

Homoeostasis

Long Answer Questions

Q.1 Define homeostasis. Why body of an organism needs this? Which processes help in its occurrence?

Ans. Homeostasis may be defined as the maintenance of the internal conditions of body at equilibrium, despite changes in the external environment.

Examples:

1. The core temperature of human body remains at about 37°C despite fluctuations in the surrounding temperature.
2. The blood glucose level remains about 1g per liter despite eating a meal rich in carbohydrates.

Need of homeostasis:

An organism's body needs homeostasis because:

1. Body cells need the internal environment in which conditions do not change much.
2. Stable internal conditions are important for the efficient functioning of enzymes.

Processes helping in homeostasis

1. Osmoregulation

Definition

It is maintenance of the amounts of water and salts in body fluids (i.e. blood and tissue fluids).

Effect of osmoregulation

Relative amount of water and salts in body fluids and inside cells control the processes of diffusion and osmosis, which are essential for the functioning of cells.

2. Thermoregulation

Definition

The maintenance of internal body temperature is called thermoregulation.

Effect of thermoregulation

The enzymes of body work best at particular temperatures (optimum temperature). Any change in body temperature may affect the functioning of enzymes.

3. Excretion

Definition

Excretion is also a process of homeostasis. In this process, the metabolic wastes are eliminated from body to maintain the internal conditions at equilibrium.

Metabolic wastes

Metabolic waste means any material that is produced during body metabolism and that may harm the body.

Q.2 Describe homeostasis in plants. What different mechanisms are adopted for homeostasis in plants? OR How plants remove metabolic wastes? (Board 2014)

Ans. Homeostasis in plants

Plants respond to environmental changes and keep their internal conditions constant i.e. homeostasis. They apply different mechanisms for the homeostasis of water and other chemicals (oxygen, carbon dioxide, nitrogenous materials etc).

Removal of extra Carbon dioxide

In daytime, the carbon dioxide produced during cellular respiration is utilized in photosynthesis and hence it is not a waste product. At night, it is surplus because there is no utilization of carbon dioxide. It is removed from the tissue cells by diffusion. In leaves and young stems, carbon dioxide escapes out through stomata. In young roots, carbon dioxide diffuses through the general root surface, especially through root hairs.

Removal of extra oxygen

Oxygen is produced in mesophyll cells only during daytime, as a by-product of photosynthesis. After its utilization in cellular respiration the mesophyll cells remove the extra amount of oxygen through stomata.

Removal of extra water

1. Transpiration

(a) Definition

Transpiration is the loss of water from plants surface in the form of vapours e.g; conifers and most of plants.

(b) Explanation

Plants obtain water from soil and it is also produced in the body during cellular respiration. Plants store large amount of water in their cells for turgidity. Extra water is removed from plant body by transpiration.

At night, transpiration usually does not occur because most plants have their stomata closed. If there is a high water content in soil, water enters the roots and is accumulated in xylem vessels.

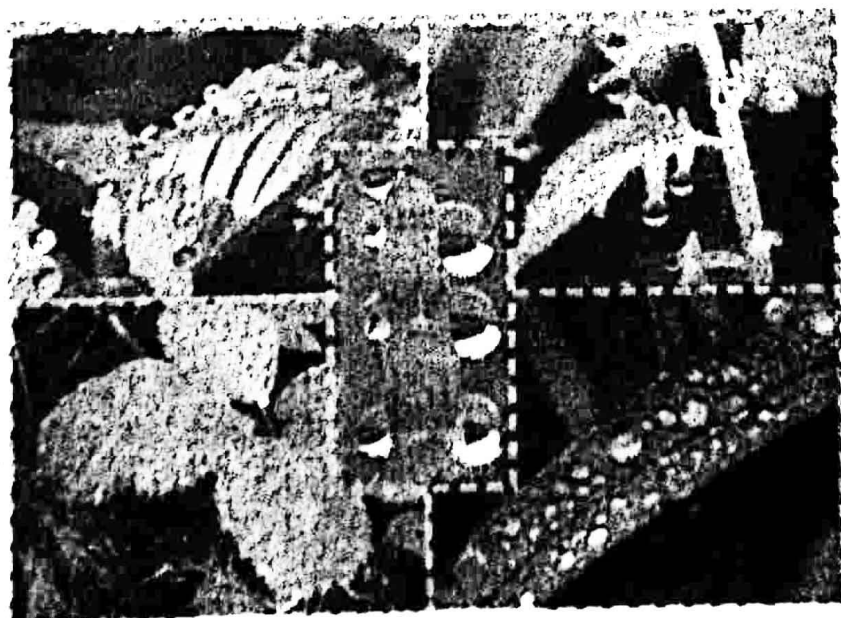


Figure 11.1: Guttation in different plants

2. Guttation

(a) Definition

The appearance of drops of water on the tips or edges of leaves is called guttation. Guttation is not to be confused with dew, which condenses from the atmosphere on to the plant surface.

(b) Explanation

Some plants such as grasses and strawberry force this water through special pores, present at leaf tips or edges, and form drops.

Removal of Other Metabolic Wastes

Plants deposit many metabolic wastes in their bodies as harmless insoluble materials.

Example

1. Calcium oxalate crystals

Calcium oxalate is deposited in the form of crystals in the leaves and stems of many plants e.g. in tomato.

2. Shedding of leaves

In trees, which shed their leaves yearly, the excretory products are removed from body during leaf fall.

3. Resins

Resins are removed by coniferous trees.

4. Gums

Gums are removed by keekar.

