Ch-11-Transportation in Animals and Plants

Circulatory System

Excretion System in Human

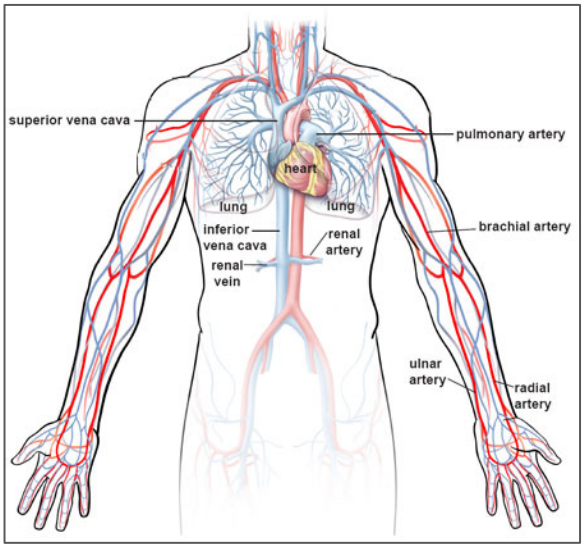
Transport of Substances in Plants

Circulatory System

All organisms need food, water and oxygen for survival. This needs to be transported to all the cells of the body. Multicellular organisms have several organ systems to carry out the vital functions. Transportation in our body occurs with the help of the circulatory system. This system comprises of the blood with blood cells, blood vessels and one of the most important organ of the human body, the heart.

Circulatory System

The circulatory system as the name indicates circulates various substances throughout the body. These include oxygen and carbon dioxide for respiration, absorption and assimilation of the digested food. Humans have a closed system in which the blood stays in the circulatory system as it circulates, and the chemicals are exchanged by diffusion.



Human circulatory system

Blood

The blood is a liquid that flows through the body. The blood has numerous functions

- All the nutrients that we obtain from the digested food are transported by the blood to the tissues.
- Even the oxygen is transported through the blood to the heart which then further transfers it to rest of the body.
- The waste material that needs to be removed out of the body is also transported through the blood.
- The hormones are also secreted through the blood to their target site.

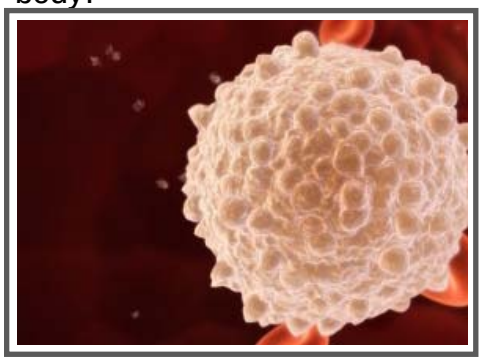
The blood is a fluid that contains blood cells and plasma. The plasma is the fluid part and the blood cells are embedded in it. There are three types of blood cells, the red blood cells, white blood cells and the platelets.

Red blood cells

The red blood cells appear red due to the presence of a red colour pigment called haemoglobin which is the oxygen carrier. The oxygen enters the body and as gas reaches the lungs, gets dissolved into plasma which is then is taken up by red blood cells. It then binds to

Red blood cell

the hemoglobin in the red blood cells which is then transported to all parts of the body.



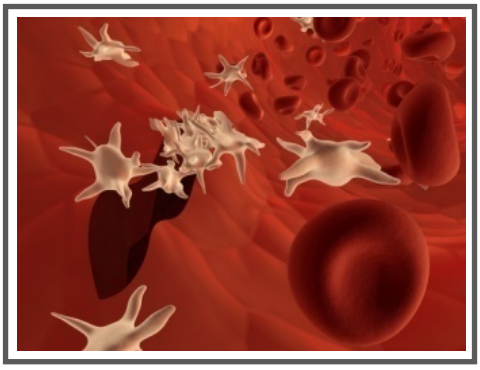
White blood cell

White blood cells

Their function is to protect the body against the germs. When we get injured or get cuts in our body, germs enter our body. The white blood cells are the soldiers of the body which fight against any invading microorganisms like bacteria and protozoa.

Platelets

The platelets help in the blood clot formation. The platelets adhere to damaged blood vessel walls and a series of reaction occurs inside the body which leads to a blood clot.



