



EXCRETION

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Excretion is the process of removal of metabolic waste material and other non-useful substances.

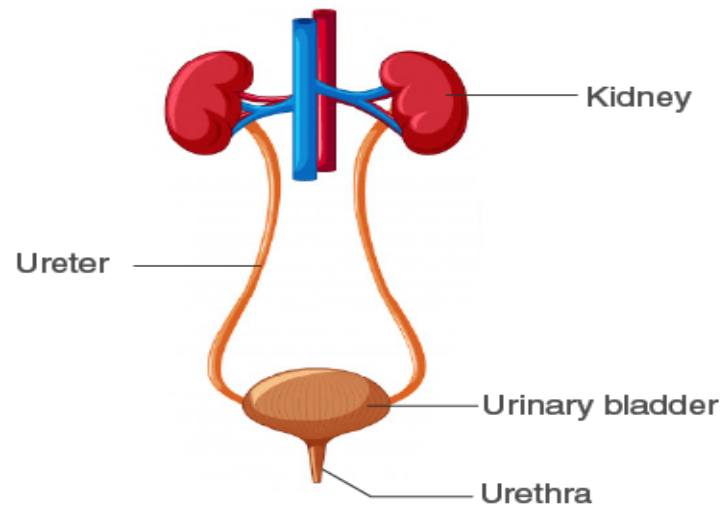
- Organisms like animals have an advanced and specialized system for excretion.
- But plants lack a well-developed excretory system like that in animals.
- They do not have special organs for excretion and thus excretion in plants is not so complex.

EXCRETION IN UNICELLULAR ORGANISM

- In unicellular organisms such as amoeba and bacteria, the waste product is removed by simple diffusion through the general body surface.
- Unicellular organisms like the amoeba, paramecium excrete excess through tiny organelles called contractile vacuoles.

EXCRETORY SYSTEM OF HUMANS

- The excretory system in humans includes
 - a pair of kidneys,
 - a pair of ureters,
 - a urinary bladder and
 - urethra.
- It produces urine as a waste product.



Human Excretory System

KIDNEYS

Paired kidneys are the main excretory organs of the body. They are basically the filtration units of the human body. The chief nitrogenous waste is UREA.

Each kidney is made up many tiny filtration units called nephrons.

Kidneys perform crucial functions like:

Filtering waste materials, medications, and toxic substances from the blood.

Regulation of osmolarity i.e. fluid balance of the body.

Regulation of ion concentration in the body.

Regulation of pH.

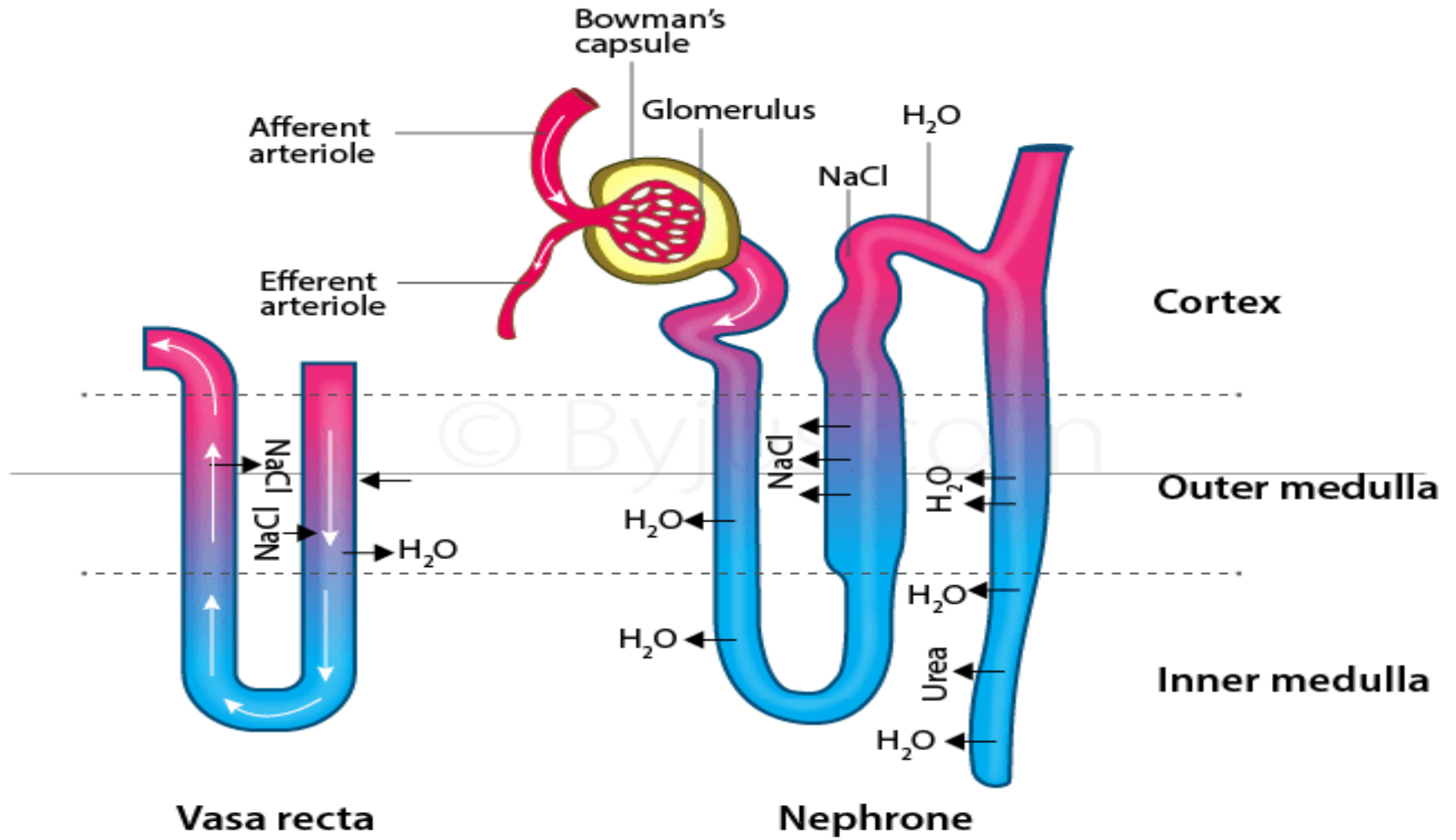
Regulation of extracellular fluid volume.

