HSSLIVE.IN

CHAPTER 18

BODY FLUIDS AND CIRCULATION

Need of a circulatory system in the body?

All living cells have to be provided with nutrients, O_2 and other essential substances. Also, the waste or harmful substances produced, have to be removed continuously for healthy functioning of tissues. It is therefore, essential to have efficient mechanisms for the movement of these substances to the cells and from the cells.

- Simple organisms like **sponges and coelenterates** circulate water from their surroundings through their body cavities to facilitate the cells to exchange these substances
- Blood is the most commonly used body fluid by most of the higher organisms including humans for this purpose

BLOOD

Blood is a special fluid connective tissue consisting of a fluid matrix, plasma, and formed elements.

a.Plasma

- Plasma is the fluid part of the blood
- Plasma is a straw coloured, viscous fluid constituting nearly 55 per cent of the blood.
- 90-92 per cent of plasma is water and proteins contribute **6-8** per cent of it.
- Fibrinogen, globulins and albumins are the major proteins
- **Fibrinogens** are needed for clotting or coagulation of blood.
- **Globulins** primarily are involved in defense mechanisms of the body
- The **albumins** help in osmotic balance.
- Plasma also contains small amounts of minerals like Na+, Ca^{++}, Mg^{++}, HCO_3^-, Cl^-, etc. Glucose, amino acids, lipids, etc., are also present in the plasma.
- Factors for coagulation or clotting of blood are also present in the plasma in an inactive form.
- Plasma without the clotting factors is called **serum**.

b.Formed element

Erythrocytes, leucocytes and platelets are collectively called formed elements and they constitute nearly **45 per cent** of the blood

i)RBC (Red Blood cells/Erythrocytes)

- They are the most abundant of all the cells in blood.
- A healthy adult man has, on an average, 5 millions to 5.5 millions of RBCs mm^{-3} of blood.
- RBCs are formed in the **red bone marrow** in the adults. Formation of RBC is called Erythropoiesis.
- RBCs are **devoid of nucleus** in most of the mammals and are biconcave in shape.
- They have a **red coloured, iron** containing complex protein called **haemoglobin**, hence the colour and name of these cells.
- A healthy individual has **12-16 gms** of haemoglobin in every 100 ml of blood. These molecules play a significant role in **transport of respiratory gases (oxygen and carbon dioxide)**.
- RBCs have an average life span of **120 days** after which they are destroyed in the **spleen** (**graveyard of RBCs**)

ii)WBC (White Blood Cells/Leucocytes)

- Leucocytes are also known as white blood cells (WBC) as they are colourless due to the lack of haemoglobin.
- They are nucleated and are relatively lesser in number which averages 6000-8000 mm^{-3} of blood.
- Leucocytes are generally short lived.
- There are two main categories of WBCs – **granulocytes and agranulocytes**

Granulocytes

- Neutrophils, eosinophils and basophils are different types of granulocytes.
- **Neutrophils** are the most abundant cells (**60-65%**) of the total WBCs and are involved in **phagocytic reactions**
- **basophils** are the least (**0.5-1%**) among the WBC. Basophils secrete histamine, serotonin, heparin, etc., and are involved in **inflammatory reactions**.
- **Eosinophils (2-3%)** resist infections and are also associated with **allergic reactions.**

Agranulocytes

- Lymphocytes and monocytes are the agranulocytes
- **monocytes** (**6-8%**) are **phagocytic** cells which destroy foreign organisms entering the body
- **Lymphocytes** (**20-25%**) are of two major types – '**B' and 'T' forms**.
- Both B and T lymphocytes are responsible for immune responses of the body

iii) Platelets (Thrombocytes)

- Platelets also called t**hrombocytes**, are cell fragments produced from **megakaryocytes** (special cells in the bone marrow).
- Blood normally contains 1,500,00-3,500,00 platelets mm^{-3}.
- Platelets can release a variety of substances most of which are involved in the coagulation or clotting of blood.
- A reduction in their number can lead to clotting disorders which will lead to excessive loss of blood from the body

BLOOD GROUPS

Various types of grouping of blood has been done. Two such groupings – the **ABO and Rh** – are widely used all over the world.

