogenous excretory product of ureotelic animals. It is produced by liver cells from deaminated excess amino acids via urea cycle, also called Ornithine cycle or Krebs-Henseleit cycle.

12 The kidney of an adult frog is

[CBSE AIPMT 1997]

- (a) pronephros
- (b) mesonephros
- (c) metanephros
- (d) opisthonephros

Ans. (b)

Mesonephric kidney consists of a large number of tubules which develop internal glomeruli enclosed in capsules forming Malpighian bodies. In amphibians, (e.g. frog) it is functional both in embryo as well as adults.

13 Uric acid is nitrogenous waste in

[CBSE AIPMT 1994]

- (a) mammals and molluscs
- (b) birds and lizards
- (c) frog and cartilaginous fishes
- (d) insects and bony fishes

Ans. (b)

Uric acid is least soluble nitrogenous waste and 1 g of it needs only 10 mL of water to be expelled out of body. Another advantage of it is that it is least toxic among all nitrogenous wastes and can be retained in the body for longer period, so it is of greater advantage to animals which have limited access to water like birds and lizards.

14 Nitrogenous waste products are eliminated mainly as

[CBSE AIPMT 1991]

- (a) urea in tadpole and ammonia in adult frog
- (b) ammonia in tadpole and urea in adult frog
- (c) urea in both tadpole and adult frog
- (d) urea in tadpole and uric acid in adult frog

Ans. (b)

Ammonia is the main nitrogenous waste. It is soluble in water and highly toxic. A large amount of water is required for its excretion. Tadpole is aquatic and lives in plenty of water so, nitrogenous wastes in tadpole are eliminated as ammonia. Frog being amphibious, excretes its nitrogenous wastes as urea.

TOPIC 2

Human Excretory System: Structure

- 15** Match the items given in Column I with those in Column II and select the correct option given below
[NEET 2018]

Column-I (Function)	Column-II (Part of Excretory System)
1. Ultrafiltration	i. Henle's loop
2. Concentration of urine	ii. Ureter
3. Transport of urine	iii. Urinary bladder
4. Storage of urine	iv. Malpighian corpuscle
	v. Proximal convoluted tubule

- | | | | | |
|-----|----|----|----|-----|
| | 1 | 2 | 3 | 4 |
| (a) | v | iv | i | ii |
| (b) | iv | i | ii | iii |
| (c) | iv | v | ii | iii |
| (d) | v | iv | i | iii |

Ans. (b)

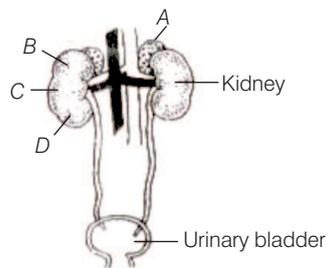
Ultrafiltration or Glomerular filtration is carried out in the glomerular capillaries found in Malpighian corpuscle. This process is carried out under high pressure.

Henle's loop continuously absorbs the water from glomerular filtrate, because of the hyperosmolarity created by counter-current mechanism. This helps in the concentration of urine and hence, it becomes hypertonic.

Ureter are narrow, tubular structures that convey or transport urine from kidney to urinary bladder.

Urinary bladder is pear-shaped, muscular, sac-like structure that temporarily stores urine.

- 16** Figure shows human urinary system with structures labelled A-D. Select option, which correctly identifies them and gives their characteristics and/of functions
[NEET 2013]



- (a) A—Adrenal gland—located at the anterior part of kidney. Secrete catecholamines, which stimulate glycogen break down
(b) B—Pelvis—broad funnel shaped space inner to hilum, directly connected to loops of Henle
(c) C—Medulla—inner zone of kidney and contains complete nephrons
(d) D—Cortex—outer part of kidney and do not contain any part of nephrons

Ans. (a)

A—Adrenal gland it is correctly mentioned. It is located at the anterior part of kidney and secretes catecholamines which stimulate glycogen breakdown.