Secreting hormones that help produce red blood cells, promote bone health, and regulate blood pressure

NEPHRON

Nephrons are the structural and functional unit of kidney.

- Each kidney has millions of nephrons and it forms the basic structural and functional unit of the kidney.
- Each nephron has two parts: Malpighian body and renal tubule.
- Malpighian body is made up of cup-like structure called Bowman's capsule which encloses a bunch of capillaries called glomerulus.
- They together filter waste materials along with many useful substances.
- Renal tubule has regions called proximal convoluted tubule, Loop of Henle and distal convoluted tubule.
- These regions absorb back useful substances into the blood and also filter remaining waste substances.
- The output from nephrons is called urine.



Structure of a Nephron

MECHANISM OF URINE FORMATION

The mechanism of urine formation involves the following steps:

Glomerular Filtration

Glomerular filtration occurs in the glomerulus where blood is filtered. This process occurs across the three layers- epithelium of Bowman's capsule, endothelium of glomerular blood vessels, and a membrane between these two layers.

Blood is filtered in such a way that all the constituents of the plasma reach the Bowman's capsule, except proteins. Therefore, this process is known as ultrafiltration.

Reabsorption

Around 99 percent of the filtrate obtained is reabsorbed by the renal tubules. This is known as reabsorption. This is achieved by active and passive transport.

Secretion

The next step in urine formation is the tubular secretion. Here, tubular cells secrete substances like hydrogen ion, potassium ion, etc into the filtrate. By this process, the ionic, acid-base and the balance of other body fluids are maintained. The secreted ions combine with the filtrate and form urine. The urine passes out of the nephron tubule into a collecting duct.

