

circulatory system

this system ensures the exchange of substances between the cells of the body and external environment and transports them throughout our body.

the three main parts are -

- 1.circulatory medium-blood , lymph , tissue fluid
- 2.blood vessels- vein, arteries, capillaries
- 3.pumping organ- heart

White blood cells

they are rounded to irregular shaped , colorless as they lack haemoglobin and are produced in bone marrow they are of 2 types

Granulocytes-spherical in shape have lobes nucleus and contain granules in their cytoplasm

there are 3 types of granulocytes (neutrophils , basophils, eosinophils)

Agranulocytes - nucleus is spherical or kidney shaped and they don't have granules in their cytoplasm .

there are 2 types(lymphocytes and monocytes)

Diapedesis it is the process of wbc's squeezing out of capillaries.

blood group

blood group	antigens	antibodies	can donate to	can receive from
A	A	b	A , AB	A, O
B	B	a	B , AB	B , O
AB	A, B	none	AB	A,AB,B,O
O	none	a ,b	A,B,AB,O	O

valves

tricuspid valve	guards the opening between the right atrium and the right ventricle
bicuspid valves	guard the opening between between the left atrium and the left ventricle
semilunar valve	present at the opening of the right and left ventricles and allow the entry of blood into pulmonary artery and the aorta respectively. they prevent the backflow of blood

heart sounds

lubb	closure of the tricuspid and bicuspid valve at the beginning of a systole
dubb	closure of the semilunar valves at the beginning of a diastole
cardiac cycle	it is the sequence of the events that takes place in the heart during one heartbeat (0.8s)

blood

blood moves from the heart through arteries and back to the heart by veins.

it is a red coloured viscous fluid which contains

- 1.plasma
- 2.blood corpuscles(RBC'S, WBC's and platelets)

Red blood corpuscles

are biconcave and enucleated and due to lack of organelles it can carry more oxygen as it increases surface area.

they contain a pigment composed of iron and a protein called **Haemoglobin**

they have a life span of 120 days and are produced in the bone marrow

blood vessels (blood flows through them)

arteries	veins	capillaries
carry blood from the heart to the body	carry blood from body parts to the heart	are microscopic vessels that carry blood from arterioles to small veins or venules
arteries carry oxygenated blood they have thick walls because blood with high speed and pressure	veins carry deoxygenated blood they have thin walls as the blood flows with low speed and low pressure valves are present	wall is very thin they have a wide lumen with valves
valves are absent		
lumen is very narrow and walls are elastic		



blood vessels leaving the heart

- 1.pulmonary artery arise from the right ventricle and carry deoxygenated blood back to the lungs for purification
- 2.systemic aorta arises from the left ventricles and supplies oxygenated to the body parts except the lungs

heart beat

heart beat originates at the sino atrial node (pacemaker)

- it occurs in 3 main phases
- 1.auricular systole (auricles contract)
 - 2.ventricular systole (ventricles contract)
 - 3.joint diastole(all chambers relax)

heart is myogenic (normal activities of the heart are auto-regulated by the nodal tissues)

- nodal tissues are-
- 1.sino-atrial node (in the wall of right upper corner of the right atrium)
 - 2.atrioventricular node (in the lower corner of the right atrium close to the atrioventricular septum)

thrombocytes/platelets

they are colorless ,oval, formed by the bone marrow. these cells help in blood clotting.

clotting of blood

blood does not clot inside our blood vessels because of the presence an anticoagulant called **heparin**

step 1-when the blood comes out of an injury blood platelets release thromboplastin which inactivates heparin and converts **prothrombin** into **thrombin**

step 2- thrombin acts as an enzyme and converts **soluble fibrinogen** into **insoluble fibrin monomers**

step 3- **the fibrin monomers** polymerize and form long threads with form a **network** over the wound and prevents the blood corpuscles from coming out.

heart

the heart has 4 chambers(right auricle, left auricle, right ventricle and left ventricle) , great blood vessels, apertures and valves)

great blood vessels entering the heart

1. superior vena cava it brings the deoxygenated blood from the head and upper region of the body into the right auricle
- 2.inferior vena cava brings deoxygenated blood from the lower region of the body in the r.a
- 3.coronary sinus brings deoxygenated blood from the hearts wall itself . these supply the heart muscles with blood

double circulation

it is the process by which the blood passes through twice through the heart during one cardiac cycle

systemic circulation circulation of oxygenated blood between the heart and the various body parts through the aorta that carries deoxygenated blood into the heart through the vena cava

pulmonary circulation it involves the circulation of the blood between the heart and the lungs . deoxygenated blood is collected from the pulmonary artery and returns oxygenated blood to the heart by the pulmonary vein.

hepatic portal vein

the veins collecting blood from the stomach and intestine join to form a single large vein called the hepatic portal vein which enters the liver.