- 17** The principal nitrogenous excretory compound in humans is synthesised
[CBSE AIPMT 2010]

- (a) in kidneys but eliminated mostly through liver
(b) in kidneys as well as eliminated by kidneys
(c) in liver and also eliminated by the same through bile
(d) in the liver but eliminated mostly through kidneys

Ans. (d)

In humans, the principal nitrogenous excretory compound (i.e. urea) is synthesised in liver by Ornithine cycle and is eliminated mostly through kidney as nitrogenous excretory product. In liver, one molecule of CO_2 is activated by biotin and combines with two molecules of NH_3 in the presence of carbamyl phosphate synthetase enzyme and 2ATP to form carbamyl phosphate and one molecule of H_2O is released.

Carbamyl phosphate reacts with Ornithine and forms Citrulline. Citrulline combines with another molecule of ammonia and form arginine that is broken into urea and Ornithine in the presence of an enzyme arginase and water.



- 18** What will happen if the stretch receptors of the urinary bladder wall are totally removed?
[CBSE AIPMT 2009]

- (a) Urine will not collect in the bladder
(b) Micturition will continue
(c) Urine will continue to collect normally in the bladder
(d) There will be no micturition

Ans. (c)

If stretch receptors of urinary bladder wall are totally removed, the urine will continue to collect normally in the bladder. The urinary bladder is a pear-shaped, hollow muscular organ situated in the pelvic cavity which is made up of smooth and involuntary muscles. The lumen of urinary bladder is lined by transition epithelium which has great power of stretching.

- 19** Bowman's glands are found in
[CBSE AIPMT 2006]

- (a) olfactory epithelium
(b) external auditory canal
(c) cortical nephrons only
(d) juxtamedullary nephrons

Ans. (a)

Bowman's glands (olfactory glands) occur below the olfactory epithelia. Their ducts open on the olfactory epithelial surface. These glands secrete watery mucus to protect and keep the epithelium moist.

- 20** Part not belonging to uriniferous tubule is
[CBSE AIPMT 1994]

- (a) glomerulus
(b) Henle's loop
(c) distal convoluted tubule
(d) collecting tubule

Ans. (a)

From the option given glomerulus do not belong to uriniferous tubule. Each nephron is about 6 cm long and is divided into two parts : Bowman's capsule and nephric or uriniferous tubule. Glomerulus is a group of about 50 capillaries. Its capillary wall has numerous minute pores, so the permeability of glomerular membrane increases 100-500 times as high as that of usual capillary.

While Henle's loop, DCT and collecting tubules are part of uriniferous tubule.

21 Proximal and distal convoluted tubules are parts of
[CBSE AIPMT 1990]

- (a) seminiferous tubules
- (b) nephron
- (c) oviduct
- (d) vas deferens

Ans. (b)

Nephron is the structural and functional unit of kidney. Nephrons are also called renal tubules or uriniferous tubules. Each nephron is formed of two parts. (i) Bowman's capsule and (ii) Nephric tubule which is a long and coiled and is formed of proximal convoluted tubule, loop of Henle and distal convoluted tubule.

22 Brush border is characteristic of
[CBSE AIPMT 1990]

- (a) neck of nephron
- (b) collecting tube
- (c) proximal convoluted tubule
- (d) All of the above

Ans. (c)

Proximal convoluted tubule is present in cortex and is convoluted. It is about 12-24 mm in length. It is lined by brush bordered cuboidal epithelium with numerous microvilli. These cells have numerous mitochondria for active transport.

TOPIC 3

Human Excretory System: Physiology

23 The increase in osmolarity from outer to inner medullary interstitium is maintained due to
[NEET (Oct.) 2020]

- I. close proximity between Henle's loop and vasa recta
 - II. counter-current mechanism
 - III. selective secretion of HCO_3^- and hydrogen ions in PCT.
 - IV. higher blood pressure in glomerular capillaries
- (a) Only II
 - (b) III and IV
 - (c) I, II and III
 - (d) I and II

Ans. (d)

Statements in option (d) are correct as the close proximity between the Henle's loop and vasa recta as well as the counter-current in them help in maintaining an increasing osmolarity towards the inner medullary interstitium, i.e. from $300 \text{ mOsmol L}^{-1}$ in the cortex (outside) to about $1200 \text{ mOsmol L}^{-1}$ in the inner medulla (inside).

