

SARVODAYA
CLASS X

Heart is right in the centre between the two lungs and above the diaphragm in the ribcage.

The narrow end of the roughly triangular heart is pointed to the left side and during working the contraction of the heart is most powerful at this end giving a feeling of the heart being on the left side.

External Structure:

The heart is surrounded by two layered tissue membrane called pericardium.

The space between the two layers is filled with fluid called pericardial fluid.

This fluid protects the heart from external pressure, push, shock and reduces friction during the heart beat and facilitates free heart contraction.

Internal Structure:

The heart is composed of outer pericardial, middle myocardial and inner endocardial layers.

The heart consists of four chambers.

The two thin walled auricles which are upper chambers (right and left). Right and left auricles are separated from each other by an inter-auricular septum.

Right auricle receives deoxygenated blood from the body parts by anterior and posterior vena cava.

The two thick walled lower chamber (right and left) are called ventricles.

Right and left ventricles are separated by an inter-ventricular septum.

The walls of left ventricle are much thicker as it supplies blood to large distance and up to the brain against gravity.

The left ventricle has chordae tendinae and papillary muscles which prevent tricuspid and bicuspid valves from being pushed into auricles at the time of ventricular contraction.

Blood Vessels Entering and Leaving the Heart:

1. (a) Superior vena cava:

It brings deoxygenated blood from anterior body parts (head, neck, chest and arms) to the right auricle.

(b) Posterior vena cava:

It brings deoxygenated blood from posterior or lower body parts i.e. abdomen and legs to the right auricle. It is the largest vein.

2. Pulmonary artery:

It arises from right ventricles and carries deoxygenated blood to the lungs for oxygenation.

3. Pulmonary vein:

It arises from each lung and brings oxygenated blood from lungs to left auricle.

4. Aorta:

It arises from left ventricles and carries oxygenated blood to supply it to all body parts. Abdominal aorta is the largest artery.

5. Coronary arteries:

There are two coronary arteries right and left, arising from the base of aorta and supply blood to heart muscles, (blockage at these arteries result a myocardial infraction or heart attack).

A full heart beat in human beings lasts for about 0.85 seconds and this period splits as follows:

Systole of auricle – 0.15 seconds

Systole of ventricle – 0.30 seconds

Auricles and ventricles in diastole-0.40 seconds

a) Arteries:

An artery is a vessel which carries oxygenated blood to various body tissues (except pulmonary artery which carries deoxygenated blood).

Artery has thick, muscular and elastic walls.

The outer layer of walls is called tunica externa middle one is called tunica media and inner is called tunica interna.

Tunica externa is made up of connective tissue, tunica media is made up of collagen fibers and un-stripped muscles. Tunica interna is made up of endothelium and connective tissue.

Lumen of arteries is small and valves are absent in arteries. Arteries do not collapse when empty. Blood flows with jerks and under great pressure in arteries. Smallest artery breaks into arterioles.

(b) Veins:

Veins carry deoxygenated blood to heart (except pulmonary vein which carry oxygenated blood).

Veins are also composed of outer tunica externa, middle tunica media and inner tunica interna.

The walls of veins are thin, less muscular and non- elastic. Veins have valves in their inner lining.

Blood flows under little pressure in veins. Small veins are called venules. Veins collapse when empty.

(c) Capillary:

Capillaries are microscopic vessels, their walls are made up of squamous epithelial cells.

Capillaries have power of vasodilation (dilating) and vasoconstriction (decrease blood supply).

TYPES OF DIGESTIVE ENZYMES:

Salivary –ptyalin

Gastric-gastric juice

Liver-bile

Intestinal gland- intestinal juice

Pancreas –typsin,amylase,lipase

TYPES OF VITAMINS

- There are 13 known vitamins.
- Vitamins are either water-soluble or fat-soluble.
- Fat-soluble vitamins are easier for the body to store than water-soluble.
- Vitamins always contain carbon, so they are described as "organic."
- Food is the best source of vitamins, but some people may be advised by a physician to use supplements

Fat-soluble vitamins

Fat-soluble vitamins are stored in the fatty tissues of the body and the liver.
Vitamins A, D, E, and K are fat-soluble.

These are easier to store than water-soluble vitamins, and they can stay in the body as reserves for days, and sometimes months.

Fat-soluble vitamins are absorbed through the intestinal tract with the help of fats, or lipids.

Water-soluble vitamins

Water-soluble vitamins do not stay in the body for long.

The body cannot store them, and they are soon excreted in urine.

Because of this, water-soluble vitamins need to be replaced more often than fat-soluble ones.

Vitamin C and all the B vitamins are water soluble.

Photosynthesis

Photosynthesis is the process by which autotrophic plants make their own food.

CO₂, water, chlorophyll, and sunlight are four important requirements for this process. Photosynthesis occurs in two steps: Light reaction and Dark Reaction.

- Light Reaction – It is a light dependent reaction
 - Dark Reaction– It is a light-independent reaction.
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- **chloroplast:** plastid containing chlorophyll
 - **plastid:** organelle in the cell
 - **rubisco:** important enzyme for attaching CO₂ to 5-carbon sugar
 - **stomata:** small pores in the plant leaf
 - **stroma:** fluid filled interior of the chloroplast
 - **thylakoid:** small sac in the chloroplast that stack up like coins
 - **chlorophyll:** green pigment in plant that can trap photons

Red light is more effective in photosynthesis because both the photosystems (PS I and PS II) absorb light of wavelengths in the red region (680 and 700 nm, respectively).

Furthermore, blue light is absorbed by carotenoids, which pass the energy to the chlorophyll, whereas the light in the red region is absorbed by chlorophyll.

The primary functions of the liver are:

- Bile production and excretion.
- Excretion of bilirubin, cholesterol, hormones, and drugs.
- Metabolism of fats, proteins, and carbohydrates.
- Enzyme activation.
- Storage of glycogen, vitamins, and minerals.

ROLE OF BILE

- Digestion: Bile is essential for the complete digestion of fats and to some extent...
- Absorption: Bile helps in the absorption of various substances.
- Excretion: Some metals like copper, zinc, mercury, etc. Toxins, bacteria, etc.