a) ABO Blood grouping

- ABO grouping is based on the presence or absence of two surface antigens (chemicals that can induce immune response) on the RBCs namely A and B.
- the plasma of different individuals contain two natural antibodies (proteins produced in response to antigens). during blood transfusion, any blood cannot be used; the blood of a donor has to be carefully matched
- with the blood of a recipient before any blood transfusion to avoid severe problems of **clumping (destruction of RBC**)

Blood group	Antigen on RBC	Antibody in plasma	Donor's group
A	A	Anti-B	O,A
B	B	Anti-A	O, B
AB	A, B	Nil	A,B,AB,O
O	nil	Anti-A, B	O

- **'O' blood** can be donated to persons with any other blood group (Because 'O' blood groud contains no antigen, so the recipient ody willnot make any antibody against it) and hence 'O' group individuals are called '**universal donors'.**
- Persons with **'AB' group** can accept blood from persons with AB as well as the other groups of blood (AB blood group can receive any blood group because it contains no antibodies). Therefore, such persons are called '**universal recipients'.**

Donor	Reciepient
A blood group	A,AB
B blood group	B,AB
AB blood group	AB
O blood group	A,B,AB,O

b) Rh grouping

- Another antigen, the Rh antigen similar to one present in **Rhesus monkeys** (hence Rh), is also observed on the surface of RBCs of majority (**nearly 80%**) of humans. Such individuals are called **Rh positive (Rh+ve)** and those in whom this antigen is absent are called **Rh negative (Rh-ve).**
- An Rh-ve person, if exposed to Rh+ve blood, will form specific antibodies against the Rh antigens. Therefore, Rh group should also be matched before transfusions.

Rh incompatibility- Erythroblastosis foetalis

- A special case of Rh incompatibility (mismatching) has been observed between the **Rh-ve blood of a pregnant mother with Rh+ve blood of the foetus**.
- Rh antigens of the foetus do not get exposed to the Rh-ve blood of the mother in the first pregnancy as the two bloods are well separated by the placenta. However, during the delivery of the first child, there is a possibility of exposure of the maternal blood to small amounts of the Rh+ve blood from the foetus. In such cases, the mother starts preparing antibodies (Rh antibodies) against Rh antigen in her blood. In case of her subsequent pregnancies, the Rh antibodies from the mother (Rh-ve) can leak into the blood of the foetus (Rh+ve) and destroy the foetal RBCs. This could be fatal to the foetus or could cause **severe anaemia** and **jaundice to the baby**. This condition is called **erythroblastosis foetalis**.
- This can be avoided by administering **anti-Rh antibodies** to the mother immediately after the delivery of the first child.

Coagulation of Blood

- We can see a **dark reddish brown scum** formed at the site of a cut or an injury over a period of time. It is **a clot or coagulam** formed mainly of a network of threads called **fibrins** in which dead and damaged formed elements of blood are trapped.
- Fibrins are formed by the conversion of **inactive fibrinogens** in the plasma by the enzyme **thrombin**.
- Thrombins, in turn are formed from another inactive substance present in the plasma called **prothrombin**. An enzyme complex, **thrombokinase**, is required for the above reaction.
- This complex is formed by a series of linked enzymic reactions (cascade process) involving a number of factors present in the plasma in an inactive state.
- An injury or a trauma stimulates the platelets in the blood to release certain factors which activate the mechanism of coagulation.
- Certain factors released by the tissues at the site of injury also can initiate coagulation. **Calcium ions** play a very important role in clotting.

Flow chart of blood coagulation

Lymph

- As the blood passes through the capillaries in tissues, some water along with many small water soluble substances move out into the spaces between the cells of tissues leaving the larger proteins and most of the formed elements in the blood vessels. This fluid released out is called the **interstitial fluid or tissue fluid**. It has the same mineral distribution as that in **plasma.**
- **Exchange of nutrients, gases, etc., between the blood and the cells always occur through this fluid Hence called middle man between blood and tissue/ connecting link between blood and tissue**
- An elaborate network of vessels called the lymphatic system collects this fluid and drains it back to the major veins. **The fluid present in the lymphatic system is called the lymph.**
- Lymph is **a colourless fluid** containing **specialised lymphocytes** which are responsible for the immune responses of the body. Lymph is also an important carrier for nutrients, hormones, etc. Fats are absorbed through lymph in the lacteals present in the intestinal villi

Blood	Lymph
Blood is a red colored fluid that contain RBC	Lymph is a colorless fluid that lacks RBC
It contain RBC,WBC, and platelets. It also contains Proteins	It contains Plasma and lesser number of WBC. It lacks proteins
Blood transport nutrients and oxygen from one organ to another	Lymph plays a role in the defensive system of the body . it also transport fat.