5. Latex

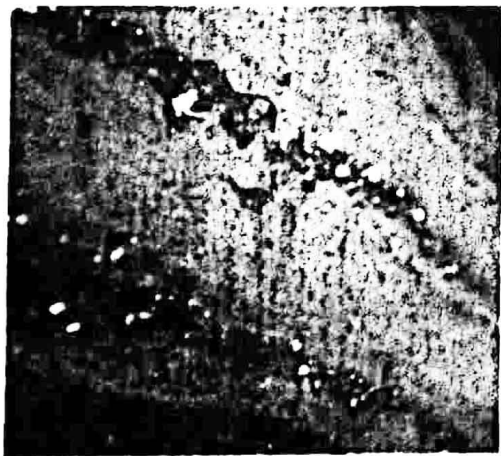
Latex are removed by rubber plants.

6. Mucilage

Mucilage are removed by carnivorous plants and lady finger.



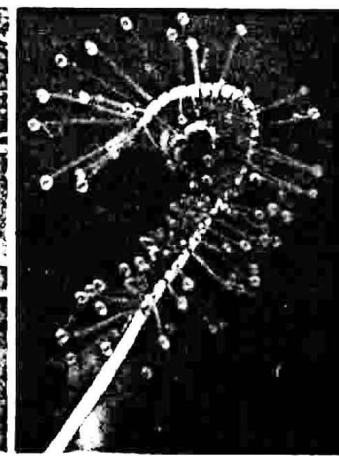
Figure11.2: Calcium oxalate needles in a leaf cell



Resin drops from a cut tree



Latex being extracted from a tree



Mucilage drops on a carnivorous plant

Figure11.3: Removal of some wastes in plants

Q.3 Describe osmotic adjustments in plants. OR On the basis of the available amount of water and salts, plants can be divided in how many groups? Explain.

Ans. On the basis of the available amount of water and salts, plants are divided into three groups.

1. Hydrophytes
2. Xerophytes
3. Halophytes

Definition

Hydrophytes are the plants which live completely or partially submerged in freshwater. Such plants do not face the problem of water shortage.

Adaptations

They have developed mechanisms for the removal of extra water from their cells.

Large number of Stomata

Hydrophytes have broad leaves with a large number of stomata on their upper surfaces. This characteristic helps them to remove the extra amount of water.

Examples

The most common example of such plants is water lilly.

2. Xerophytes

Definition

These plants live in dry environments.

Adaptations

i. Cuticle

They possess thick, waxy cuticle over their epidermis to reduce water loss from internal tissues.

ii. Less Stomata

They have less number of stomata to reduce the rate of transpiration.

iii. Deep roots

Such plants have deep roots to absorb maximum water from soil.

iv. Special Parenchyma cells

Some xerophytes have special parenchyma cells in stem or roots in which they store large quantities of water. This makes their stems or roots wet and juicy, called **succulent organs**.

Examples

Cacti (singular *cactus*) are common examples.

3. Halophytes

Definition

These plants live in sea water and are adapted to salty environments. Salts enter in the bodies of such plants due to their higher concentration in sea water. On the other hand, water tends to move out of their cells into the hypertonic sea water.

Adaptations

Holding of large amount of Salts

When salts enter into cells, plants carry out active transport to move and hold large amount of salts in vacuoles. Salts are not allowed to move out through the semi-permeable membranes of vacuoles. So the sap of vacuoles remains even more hypertonic than sea water. In this way, water does not move out of cells.



Hydrophytes



Halophytes



Xerophytes

Figure 11.4: three groups of plants

Examples

Many sea grasses are included in this group of plant.

Q4. What are the organs of humans which work for homeostasis? Describe skin and lungs in detail.

Ans. Humans have highly developed systems for homeostasis. The following are the main organs which work for homeostasis:

1. Lungs

They remove excess carbon dioxide and keep it in balance.

2. Skin

Skin performs role in maintenance of body temperature and also removes excess water and salts.

3. Kidneys

They filter excess water, salts, urea, uric acid etc. from the blood and form urine.

Explanation

Skin / What is skin? Write its function. (Board 2014)

a. Structure of skin

Our skin consists of two layers:

1. Epidermis is the outer protective layer without blood vessels.
2. Dermis is the inner layer containing blood vessels, sensory nerve endings, sweat and oil glands, hairs and fat cells.

b. Roles of Skin

i. Regulation of body Temperature

Thin layer of fat cells in the dermis insulates the body. Contraction of small muscles attached to hair forms 'Goosebumps'. It creates an insulating blanket of warm air.

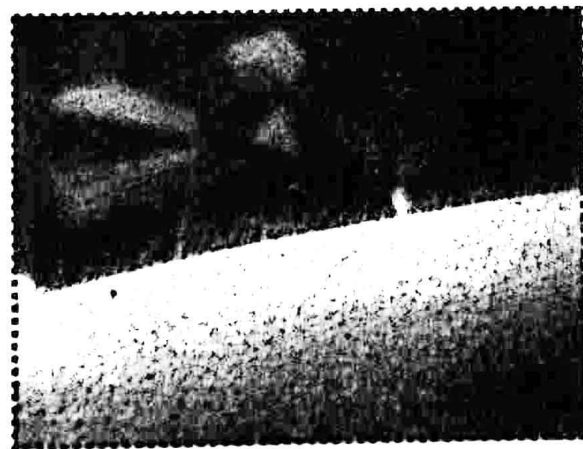


Figure 11.5: Goosebumps

Skin helps in providing cooling effect when sweat is produced by sweat glands and excess body heat escapes through evaporation. Metabolic wastes such as excess water, salts, urea and uric acid are also removed in sweat.

Lungs

i. Removal of carbon dioxide

Lungs maintain the concentration of carbon dioxide in blood. During cellular respiration our cells produce carbon dioxide. From cells, this carbon dioxide diffuses into tissue fluid and from there into blood. Blood carries carbon dioxide to lungs from where it is removed in air.

Q5. Describe urinary system of humans. Also describe the structure of nephron?