24 Match the following parts of a nephron with their function.
[NEET (Odisha) 2019]

Column I		Column II
1. Descending limb of Henle's loop	(i)	Reabsorption of salts only
2. Proximal convoluted tubule	(ii)	Reabsorption of water only
3. Ascending limb of Henle's loop	(iii)	Conditional reabsorption of sodium ion and water
4. Distal convoluted tubule	(iv)	Reabsorption of ion, water and organic nutrients

Select the correct option from the following.

- (a) 1 2 3 4
- (b) (i) (iii) (ii) (iv)
- (c) (ii) (iv) (i) (iii)
- (d) (i) (iv) (ii) (iii)
- (e) (iv) (i) (iii) (ii)

Ans. (b)

The correct matches are

Part of nephron		Function
1. Descending limb of Henle's loop	(ii)	Reabsorption of water only
2. Proximal convoluted tubule	(iv)	Reabsorption of ion, water and organic nutrients
3. Ascending limb of Henle's loop	(i)	Reabsorption of salts
4. Distal convoluted tubule	(iii)	Conditional reabsorption of sodium ion and water

25 Which of the following statements is correct?
[NEET 2017]

- (a) The ascending limb of loop of Henle is impermeable to water
- (b) The descending limb of loop of Henle is impermeable to water

- (c) The ascending limb of loop of Henle is permeable to water
- (d) The descending limb of loop of Henle is permeable to electrolytes

Ans. (a)

The ascending limb of loop of Henle is impermeable to water and permeable to K^+ , Cl^- and Na^+ and partially permeable to urea. Due to this, sodium, potassium, calcium, magnesium and chloride are reabsorbed here making the filtrate hypotonic.

26 The part of nephron involved in active reabsorption of sodium is
[NEET 2016, Phase II]

- (a) distal convoluted tubule
- (b) proximal convoluted tubule
- (c) Bowman's capsule
- (d) descending limb of Henle's loop

Ans. (b)

Proximal convoluted tubule is involved in active reabsorption of sodium. The majority (about 70%) of sodium is reabsorbed here, into the cytosol of the epithelial cells of the nephron.

27 Which of the following causes an increase in sodium reabsorption in the distal convoluted tubule?
[CBSE AIPMT 2014]

- (a) Increase in aldosterone levels
- (b) Increase in antidiuretic hormone levels
- (c) Decrease in aldosterone levels
- (d) Decrease in antidiuretic hormone levels

Ans. (a)

Increase in aldosterone levels cause an increase in sodium reabsorption in DCT. It is secreted by outer layer of adrenal gland when aldosterone is present in the blood and all the Na^+ ions in the filtrate are reabsorbed. Retaining Na^+ raises the osmotic pressure of the blood and reduces the water loss from the body.

28 The maximum amount of electrolytes and water (70-80%) from the glomerular filtrate is reabsorbed in which part of the nephron?
[CBSE AIPMT 2012]

- (a) Ascending limb of loop of Henle
- (b) Distal convoluted tubule
- (c) Proximal convoluted tubule
- (d) Descending limb of loop of Henle

Ans. (c)

From the Bowman's capsule, the glomerular filtrate enters the proximal convoluted tubule (PCT). PCT is surrounded by a network of peritubular capillaries and is the seat of reabsorption. About 75% of glomerular filtrate is normally reabsorbed in PCT before reaching the loop of Henle.

The reabsorbed materials include glucose, amino acids, vitamins, hormones, sodium, potassium, chlorides, phosphates, bicarbonates, most of the water and some urea, etc.