CIRCULATORY PATHWAYS

The circulatory patterns are of two types – **open or closed**.

a)Open circulatory system

- It is present in **arthropods, hemichordates and molluscs**
- in which blood pumped by the heart passes through large vessels into open spaces or body cavities called **sinuses.**

b)Closed circulatory system

Annelids and chordates have a closed circulatory system in which the blood pumped by the heart is always circulated through a closed network of blood vessels. This pattern is considered to be more advantageous as the flow of fluid can be more precisely regulated

Circulatory system in different organism

a)FISHES

- Fishes have a **2-chambered** heart with **an atrium and a ventricle**.
- In fishes the heart pumps out deoxygenated blood which is oxygenated by the gills and supplied to the body parts from where deoxygenated blood is returned to the heart **(single circulation).**

- **Heart-impure blood-gills-pure blood-various body parts-Heart**

b)Amphibians and reptiles

- Amphibians and the reptiles (**except crocodiles)** have a 3-chambered heart with **two atria and a single ventricle**
- In amphibians and reptiles, the left atrium receives oxygenated blood from the gills/lungs/skin and the right atrium gets the deoxygenated blood from other body parts.
- However, they get mixed up in the single ventricle which pumps out mixed blood (**incomplete double circulation**).

c) Birds, mammals

- **crocodiles, birds and mammals** possess a 4-chambered heart with two atria and two ventricles.
- In birds and mammals, oxygenated and deoxygenated blood received by the left and right atria respectively passes on to the ventricles of the same sides.
- The ventricles pump it out without any mixing up, i.e., two separate circulatory pathways are present in these organisms, hence, these animals have **double circulation.**

HUMAN CIRCULATORY SYSTEM

Human circulatory system, also called the **blood vascular system consists** of

- a muscular chambered heart,
- a network of closed branching blood vessels and
- blood, the fluid which is circulated

♥HEART♥

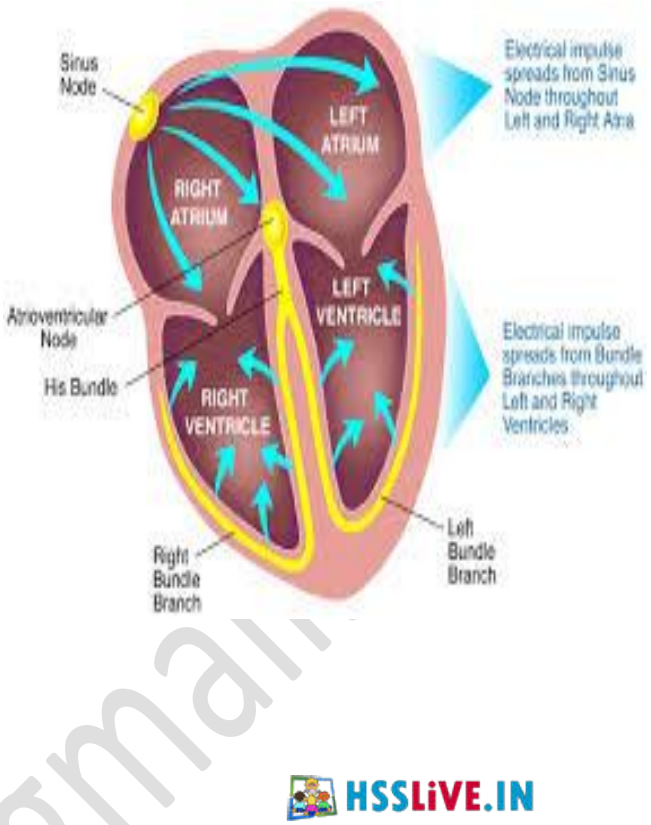
- Heart, the **mesodermally** derived organ, is situated in the **thoracic cavity**, in **between the two lungs**, slightly tilted to the left.
- It has the size of a clenched fist.
- It is protected by a double walled membranous bag, pericardium, enclosing the pericardial fluid.
- Our heart has four chambers, two relatively small upper chambers called atria and two larger lower chambers called ventricles.
- A **thin**, muscular wall called the **interatrial septum** separates the right and the left atria, whereas **a thick**-walled, the **inter-ventricular septum**, separates the left and the right ventricles.
- The atrium and the ventricle of the same side are also separated by a thick fibrous tissue called the **atrio-ventricular septum**. However, each of these septa are provided with an opening through which the two chambers of the same side are connected.
- The opening between the right atrium and the right ventricle is guarded by a valve formed of three muscular flaps or cusps, **the tricuspid valve.**
- a **bicuspid or mitral valve** guards the opening between the left atrium and the left ventricle. The openings of the right and the left ventricles into the pulmonary