Ans. Urinary system of Humans

The excretory system of humans is also called the urinary system. It is formed of one pair of kidneys, a pair of ureters, a urinary bladder and a urethra.

Kidneys

Kidneys filter blood to produce urine.

Ureters

The ureters carry urine from kidneys to urinary bladder.

Bladder

The bladder temporarily stores urine until it is released from body.

Urethra

Urethra is the tube that carries urine from urinary bladder to the outside of body.

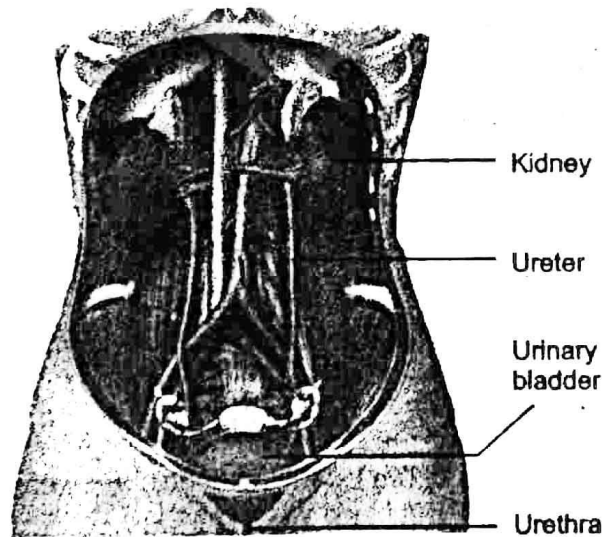


Figure11.6: The Urinary system of humans

Structure of kidney

(i) Colour and shape

Kidneys are dark-red bean shaped organs.

(ii) Size

Each kidney is 10 cm long, 5cm wide and 4 cm thick.

(iii) Weight

Each kidney weighs about 27 grams.

(iv) Location

They are placed against the back wall of abdominal cavity just below diaphragm, one on either side of vertebral column. They are protected by the last 2 ribs. The left kidney is a little higher than the right.

(v) Hilus

The concave side of kidney faces vertebral column. There is a depression, called hilus, near the centre of the concave area of kidney. This is the area of kidney through which ureter leaves kidney and other structures including blood vessels, lymphatic vessels and nerves enter and leave kidney.

(vi) Renal cortex

The longitudinal section of kidney shows two regions. Renal cortex is the outer part of kidney and it is dark in colour.

(vii) Renal medulla

Renal medulla is the inner part of kidney and is pale red in colour.

(viii) Pyramids

Renal medulla consists of several cone-shaped areas called renal pyramids.

(ix) Renal pelvis

Renal pyramids project into a funnel – shaped cavity called renal pelvis, which is the base of ureter.

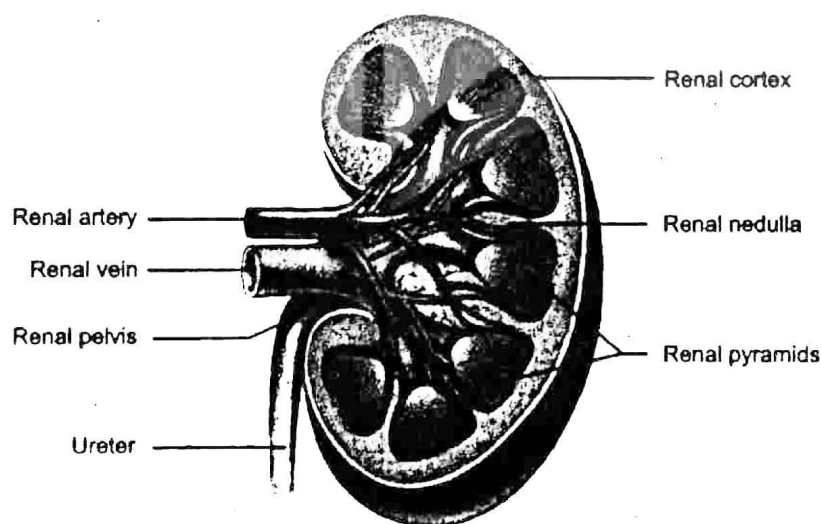


Figure 11.7: The anatomy of a kidney

Draw the labeled diagram of human kidney (Board 2014)

Structure of nephron (Board 2013)

The functional unit of the kidney is called nephron. There are over one million nephrons in each kidney.

Parts of Nephron

There are two parts of a nephron:

1. Renal corpuscle
2. Renal tubule

1. Renal corpuscle

The renal corpuscle is not tubular and has two parts:

(i) Glomerulus

It is a network of capillaries.

(ii) Bowman's capsule

Bowman's capsule is a cup-shaped structure that encloses glomerulus.

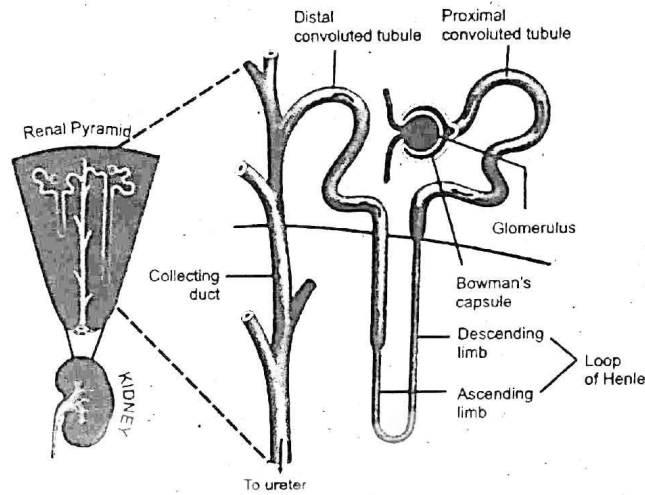


Figure 11.8: The structure of a nephron

2. Renal tubule

Renal tubule is the part of nephron which starts after Bowman's capsule. It is sub-divided into following parts:

(i) Proximal convoluted tubule.

