(0:00) The biological process involved in the removal of harmful metabolic wastes from the body (0:10) is called excretion. (0:13) As in other processes like nutrition, respiration, transportation, different organisms use different (0:24) strategies to do excretion. (0:27) In case of unicellular organisms, wastes are removed from body surface into the surrounding (0:34) water by the process called diffusion.

(0:39) But in case of multicellular organisms, specialized organs are evolved to perform excretion. (0:50) Excretion in human beings. (0:52) The chief organ that is involved in excretion is kidneys.

(0:59) The excretory system of human beings consists of 1. (1:05) A pair of kidneys, right kidney and left kidney. (1:10) 2. (1:11) A pair of ureters, right ureter and left ureter. (1:18) 3. (1:18) A urinary bladder, 4. (1:22) A urethra.

(1:25) Kidneys are located in the abdomen on either side of the backbone. (1:30) Kidney is a basic filtration unit. (1:34) It consists of very thin walled blood capillaries.

(1:39) Each capillary cluster is associated with cup shaped end of a tube that collects filtered (1:47) urine. (1:48) Each kidney has large number of filtration units called nephrons packed close together. (1:57) The waste products are nitrogenous wastes that are collected from the blood in the form (2:03) of urine.

(2:05) The produced urine passes through ureters into urinary bladder. (2:11) The urine is stored in the urinary bladder and the urine is released to outside through (2:18) urethra. (2:21) Now let us learn how urine is produced.

(2:26) The process of urine formation takes place in three steps. (2:32) 1. (2:33) Filtration. (2:34) 2. (2:36) Reabsorption.

(2:38) 3. (2:38) Secretion. (2:40) Filtration. (2:42) The nitrogenous wastes such as urea, uric acid are removed from blood in the kidneys.

(2:51) The process of urine formation takes place in nephron. (2:57) Reabsorption. (2:58) Some substances like glucose, amino acids, salts and major water which are filtered along (3:07) with nitrogenous wastes are reabsorbed.

(3:11) The amount of water reabsorbed depends on excess water and dissolved waste along with wastes. (3:19) Secretion. (3:22) Reabsorbed components of wastes are secreted into the blood when the urine flows through (3:28) the tubular part of nephron in the kidney.

(3:33) Mechanism of urination. (3:37) The urine formed in kidney enters into a lung tube called ureter. (3:44) The one end of the ureter is connected to kidney and the other end is connected to urinary bladder.

(3:51) Urine is stored in the urinary bladder until the pressure of urinary bladder leads to urge (4:00) to pass urine. (4:02) When it reaches the pressure to urge to pass it, urine passes out through urethra. (4:10) How can we hold urine until it reaches to the urge to pass urine? (4:17) As urinary bladder is muscular and it is under the control of nervous system, we can usually (4:24) control to urge to urinate.

(4:28) The process of passing out urine is called as urination. (4:34) Artificial kidney. (4:37) Haemodialysis.

(4:39) Kidneys are one of the vital organs for the survival. (4:43) Filtration of urine artificially other than by kidney is called haemodialysis. (4:50) In abnormal or ill health conditions like infections, injury or restricted blood flow (4:58) to kidneys will reduce the functions of kidney.

(5:03) This leads to accumulation of poisonous or toxic wastes in the body, sometimes which (5:11) can even lead to death. (5:14) In case of kidney failure, an artificial kidney can be used. (5:19) An artificial kidney is a device which is used to remove nitrogenous waste products (5:24) from the blood through the process called dialysis.

(5:29) 1. Artificial kidneys contain a number of tubes with a semipermeable lining suspended (5:37) in a tank filled with dialysing fluid. (5:41) 2. This fluid has the same osmotic pressure as blood except that it is lack of nitrogenous wastes. (5:49) 3. One line connected to the artery is connected to the one end of dialysis device where the (5:59) blood is collected from patient for filtration.

(6:03) 4. During this passage, the waste products from the blood pass into dialysing fluid by diffusion. (6:13) 5. The purified blood is pumped back into the vein of the patient which is connected (6:19) to other end of the dialysis device. (6:23) This is similar to the function of the kidney but it is different since there is no reabsorption involved.

(6:32) Normally, in a healthy adult, the intake filtrate in the kidneys is about 180 litres a daily. (6:41) However, the volume actually excreted is only a litre or two a day because the remaining (6:50) filtrate is reabsorbed in the kidney tubules. (6:55) Excretion in plants (6:57) As in animals, plants also use different strategies for excretion of wastes that are produced.

(7:06) Waste products of plants (7:09) Oxygen that is produced during photosynthesis is released into environment during exchange (7:16) of gases through stomata. (7:18) The excess of water is removed by the process of transpiration. (7:24) Plant tissue consists of dead cells of leaves which are withered and fall off.

(7:31) Some of the plant waste products are stored in cellular vacuoles. (7:36) Some other waste products of xylem are stored in the form of raisins, gums.

Summary:

- **Excretion** is the process of **removing harmful metabolic waste** from the body.
- In **unicellular organisms**, excretion occurs by **diffusion** through the cell membrane.

- In **humans**, the **excretory system** consists of **kidneys, ureters, urinary bladder, and urethra**.
- The kidneys contain **nephrons**, which are responsible for **filtration, reabsorption, and secretion** to produce **urine**.
- **Urination (micturition)** is the process of releasing urine from the **bladder through the urethra**.
- **Artificial kidneys (dialysis)** are used when kidneys fail. Dialysis removes **nitrogenous waste from blood** using **semipermeable membranes**.
- **Plants** excrete waste by:
    - **Releasing oxygen** during photosynthesis.
    - **Transpiration**, which removes **excess water**.
    - **Storing waste in vacuoles, resins, and gums**.

Quiz Questions

Question 1:

What is the **biological process** of removing metabolic waste from the body called?
A) Respiration
B) Digestion
C) Excretion ✅ (Correct)
D) Circulation

Question 2:

Which organ is the **main filtration unit** in the human excretory system?
A) Liver
B) Lungs
C) Kidneys ✅ (Correct)
D) Stomach

Question 3:

What is the **function of an artificial kidney (dialysis)?**
A) It produces urine in the body
B) It removes nitrogenous waste from the blood ✅ (Correct)
C) It increases the filtration rate of the kidneys
D) It helps digest proteins

Question 4:

How do **plants excrete waste products**?
A) Through the lungs
B) By sweating
C) By releasing oxygen and water vapor through stomata ✅ (Correct)
D) By producing urea in roots