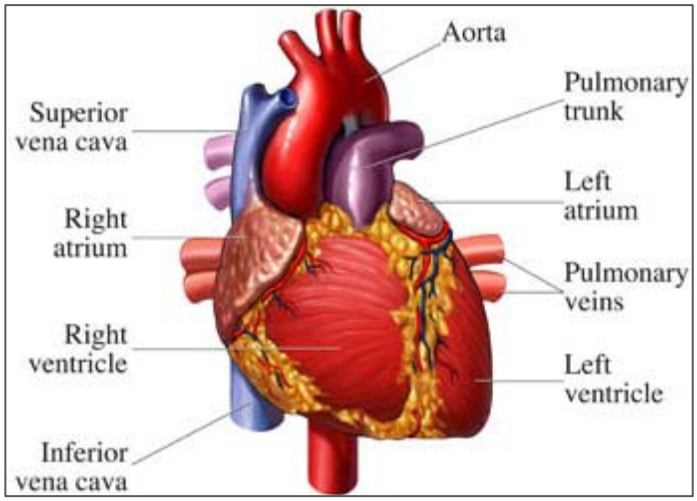
White blood cell

Blood vessels

The body has a network of blood vessels through which the blood is transported. The red coloured vessels contain blood rich in oxygen and are called the arteries. The artery walls are thick and elastic to allow rapid flow of blood at high pressure. The blue coloured vessels are the veins carrying the blood rich in carbon dioxide with other waste to the heart. These have thin walls and posses valves to prevent back flow of blood.

Heart

The human heart is a fist sized, muscular organ possessing four chambers. Every minute, the heart re-circulates the body's entire blood volume (about 5 liters). The two thin-walled artia act as receiving chambers and fill with blood as the heart relaxes to avoid mixing of blood. Contraction of the thicker-walled ventricles pushes blood out of the heart.



Human Heart

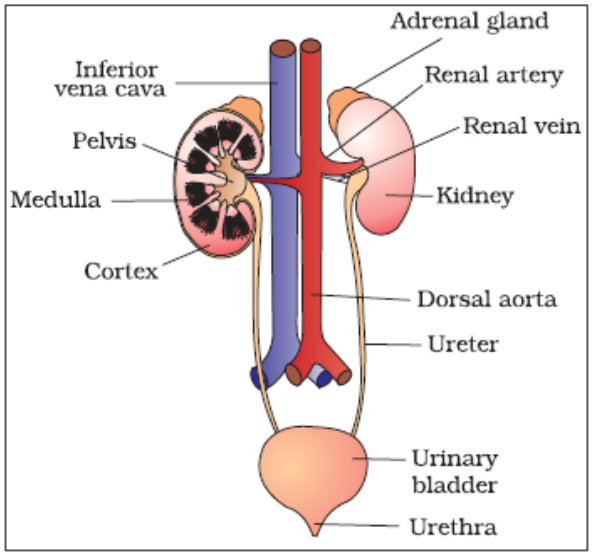
It acts as a pump which transfers blood to all parts of the body. The deoxygenated blood enters the right atrium from the pulmonary artery and then goes into the right ventricle from where it goes back to the lungs. The oxygenated blood enters from the lungs through the pulmonary vein to the left atrium and then to the left ventricle. This blood is then transported to all the cells of the body. There are valves present in heart to avoid back flow of blood from the ventricle to the atrium.

Heartbeat

The walls of the chambers of the heart are made up of muscles. These muscles contract and relax rhythmically. This rhythmic contraction followed by its relaxation constitutes a heartbeat. A **stethoscope** is an instrument used to amplify the sound of the heart. It consists of a chest piece that carries a sensitive diaphragm, two ear pieces and a tube joining the parts.
Pulse is "Rhythmic dilation of an artery, produced by the increased volume of blood thrown into the vessel by the contraction of the heart.

Excretion System in Human

All the food we eat is not used by the body, some of it after digestion is not required and thus needs to be removed out of the body as these may be toxic to the body. Like the impure blood or the carbon dioxide rich blood is exhaled out of the body. The waste materials are also removed. This process of getting rid of wastes produced in the cells of the living organisms is called excretion. The parts involved in excretion forms the excretory system.