First portion of renal tubule is called proximal convoluted tubule.

(ii) Loop of Henle

Next portion is U-shaped and is called the loop of Henle.

(iii) Distal convoluted tubule

The last portion of renal tubule is the distal convoluted tubule.

(iv) Collecting ducts and Papillary ducts

The distal convoluted tubule of many nephrons open in a single collecting duct. Many collecting ducts join together to form several hundred papillary ducts which drain into renal pelvis.

Q.6 Write a note on functioning of kidney.

Functioning of kidney:

Ans. The main function of kidney is urine formation which takes place in three steps:

- i. Pressure filtration
- ii. Selective re-absorption
- iii. Tubular secretion

i. Pressure filtration

The first step is pressure filtration. When blood enters the kidney via the renal artery, it goes to many arterioles, and then to the glomerulus. The pressure of blood is very high and so most of the water, salts, glucose and urea of blood is forced out of glomerular capillaries. This material passes into the Bowman's capsule and is now called glomerular filtrate.

ii. Selective re-absorption

The second step is the selective re-absorption. In this step about 99% of the glomerular filtrate is reabsorbed into the blood capillaries surrounding renal tubule. It occurs through osmosis, diffusion and active transport. Some water and most of the glucose is reabsorbed from the proximal

convoluted tubule. Here, salts are reabsorbed by active transport and then water follows by osmosis. The descending limb of Loop of Henle allows the reabsorption of water while the ascending limb of Loop of Henle allows the reabsorption of salts. The distal convoluted tubule again allows the reabsorption of water into the blood.

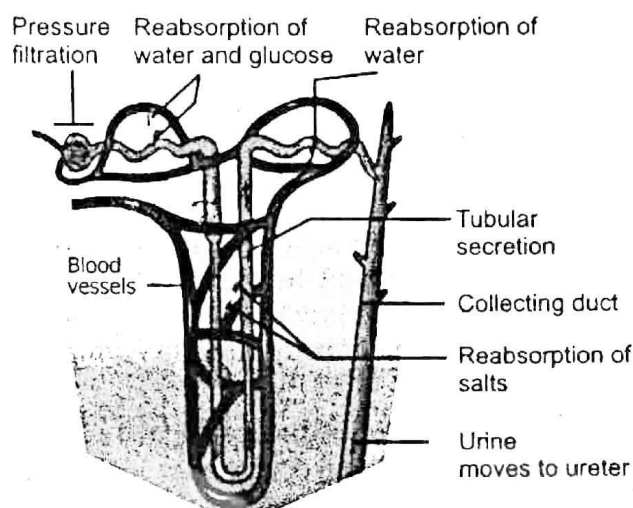


Figure11.9: Functioning of kidney (Nephron)

iii. Tubular secretion

The third step is the tubular secretion. Different ions, creatinine, urea etc. are secreted from blood into the filtrate in renal tubule. This is done to maintain blood at a normal pH (7.35-7.45) after the above mentioned steps, the filtrate present in renal tubules is known as urine. It moves into collecting ducts and then into pelvis.

Q.7 Write the normal composition of urine.

Ans. The normal composition of urine is shown in the following table:

Table 11.1 Normal Chemical composition of urine (source: NASA Contractor Report)	
Water	95%
Urea	9.3g/l
Chloride ions	1.87g/l
Sodium ions	1.17g/l
Potassium ions	0.750 g/l
Other ions and compounds	Variable amounts

Q.8 Describe osmoregulatory function of kidney.

Ans. Osmoregulation

Osmoregulation is defined as the regulation of the concentration of water and salts in blood and other body fluids. Kidneys play an important role in osmoregulation by regulating the water contents of blood. It is an important process as excessive loss of water concentrates the body fluids whereas excess intake of water dilutes them.

Dilute urine

When there is excess water in body fluids, kidneys form dilute (hypotonic) urine. For this purpose, kidneys filter more water from glomerular capillaries into Bowman's capsule. Similarly less water is reabsorbed and abundant dilute urine is produced. It brings down the volume of body fluids to normal.

Concentrated urine

When there is shortage of water in body fluids, kidneys filter less water from glomerular capillaries and the rate of reabsorption of water is increased. Less filtration and more reabsorption produce small amount of concentrated (hypertonic) urine. It increases the volume of body fluids to normal. This whole process is under hormonal control.

Q.9 What do you know about Kidney disorders?

Ans. There are many different kidney disorders:

(i) Kidney stones

When urine becomes concentrated, crystals of many salts e.g. calcium oxalate, calcium and ammonium phosphate, uric acid etc are formed in it. Such large crystals cannot pass in urine and form hard deposits called kidney stones. Most stones start in kidneys, some may travel to ureter or urinary bladder.

Causes of Kidney stones

Major causes of kidney stones are:

1. Age
2. Diet (containing more green vegetables, salts, vitamins C and D)
3. Recurring urinary tract infections
4. Less intake of water
5. Alcohol consumption

Symptoms of kidney stones

Following are the symptoms of kidney stones:

1. Severe pain in kidney or in lower abdomen
2. Vomiting
3. Frequent urination
4. Foul- smelling urine with blood and pus

Treatment of kidney stones

(i) Drinking plenty of water

About 90% of kidney stones can pass through the urinary system by drinking plenty of water.

(ii) Surgical treatment

In surgical treatment, the affected area is opened and stone (s) are removed

(iii) Lithotripsy

Lithotripsy is another method for the removal of kidney stones. In this method, non-electrical shock waves from outside are bombarded on the stones in the urinary system. Waves hit the dense stones and break them. Stones become sand-like and are passed through urine.