29 Which one of the following correctly explains the function of a specific part of a human nephron? [CBSE AIPMT 2011]

(a) Henle's loop	—	Most reabsorption of the major substances from the glomerular filtrate
(b) Distal convoluted tubule	—	Reabsorption of ions into the surrounding blood capillaries
(c) Afferent arteriole	—	Carries the blood away from the glomerulus towards renal vein
(d) Podocytes	—	Create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule

Ans. (d)

Podocytes or visceral epithelial cells are the cells in Bowman's capsule in the kidneys that wrap around the capillaries of glomeruli. They create minute pores (slit pores) for the filtration of blood into the Bowman's capsule.

30 Injury to adrenal cortex is not likely to affect the secretion of which one of the following? [CBSE AIPMT 2010]

- (a) Aldosterone
- (b) Both androstenedione and dehydroepiandrosterone
- (c) Adrenalin
- (d) Cortisol

Ans. (c)

The adrenal medulla synthesises two hormones adrenaline (epinephrine) and non-adrenaline (non-epinephrine).

These hormones are proteinaceous in nature and derived from amino acid tyrosine. Thus, injury to adrenal cortex will not affect the secretion of adrenaline.

31 Which one of the following statements in regard to the excretion by the human kidneys is correct? [CBSE AIPMT 2010]

- (a) Descending limb of Loop of Henle is impermeable to water
- (b) Distal convoluted tubule is incapable of reabsorbing HCO_3^-
- (c) Nearly 99% of the glomerular filtrate is reabsorbed by the renal tubules
- (d) Ascending limb of loop of Henle is impermeable to electrolytes

Ans. (c)

The plasma fluid that filters out from glomerular capillaries into Bowman's capsule of nephron is called glomerular filtrate. A comparison of the volume of the filtrate formed per day (180 L/day) with that of the urine released (1.5L), suggests that nearly 99% of the filtrate has to be reabsorbed by the renal tubules in a process called reabsorption.

32 The net pressure gradient that causes the fluid to filter out of the glomeruli into the capsule is [CBSE AIPMT 2005]

- (a) 20 mmHg
- (b) 75 mmHg
- (c) 30 mmHg
- (d) 50 mmHg

Ans. (a)

Kidneys help in the formation of urine, from the blood flowing through glomerular capillaries. About 20% of plasma fluid filters out into the Bowman's capsule through a thin glomerular-capsular membrane due to a net or effective filtration of about 10-15 mm Hg. So, it is the nearest option (a) which is correct.

33 If Henle's loop were absent from mammalian nephron, which of the following is to be expected? [CBSE AIPMT 2003]

- (a) The urine will be more concentrated
- (b) The urine will be more dilute
- (c) There will be no urine formation
- (d) There will be hardly any change in the quality and quantity of urine formed

Ans. (b)

The main function of the Henle's loop is to absorb water from the tubular lumen, thus making the urine concentrated. If loop of Henle absent then the urine becomes more dilute.

34 The ability of the vertebrates to produce concentrated (hyperosmotic) urine usually depends upon the [CBSE AIPMT 2000]

- (a) area of Bowman's capsule epithelium
- (b) length of Henle's loop
- (c) length of the proximal convoluted tubule
- (d) capillary network forming glomerulus

Ans. (b)

Length of Henle's loop determined the concentration of urine. Urine is concentrated through counter current mechanism which involves (a) the loop of Henle (b) the vasa recta (c) nearby collecting tubules and ducts, (d) the interstitial fluid.

35 The basic functional unit of human kidney is [CBSE AIPMT 1997]

- (a) nephron
- (b) pyramid
- (c) nephridia
- (d) Henle's loop

Ans. (a)

Each human kidney consists of about one million structural and functional units called nephrons. Each nephron is mainly made up of two parts :

- (i) Malpighian body
- (ii) Renal tubule.

Nephridia are excretory tubules found in the Platyhelminthes (flatworms) and annelids (earthworms).