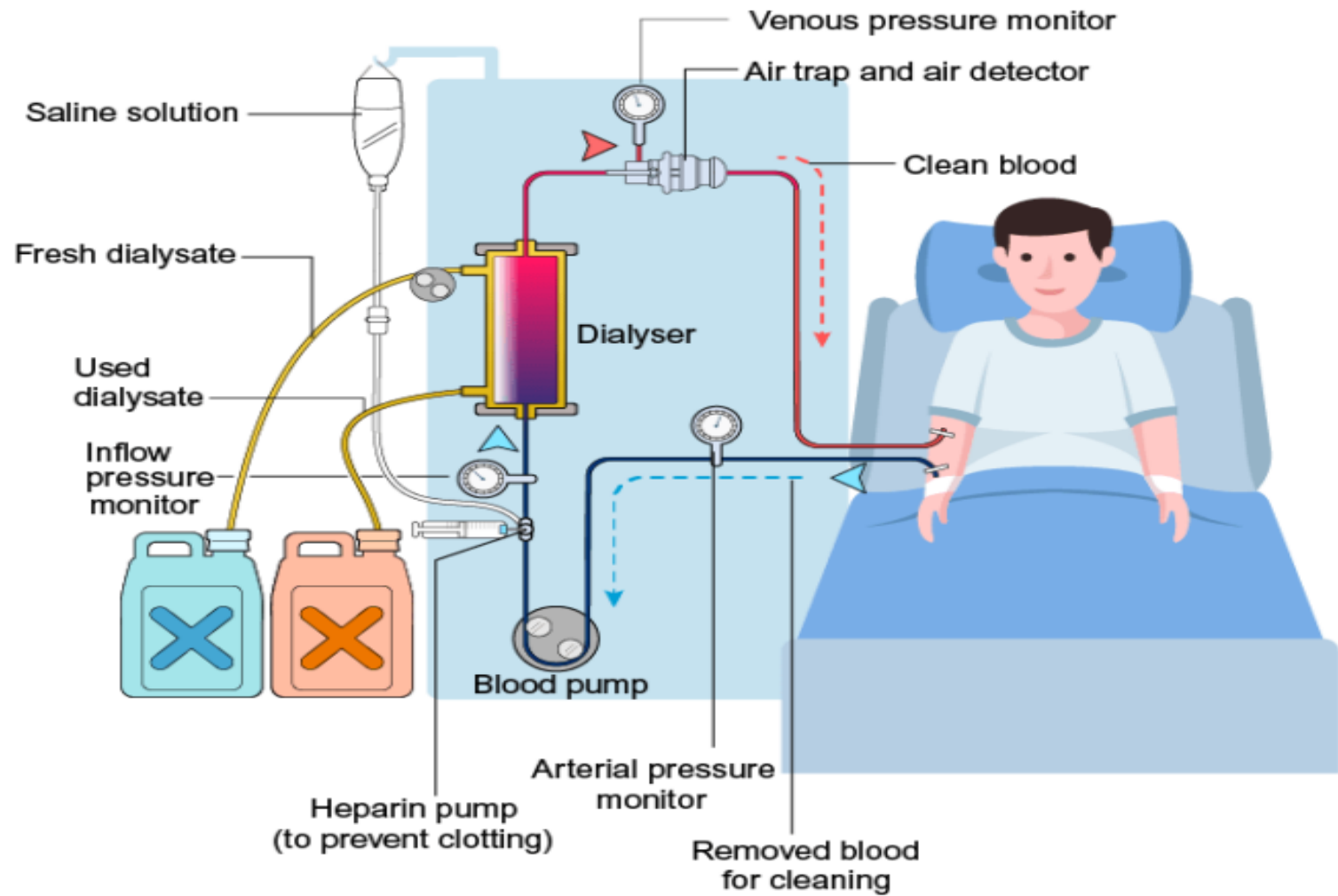
HAEMODIALYSIS

When the kidneys fail, it results in a lot of complications and to compensate this situation a technology called dialysis has been developed.

It uses a machine filter called a dialyzer or artificial kidney.

This is to remove excess water and salt, to balance other electrolytes in the body and remove waste products of metabolism.

Blood from the body is removed and flowed through a series of tubes made up of a semipermeable membrane. A dialysate flows on the other side of the membrane, which draws impurities through the membrane.



EXCRETION IN PLANTS

The cellular respiration, photosynthesis, and other metabolic reactions produce a lot of excretory products in plants.

Carbon dioxide, excess water produced during respiration and nitrogenous compounds produced during protein metabolism are the major excretory products in plants.

Plants produce two gaseous waste products i.e. oxygen during photosynthesis and carbon dioxide during respiration.

Excretion of gaseous waste in plants takes place through stomatal pores on leaves.

Oxygen released during photosynthesis is used for respiration while carbon dioxide released during respiration is used for photosynthesis.

Excess water is excreted by transpiration.

Organic by-products generated by the plant are stored in different forms in different parts.

- The gums, oils, latex, resins, etc. are some waste products stored in plant parts like barks, stems, leaves, etc.
- Eventually, plants shed off these parts.
- Few examples of the excretory products of plants are oil produced from orange, eucalyptus, jasmine, latex from the rubber tree, papaya tree, and gums from acacia.
- Sometimes plants even excrete into the soil.



Different forms of excretory products in plants