(ii) Kidney (Renal) Failure

Kidney failure means a complete or partial failure of kidneys to function.

Causes of kidney failure

Following are causes of kidney failure:

- i. Diabetes mellitus
- ii. Hypertension
- iii. Sudden interruption in the blood supply to kidneys
- iv. Drug overdoses

Symptoms of kidney failure

Main symptoms include:

- i. High level of urea and other wastes in blood
- ii. Vomiting
- iii. Nausea
- iv. Weight loss
- v. Frequent urination
- vi. Blood in urine
- vii. Excess fluids in body may causes swelling of legs, feet and face
- viii. Shortness of breath

Treatment of kidney Failure

Kidney failure is treated with:

- i. Dialysis
- ii. Kidney transplant

1. Dialysis (Board 2013)

Dialysis means the cleaning of blood by artificial ways. There are two methods of dialysis:

- (1) Peritoneal Dialysis
- (2) Haemodialysis

(1) Peritoneal Dialysis

In this type of dialysis, the dialysis fluid is pumped for a time into the peritoneal cavity which is the space around gut. This cavity is lined by peritoneum. Peritoneum contains blood vessels. When we place dialysis fluid in peritoneal cavity, waste materials from peritoneal blood vessels diffuse into the dialysis fluid, which is then drained out. This type of dialysis can be performed at home, but must be done every day.

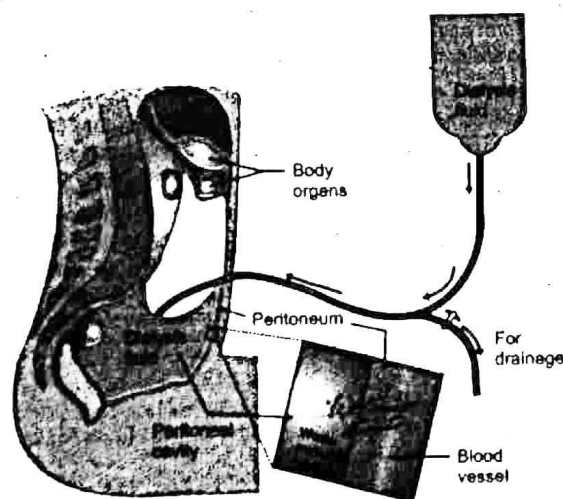


Figure11.10: Peritoneal dialysis

(2) Haemodialysis

In haemodialysis, patient's blood is pumped through an apparatus called dialyzer. The dialyzer contains long tubes, the walls of which act as semi-permeable membranes. Blood flows through the tubes while the dialysis fluid flows around the tubes. Extra water and wastes move from blood into

the dialysis fluid. The cleansed blood is then returned back to body. The haemodialysis treatments are typically given in dialysis centres three times per week.

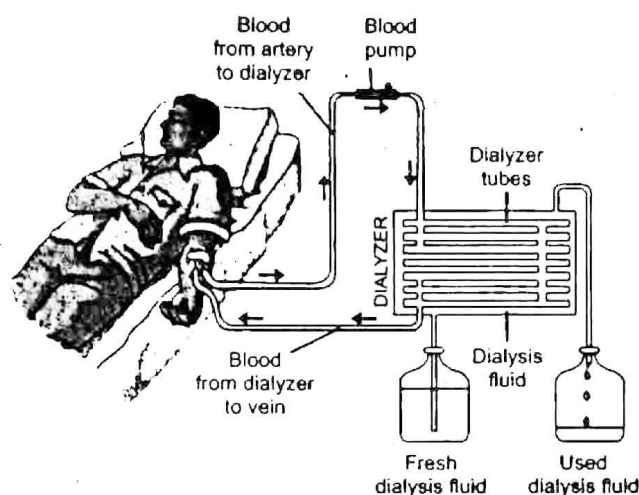


Figure 11.11: Haemodialysis

ii) Kidney Transplant

Introduction

Dialysis needs to be repeated after every few days and is unpleasant for patients and attendants. Another treatment for the end-stage kidney failure is kidney transplantation. It is the replacement of patient's damaged kidney with a donor healthy kidney.

Conditions for Transplant

- (1) Kidney may be donated by a deceased-donor or living donor.
- (2) The donor may or may not be a relative of the patient.
- (3) Before transplant, the tissue proteins of donor and patient are matched.
- (4) The donor's kidney is transplanted in patient's body and is connected to the patient's blood and urinary system.
- (5) The average lifetime for a donated kidney is 10 to 15 years.
- (6) When transplant fails, the patient may be given a second kidney transplant. In this situation, the patient is treated through dialysis for some intermediary time.

Problems after transplant

Problems after a transplant may include transplant rejection, infections, imbalances in body salts which can lead to bone problems and ulcers.

Q.10 What are the contributions of Muslim scientists about kidney diseases?

Ans. Contributions of Abu Nasr al-Farabi

Abu Nasr al-Farabi (872-951) was a prominent scientist who wrote many books that contained information about kidney diseases.

Contributions of Al-Zahrawi in removing stones

The genius Abu al Qasim Al-Zahrawi (known as Albucasis 936-1013) is considered to be Islam's greatest surgeon who invented many surgical procedures including the surgical removal of stones from the urinary bladder. His encyclopedia, Al-Tasrif ("The Method") contained over 200 surgical medical instruments he personally designed.