36 Under normal conditions which one is completely reabsorbed in the renal tubule? [CBSE AIPMT 1991]

- (a) Urea
- (b) Uric acid
- (c) Salts
- (d) Glucose

Ans. (d)

Glucose is high threshold substance, i.e., it is totally or mostly reabsorbed from the nephric filtrate in the blood capillaries.

Renal threshold, i.e., upper limit of kidney to reabsorb such high threshold substances of kidney for reabsorption of glucose is about 180 mg/100 mL of nephric filtrate. When blood sugar level reaches beyond this, sugar also appears in urine.

37 Reabsorption of useful substances from glomerular filtrate occurs in [CBSE AIPMT 1989]

- (a) collecting tube
- (b) loop of Henle
- (c) proximal convoluted tubule
- (d) distal convoluted tubule

Ans. (c)

Proximal convoluted tubule is the main site for the reabsorption of useful substances from glomerular filtrate. In PCT complete reabsorption by active transport takes place for glucose.

PCT reabsorbs most of the amino acids and vitamin-C, about 70% of Na^+ and nearly 75% of K^+ and a large amount of Ca^{2+} from glomerular filtrate.

Cl^- is reabsorbed by diffusion. 70% of water from filtrate is also reabsorbed in PCT by osmosis.

TOPIC 4

Regulation of Kidney Function

38 Select the correct statement. [NEET (Oct.) 2020]

- (a) Atrial Natriuretic Factor increases the blood pressure
- (b) Angiotensin II is a powerful vasodilator
- (c) Counter-current pattern of blood flow is not observed in vasa recta
- (d) Reduction in Glomerular Filtration Rate (GFR) activates JG cells to release renin

Ans. (d)

Statement in option (d) is correct as a reduction in glomerular filtration rate activate the JG cells to release renin which converts angiotensinogen in blood to angiotensin-I. Other statements are incorrect and can be corrected as Atrial Natriuretic Factor (ANF) causes vasodilation and thereby decreases the blood pressure.

Angiotensin-II is a powerful vasoconstrictor, it increases the GFR. Counter-current pattern of blood flow is observed in vasa recta.

39 Which of the following factors is responsible for the formation of concentrated urine? [NEET (National) 2019]

- (a) Maintaining hyperosmolarity towards inner medullary interstitium in the kidneys
- (b) Secretion of erythropoietin by juxtaglomerular complex
- (c) Hydrostatic pressure during glomerular filtration
- (d) Low levels of antidiuretic hormone

Ans. (a)

Maintaining hyperosmolarity towards inner medullary interstitium in the kidneys is the factor responsible for the formation of concentrate urine because it provides concentration gradient necessary for water reabsorption in renal tubules.

Erythropoietin secretion by juxtaglomerular complex is related to red blood cell production and hydrostatic pressure during glomerular filtration to amount of filtrate formed by kidneys.

High levels of antidiuretic hormone and not low levels produce urine that is more concentrated.

40 A decrease in blood pressure/volume will not cause the release of [NEET 2017]

- (a) renin
- (b) atrial natriuretic factor
- (c) aldosterone
- (d) ADH

Ans. (b)

A decrease in blood pressure/volume stimulates the hypothalamus to release ADH (Anti Diuretic Hormone) as well as JGA (Juxtaglomerular Apparatus) cells to release renin. Renin by **renin angiotensin** mechanism activates the adrenal cortex to release aldosterone.

Atrial Natriuretic Factor (ANF) is produced by atria of heart during increased blood pressure/volume.

It can cause vasodilation and there by, decrease the blood pressure, therefore, option (b) is correct

41 Human urine is usually acidic because [CBSE AIPMT 2015]

- (a) the sodium transporter exchanges one hydrogen ion for each sodium ion, in peritubular capillaries
- (b) excreted plasma proteins are acidic
- (c) potassium and sodium exchange generates acidity
- (d) hydrogen ions are actively secreted into the filtrate

Ans. (d)

The proximal tubule is the portion of nephron of the kidney which leads from the Bowman's capsule to the loop of Henle.