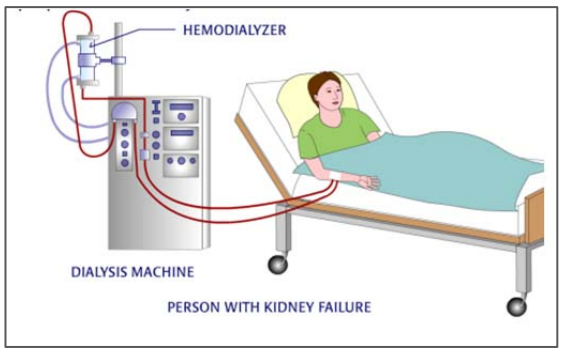


Human excretory system

Human excretory system

The **kidneys** are the filters that filter the blood to remove the harmful substances in it. The useful components are then reabsorbed. The wastes dissolved in water are removed as **urine**. From the kidneys, the urine goes into the **urinary bladder** through tube-like **ureters**. It is stored in the bladder and is passed out through the urinary opening at the end of a muscular tube called **urethra**.

Dialysis is an artificial method to purify the blood. When a person's kidneys stop functioning his or her blood is purified with the help of dialysis machine. It takes out blood from the body filters it externally and then pumps inside the body.



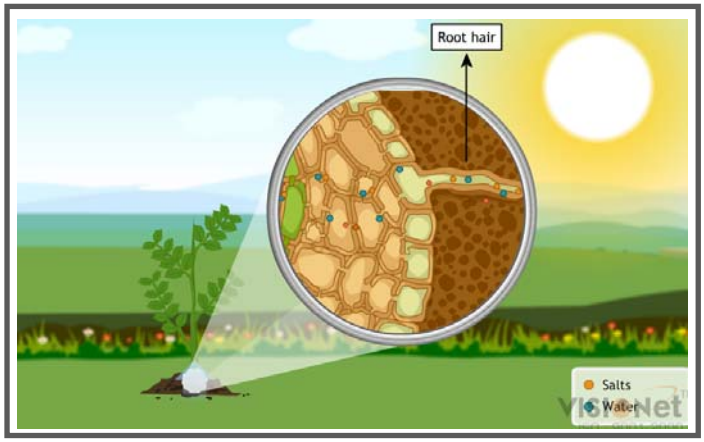
Dialysis

Waste products in animals

The urine comprises of 95% water, 2.5 % urea and 2.5% other waste products. Sweat is also a waste product that contains salts and water.
The excretory product is not similar in all animals. We excrete waste product in the form of urea and the birds in the form of uric acid while the fishes excrete ammonia gas that dissolves in water.

Transport of Substances in Plants

We know that water is required by the plants to synthesize their food but how do they get water and nutrients. The plants obtain water and nutrients from the soil through the roots. There are root hairs present which increase the surface area for the absorption of water and nutrients.



In plants the transport takes place through special tissues called the vascular tissue. Xylem and phloem are the vascular tissues of plants.

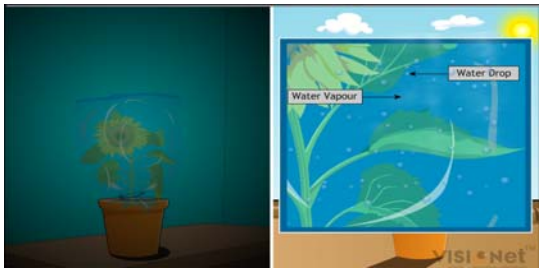
Transport of water and minerals

Xylem has pipe-like vessels that transport water and nutrients from the soil.
The xylem forms a continuous network of channels that connects roots to the leaves through the stem and branches and thus transports water to the entire plant. The glucose prepared by the leaves need to transported to all the parts of the plant. This is done by another kind of vascular tissue called the phloem.

Transpiration

The loss of water from the leaves to the atmosphere in the form of water vapour is called as transpiration.

Activity



Take two branches, or pieces of a branch with large leaves on them. The two branches need to be approximately the same size and preferably from the same plant. Immediately put one branch into one of the plastic bags and the other into the second bag. Seal the bags tightly using the elastic bands. Place the one branch in a bag in a cool and dark place. Place the other in sunlight. Leave for one hour. Can you guess what will happen to leaves? The branch in a bag that was left in the sun will have a fair amount of moisture inside the bag and the leaves are wilted and dry, whereas the branch in a bag that was left in the dark will have hardly any or possibly no moisture in the bag and the leaves are still fresh.Why this happen? Water was evaporated out of the plant via the leaves through transpiration. Plants release a lot of water into the air through this process.