Multiple Choice Questions

1. The human urinary system consists of;
(a) Rectum, lungs, kidneys, ureters
(b) Kidneys, ureters, urinary bladder
(c) Skin, liver, lungs, kidneys
(d) Kidneys, ureters, urinary bladder, urethra
2. Which organ is responsible for filtering the blood?
(a) Intestine (b) Brain
(c) Stomach (d) Kidney
3. The tube between kidney and urinary bladder is the;
(a) Ureter (b) Urethra
(c) Renal tubule (d) Nephron
4. Body balance of water, salts, temperature and glucose is termed as:
(a) Excretion (b) Tubular secretion
(c) Homeostasis (d) Re-absorption
5. Which is the correct order for the path taken by urine after it leaves the kidneys?
(a) Urethra, bladder, ureters
(b) Bladder, ureters, urethra
(c) Ureters, bladder, urethra
(d) Bladder, urethra, ureters
6. What is the function of the ureter?
(a) To store urine
(b) To carry urine from the kidney to the bladder
(c) To carry urine out of the body
(d) To remove wastes from the blood
7. What waste products are excreted by kidneys?
(a) Urea, water & salts
(b) Salts, water and carbon dioxide
(c) Urea & water
(d) Urea & salts
8. The two main functions of sweat are;
(a) To keep the body cool and to remove excess proteins
(b) To keep the body warm and to filter the blood
(c) To filter the blood and to remove waste products
(d) To remove waste products and to cool the body
9. Which would NOT be present in the filtrate entering the Bowman's capsule of nephron?
(a) Water (b) Calcium ions
(c) Blood cells (d) Urea
10. During peritoneal dialysis, the waste materials move from:
(a) The abdomen to the dialysis fluid
(b) The dialysis fluid to the peritoneum blood vessels
(c) The peritoneum blood vessels to the dialysis fluid
(d) The dialysis fluid to the abdomen
11. Core temperature of human body remains at about:
(a) 35°C (b) 36°C
(c) 34°C (d) 37°C
12. Calcium oxalate is deposited in the form of crystals in the leaves and stems of:
11(022)
(a) Pines (b) Tomatoes
(c) Rubber (d) Keekar
13. Resins are removed by:
(a) Conifers (b) Lady finger
(c) Grasses (d) Keekar
14. Cacti are examples of:
(a) Hydrophytes (b) Xerophytes
(c) Halophytes (d) None

15. **Organs which work for homeostasis are:**
(a) Lungs (b) Skin
(c) Kidneys (d) All of the above
16. **The depression near the centre of concave area of kidney is called:**
(a) Cortex (b) Hilus
(c) Medulla (d) Pyramids
17. **U-shaped part of renal tubule is called:**
(a) Renal corpuscle
(b) Glomerulus
(c) Loop of Henle
(d) Bowman's capsule
18. **Which of following are not filtered through glomerular capillaries:**
(a) Blood cells
(b) Proteins
(c) Blood cells and Proteins
(d) Urea
19. **The typical volume of urine produced by an average adult per day is:**
(a) 1 liter (b) 2 liters
(c) 5 liters (d) 1.4 liters
20. **By drinking plenty of water how many stones can be avoided?**
(a) 20% (b) 90%
(c) 50% (d) 30%
21. **A method for removing stones in which non-electrical shock waves are bombarded on stones is called:**
(a) Lithotripsy (b) Surgery
(c) Dialysis (d) None
22. **Normal pH of blood is maintained at:**
(a) 7.35 – 7.40 (b) 7.35 – 7.45
(c) 7.30 – 7.40 (d) 7.30 – 7.45
23. **The loss of water in the form of drops from tips of leaf is called: (B 2013)**
(a) Excretion (b) Guttation
(c) Transpiration (d) Evaporation
24. **A method for removal of kidney stone is: (Board 2013)**
(a) Haemodialysis
(b) Peritoneal Dialysis
(c) Lithotripsy
(d) Kidney transplant
25. **In plants the excess water is removed by:**
(a) Respiration
(b) Transpiration
(c) Guttation
(d) Transpiration and Guttation
26. **The 'Nephrons' are mainly made of:**
(a) Renal corpuscle
(b) Renal tubule
(c) Renal corpuscle and renal tubule
(d) Renal pelvis
27. **Which is not the function of kidney?**
(a) pH balance
(b) Blood pressure
(c) Composition of blood
(d) Digestion of proteins
28. **In animals, the excretion of CO₂ takes place by:**
(a) Kidneys (b) Stomach
(c) Lungs (d) Liver
29. **Which one is not the part of kidney?**
(a) Medulla (b) Cerebellum
(c) Nephrons (d) Glomerulus
30. **Metabolic wastes are eliminated by:**
(a) Respiration (b) Excretion
(c) Homeostasis (d) Nutrition
31. **Guttation occurs in:**
(a) Pines (b) Tomatoes
(c) Grasses (d) Lady finger
32. **Water is transported by:**
(a) Xylem
(b) Phloem
(c) Xylem and Phloem
(d) Cambium