It regulates the pH of the filtrate by exchanging hydrogen ions in the interstitium for bicarbonate ions in the filtrate. Due to the H^+ ions the human urine is usually acidic. Thus H^+ are actively secreted into the filtrate is the correct option.

42 Which one of the following statements is correct with respect to kidney function regulation? [CBSE AIPMT 2011]

- (a) Exposure to cold temperature stimulates ADH release
- (b) An increase in glomerular blood flow stimulates formation of angiotensin-II
- (c) During summer when body loses lot of water by evaporation, the release of ADH is suppressed
- (d) When someone drinks lot of water ADH release is stopped

Ans. (d)

When someone drinks lot of water which is not required by body, the osmoregulation of the blood will decrease. The decrease in osmoregulation will inhibit the release of ADH.

43 A person who is on a long hunger strike and is surviving only on water, will have [CBSE AIPMT 2007]

- (a) more sodium in his urine
- (b) less amino acids in his urine
- (c) more glucose in his blood
- (d) less urea in his urine

Ans. (d)

A person who is on a long hunger strike and is surviving only on water, will have less urea in his urine.

As urea is an organic compound which is a waste product produced during body metabolism.

- 44** Angiotensinogen is a protein produced and secreted by
[CBSE AIPMT 2006]
- (a) macula densa cells
 - (b) endothelial cells (cells lining the blood vessels)
 - (c) liver cells
 - (d) Juxtaglomerular (JG) cells

Ans. (c)

Angiotensinogen is a plasma protein produced and secreted by the liver cells. Renin is secreted from juxtaglomerular cells and acts enzymatically on angiotensinogen to release 10 amino acid containing peptide angiotensin-I. Macula densa is actually a plaque in wall at the end of thick ascending limb of nephrons.

- 45** A person is undergoing prolonged fasting. His urine will be found to contain abnormal quantities of
[CBSE AIPMT 2005]
- (a) fats
 - (b) ketones
 - (c) amino acids
 - (d) glucose

Ans. (b)

If a person is undergoing prolonged fasting, his urine will be found to contain abnormal quantities of ketones. During fasting energy is obtained by the oxidation of reserved fats. As a result of fatty acid oxidation large amount of ketone bodies are produced such as acetoacetate, β -hydroxybutyrate and acetone.

- 46** Glucose is taken back from glomerular filtrate through
[CBSE AIPMT 1993]
- (a) active transport
 - (b) passive transport
 - (c) osmosis
 - (d) diffusion

Ans. (a)

Glucose is taken back from glomerular filtrate through active transport in proximal convoluted tubule.

TOPIC 5

Accessory Excretory Organs

- 47** Which one of the following is correctly matched pair of the given secretion and its primary role in human physiology?
[CBSE AIPMT 2000]

- (a) Sebum – Sexual attraction
- (b) Sweat – Thermoregulation
- (c) Saliva – Tasting food
- (d) Tears – Excretion of salts

Ans. (b)

Sweat glands are coiled tubular glands situated in the dermis and connected to a sweat duct which open as pore on the surface of the skin.

These secrete sweat which contains 0.1–0.4% of sodium chloride, sodium acetate and urea.

Sweating occurs when the body temperature increases. As sweat evaporates from the skin surface, energy is lost from the body as latent heat of vaporation and in this way sweat reduces body temperature.

TOPIC 6

Disorders of Excretory System

- 48** Presence of which of the following conditions in urine are indicative of diabetes mellitus?
[NEET (Sep.) 2020]

- (a) Uremia and Renal calculi
- (b) Ketonuria and Glycosuria
- (c) Renal calculi and Hyperglycaemia
- (d) Uremia and Ketonuria

Ans. (b)

Presence of glucose (glycosuria) and ketone bodies (ketonuria) in urine are indicative of diabetes mellitus. In diabetes mellitus the body produces

excess ketones as an indication that it is using an alternative source of energy. It is seen more commonly in type 1 diabetes mellitus.