33. What is produced during respiration?
 (a) CO_2 (b) H_2O
 (c) CO_2 and H_2O (d) N_2
34. Rubber plant produces:
 (a) Gums (b) Mucilage
 (c) Latex (d) Resins
35. Keekar produces:
 (a) Gums (b) Mucilage
 (c) Latex (d) Resins
36. Broad leaves are found in:
 (a) Hydrophytes (b) Mesophytes
 (c) Xerophytes (d) Halophytes
37. Succulent organs are found in:
 (a) Mesophytes
 (b) Hydrophytes
 (c) Xerophytes
 (d) Halophytes
38. Uric acid is removed by:
 (a) Skin
 (b) Kidneys
 (c) Kidneys and Skin
 (d) Lungs
39. Which creates an insulating blanket of warm air?
 (a) Dermis (b) Lungs
 (c) Liver (d) Goosebumps
40. Which encloses glomerulus?
 (a) Pyramids
 (b) Loop of Henle
 (c) Bowman's capsule
 (d) Collecting duct
41. Amount of urea in normal chemical composition of urea in urine is:
 (a) 9.3 g/ℓ (b) 1.87 g/ℓ
 (c) 1.17 g/ℓ (d) 0.75 g/ℓ
42. %age of Potassium ions in urine is;
 (a) 1.8 g/ℓ (b) 1.17 g/ℓ
 (c) 0.75 g/ℓ (d) 9.3 g/ℓ
43. Which is done at home?
 (a) Lithotripsy
 (b) Haemodialysis
 (c) Peritoneal dialysis
 (d) Kidney transplant
44. Average life for a donated kidney is:
 (a) 8-10 years (b) 5 years
 (c) 20 years (d) 10-15 years
45. Hypotonic urine is formed when water in body fluid is:
 (a) Less (b) Absent
 (c) In excess (d) Not filtered
46. %age of water in Urine is:
 (a) 90% (b) 95%
 (c) 80% (d) 100%
47. The name of the common mineral salt present in sweat is _____.
 (a) Calcium nitrate
 (b) Sodium chloride
 (c) Potassium chloride
 (d) Iron phosphate
48. In kidney the formation of urine occurs in _____ steps?
 (a) 1 (b) 2
 (c) 3 (d) 4
49. Arterial blood dialysis is also called:
 (a) Lithotripsy
 (b) X-rays
 (c) Haemodialysis
 (d) Kidney transplant
50. The category of the plants that has adaptations of small and thick leaves to limit water loss is called:
 (a) Hydrophytes (b) Xerophytes
 (c) Mesophytes (d) Hygrophytes
51. Who wrote an encyclopedia "Al Tasrif"?
 (a) Abu Nasr-al-Farabi
 (b) Abu al-Qasim Al-Zahrawi
 (c) Bu Ali Sina
 (d) Darwin

52. Mucilage is secreted in:
 (a) Carnivorous plants
 (b) Lady finger
 (c) Carnivorous plants and Lady finger
 (d) Keekar
53. The plants which live in sea water and are adapted to salty environments are called:
 (a) Halophytes
 (b) Hydrophytes
 (c) Xerophytes
 (d) Halophytes and Hydrophytes
54. Excretion is also a process of:
 (a) Respiration
 (b) Co-ordination
 (c) Homeostasis
 (d) Breathing

55. Despite eating a meal rich in carbohydrates, the blood glucose level remains about:
 (a) 1 g per liter (b) 2 g per liter
 (c) 3 g per liter (d) 4 g per liter
56. Approximate weight of a Kidney is:
 (Board 2014)
 (a) 10 grams (b) 15 grams
 (c) 20 grams (d) 27 grams
57. The length of each Kidney is:
 (a) 10 cm (b) 15 cm
 (c) 20 cm (d) 30 cm
58. Secretions secreted by conifers are called: (Board 2014)
 (a) Resins (b) Gums
 (c) Later (d) Mucilage

Answer Key

1.	d	2.	d	3.	a	4.	c
5.	c	6.	b	7.	a	8.	d
9.	c	10.	c	11.	d	12.	b
13.	a	14.	b	15.	d	16.	b
17.	c	18.	c	19.	d	20.	b
21.	a	22.	b	23.	b	24.	c
25.	d	26.	c	27.	d	28.	c
29.	b	30.	b	31.	c	32.	a
33.	c	34.	c	35.	a	36.	a
37.	c	38.	c	39.	d	40.	c
41.	a	42.	c	43.	c	44.	d
45.	c	46.	b	47.	b	48.	c
49.	c	50.	b	51.	b	52.	c
53.	a	54.	c	55.	a	56.	d
57.	a	58.	a				

Short Answer Questions

Q.1 What are the major organs involved in homeostasis in human body? State the role of each organ?

Ans. Human beings have highly developed organs for homeostasis which are:

(i) Lungs (ii) Skin (iii) Kidneys

Lungs remove excess carbon dioxide and keep it in balance.

Skin performs role in maintenance of body temperature and also removes excess water and salts.

Kidneys filter excess water, salts, urea, uric acid etc. from the blood and form urine.

Q.2 What is Bowman's capsule?

Ans. One end of the renal tubule is blind and attains a cup shaped structure called Bowman's capsule that encloses glomerulus.

Q.3 Define Homeostasis. (Board 2013) OR

What is homeostasis. Give an example. (Board 2013)

Ans. Homeostasis may be defined as the maintenance of the internal conditions of body in equilibrium, despite changes in the external environment e.g. the core temperature of human body remains at about 37°C despite fluctuations in the surrounding air temperature.

Q.4 Define osmoregulation. (Board 2014)

Ans. It is defined as the maintenance of the amounts of water and salts in body fluids i.e., blood and tissue fluids.

Q.5 Define thermoregulation.

Ans. The maintenance of internal body temperature is called thermoregulation e.g., human body temperature is kept constant at 37°C .

Q.6 Define Excretion.

Ans. The process by which metabolic wastes are eliminated from body to maintain the internal conditions at equilibrium is called excretion e.g., urea, salts of uric acid and water are eliminated out of body through excretion.

Q.7 Differentiate between transpiration and Guttation.

Ans:

Transpiration	Guttation
i. It is defined as loss of water from plants surface in the form of vapours. ii. It occurs through stomata.	i. It is defined as appearance of drops of water on the tips or edges of leaves. ii. It occurs through special pores called hydathodes present at leaf tips or edges.

Q.8 What are Hydrophytes?

Ans. Hydrophytes are the plants which live completely or partially submerged in fresh water e.g. water lilly.

Q.9 What are Xerophytes?

Ans. Xerophytes live in dry environment e.g. cacti.

Q.10 What are Halophytes? (Board 2014)

Ans. The plants living in sea water and adapted to salty environments are called halophytes e.g. different sea grasses.

Q.11 What is Hilus?