Presence of glucose indicates Type II diabetes. In some cases, insulin cannot transport blood sugar into the body's cells effectively.

This can also cause blood sugar to be passed out in urine.

- 49** Which of the following would help in prevention of diuresis?
[NEET (Sep.) 2020]

- (a) Reabsorption of Na^+ and water from renal tubules due to aldosterone
- (b) Atrial natriuretic factor causes vasoconstriction
- (c) Decrease in the secretion of renin by JG cells
- (d) More water reabsorption due to undersecretion of ADH

Ans. (a)

Adrenal cortex secretes mineralocorticoids, i.e. aldosterone which increase the reabsorption of Na^+ and water from renal tubule thereby preventing diuresis.

- 50** Use of an artificial kidney during hemodialysis may result in :
[NEET (National) 2019]

- A. Nitrogenous waste build-up in the body
- B. Non-elimination of excess potassium ions
- C. Reduced absorption of calcium ions from gastrointestinal tract
- D. Reduced RBC production

Which of the following options is the most appropriate?

- (a) (B) and (C) are correct
- (b) (C) and (D) are correct
- (c) (A) and (D) are correct
- (d) (A) and (B) are correct

Ans. (b)

Statements (C) and (D) are correct.

Use of an artificial kidney during haemodialysis may result in reduced

RBC production and reduced absorption of calcium ions from gastrointestinal tract. The former would occur due to the low level of erythropoietin hormone secreted by juxtaglomerular cells.

The later would be caused due to the elimination of calcium ions along with phosphate ions during dialysis.

Statements (A) and (B) are incorrect because dialysis helps in the removal of nitrogenous waste and potassium ions from the body.

- 51** Match the items given in Column I with those in Column II and select the correct option given below

[NEET 2018]

Column I		Column II
1. Glycosuria	(i)	Accumulation of uric acid in joints.
2. Gout	(ii)	Mass of crystallised salts within the kidney.
3. Renal calculi	(iii)	Inflammation in glomeruli
4. Glomerular nephritis	(iv)	Presence of glucose in urine.

- 1 2 3 4
 (a) (ii) (iii) (i) (iv)
 (b) (i) (ii) (iii) (iv)
 (c) (iii) (i) (iv) (i)
 (d) (iv) (i) (ii) (iii)

Ans. (d)

Increased level of glucose in blood which may be caused due to untreated diabetes mellitus results in glycosuria. In this condition, glucose is present in the urine.

Gout is a form of arthritis characterised by severe pain and tenderness in joints. It is caused due to the accumulation of uric acid crystals in joints.

Renal calculi or kidney stones are small masses of crystalline salts within the kidneys. These stones can be of calcium, uric acid, struvite (magnesium ammonium phosphate), etc.

Glomerular nephritis is the inflammation of filtering unit, i.e. glomerulus of kidney. It is also known as Bright's disease. It may cause haematuria (blood in urine) and proteinuria (proteins in blood).

- 52** A condition of failure of kidney to form urine is called

[CBSE AIPMT 1998]

- (a) deamination
 (b) entropy
 (c) anuria
 (d) None of these

Ans. (c)

The terms anuria, oligonuria, polyuria and dysuria are used for absence of urine, scanty urine, large amounts of urine and painful urination respectively. Deamination is the removal of an amino ($-NH_2$) group frequently from an amino acid by transaminase enzymes.

- 53** If kidneys fail to reabsorb water, the effect on tissue would

[CBSE AIPMT 1994]

- (a) remain unaffected
 (b) shrink and shrivel
 (c) absorb water from blood plasma
 (d) take more O_2 from blood

Ans. (b)

If kidney fails to reabsorb water the concentration of urine will be low and urination will be more frequent, a condition called polyuria as a result, the tissues of the body will be dehydrated and shrink.