Ans. The concave side of kidney faces vertebral column. There is a depression called hilus, near the centre of the concave area of kidney. This is the area of kidney through which ureter leaves kidney and other structures including blood vessels, lymphatic vessels and nerves enter and leave kidney.

Q.12 What are Renal Pyramids?

Ans. Renal medulla consists of several cone-shaped areas called renal pyramids.

Q.13 What is Renal pelvis?

Ans. Renal pyramids project into a funnel-shaped cavity called renal pelvis which is the base of ureter.

Q.14 What is renal corpuscle?

Ans. The part of nephron which is not tubular and has two parts:

(i) Glomerulus

(ii) Bowman's capsule

Q.15 What is Glomerulus?

Ans. Glomerulus is a network of capillaries and is enclosed by a cup shaped structure called Bowman's capsule.

Q.16 Define renal tubule.

Ans. Tubular part of nephron which starts after Bowman's capsule is called renal tubule. It is subdivided into following parts:

i. Proximal convoluted tubule

ii. Loop of Henle

iii. Distal convoluted tubule

iv. Collecting duct

Q.17 What do you know about proximal convoluted tubule?

Ans. First portion of renal tubule is called proximal convoluted tubule.

Q.18 What is Loop of Henle?

Ans. U – shaped part of renal tubule is called Loop of Henle.

Q.19 What is distal convoluted tubule?

Ans. Last portion of renal tubule is called distal convoluted tubule.

Q.20 What are collecting ducts?

Ans. The distal convoluted tubule of many nephrons open in a single collecting duct. Many collecting ducts join together to form several hundred papillary ducts which drain into renal pelvis.

Q.21 What is a nephron?

Ans. The functional unit of the kidney is called nephron. There are over one million nephrons in each kidney.

Q.22 What is pressure filtration?

Ans. The first step of urine formation is pressure filtration. When blood enters the kidney via the renal artery it goes to many arterioles, and then to the glomerulus. The pressure of blood is very high and so most of the water, salts, glucose and urea of the blood is forced out of glomerular capillaries.

Q.23 What do you know about selective reabsorption?

Ans. It is the second step of urine formation. In this step, about 99% of the glomerular filtrate is reabsorbed into the blood capillaries surrounding renal tubule. It occurs through osmosis, diffusion and active transport.

Q.24 What is the tubular secretion?

Ans. The third step of urine formation is called tubular secretion. Different ions, creatinine, urea etc. are secreted from blood into the filtrate in renal tubule. This is done to maintain blood at a normal pH (7.35 – 7.45).

Q.25 What is lithotripsy. (Board 2014)

Ans. It is the method to remove kidney stones. In this method, non-electrical shock waves from outside are bombarded on the stones in the urinary system. Waves hit the dense stones and break them. Stones become sand like and are passed through urine.

Q.26 Define dialysis.

Ans. Dialysis means the cleaning of blood by artificial ways by using a dialyzer. It is of two types:

(i) Peritoneal Dialysis (ii) Haemodialysis

Q.27 What is a dialyzer?

Ans. In haemodialysis, patient's blood is pumped through an apparatus called dialyzer. It contains long tube, the walls of which act as semi-permeable membranes. Blood flows through the tubules and during this extra water and wastes move from blood into the dialysis fluid.

Q.28 What is peritoneal dialysis?

Ans. In this type of dialysis, the dialysis fluid is pumped for a time into the peritoneal cavity which is the space around gut. This cavity is lined by peritoneum. Peritoneum contains blood vessels. When dialysis fluid is placed in peritoneal cavity, waste materials from peritoneal blood vessels diffuse into the dialysis fluid, which is then drained out.

Q.29 What is Haemodialysis?

Ans. In haemodialysis, patient's blood is pumped through an apparatus called dialyzer. It contains long tubing which act as semipermeable membrane. Blood flows through the tubes while the dialysis fluid flows around the tubes. Extra water and wastes move from blood into dialysis fluid. The cleaned blood is returned back to the body.

Q.30 What is glomerulus filtrate?

Ans. In the glomerulus due to high pressure of blood most of the water, salts, glucose and urea of the blood is forced out of glomerular capillaries. This material passes into the Bowman's capsule and is called glomerular filtrate.

Q.31 What are papillary ducts?

Ans. Many collecting ducts join together to form several hundred papillary ducts which drain into renal pelvis.

Q.32 What are ureters?

Ans. Kidneys filter blood to produce urine and the ureters carry urine from kidneys to urinary bladder.

Q.33 What is urethra?

Ans. Urethra is the tube that carries urine from urinary bladder to the outside of body.

Q.34 What is urinary bladder?

Ans. Bladder is an organ of urinary system which temporarily stores urine until it is released from body.

Q.35 What is urinary system?

Ans. Excretory system of human is also called the urinary system. It is composed of:

i. Pair of kidneys ii. Pair of ureters iii. Urinary bladder and urethra

Q.36 Why transpiration does not take place at night? (Board 2013)

Ans. At night, transpiration usually does not occur because most plants have their stomata closed.

Q.37 What do you mean by kidney stone? (Board 2014)

Ans. When urine becomes concentrated, crystals of many salts e.g. calcium oxalate, calcium and ammonium phosphate, uric acid etc are formed in it. Such large crystals cannot pass in urine and form hard deposits called kidney stones. Most stones start in kidneys, some may travel to ureter or urinary bladder.

Q.38 What is guttation? How does it differ from dew? (Board 2014)

Ans. Guttation

(a) Definition

The appearance of drops of water on the tips or edges of leaves is called guttation. Guttation is not to be confused with dew, which condenses from the atmosphere on to the plant surface.

(b) Explanation

Some plants such as grasses and strawberry force this water through special pores, present at leaf tips or edges, and form drops.