artery and the aorta respectively are provided with the **semilunar valves**.

The main functions of the valve in the heart allows the flow of blood only in one direction, i.e., from the atria to the ventricles and from the ventricles to the pulmonary artery or aorta. These valves prevent any backward flow.

Conducting system of human heart

- The entire heart is made of cardiac muscles.
- The walls of ventricles are much thicker than that of the atria.
- A **specialised cardiac musculature** called the **nodal tissue** is also distributed in the heart .A patch of this tissue is present in the right upper corner of the right atrium called the **sino-atrial node (SAN).** Another mass of this tissue is seen in the lower left corner of the right atrium close to the atrio-ventricular septum called the **atrio-ventricular node (AVN).**
- A bundle of nodal fibres, **atrioventricular bundle (AV bundle)** continues from the AVN which passes through the atrio-ventricular septa to emerge on the top of the interventricular septum and immediately divides into a right and left bundle. These branches give rise to minute fibres throughout the ventricular musculature of the respective sides and are called **purkinje fibres**. These fibres alongwith right and left bundles are known as **bundle of His**.
- The nodal musculature has the ability to generate action potentials without any external stimuli, i.e., it is autoexcitable. Hence human heart is called **Myogenic**. However, the number of action potentials that could be generated in a minute vary at different parts of the nodal system.
- The SAN can generate the maximum number of action potentials, i.e.,**70-75 min^{-1},** and is responsible for initiating and maintaining the rhythmic contractile activity of the heart. Therefore, it is called the **pacemaker**.
- Our heart normally beats **70-75 times in a minute** (average 72 beats min^{-1}).



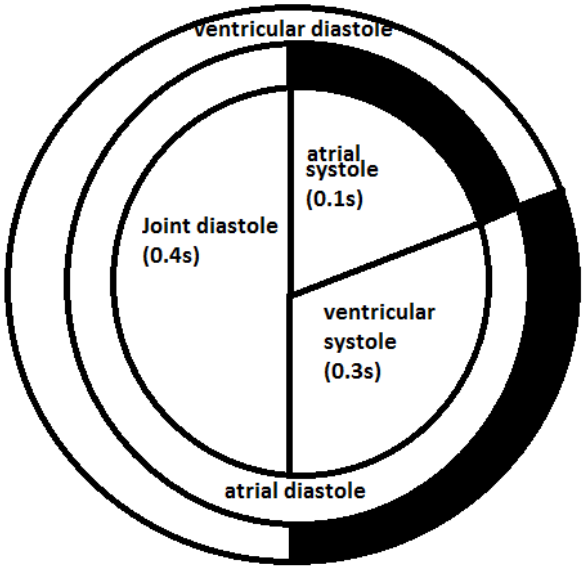
Cardiac cycle

How does the heart function? Let us take a look.

- To begin with, all the four chambers of heart are in a **relaxed state**, i.e., they are in **joint diastole**. As the tricuspid and bicuspid valves are open, blood from the pulmonary veins and vena cava flows into the left and the right ventricle respectively through the left and right atria. The semilunar valves are closed at this stage.
- The SAN now generates an action potential which stimulates both the atria to undergo a simultaneous contraction – the atrial systole. This increases the flow of blood into the ventricles by about **30 per cent.**
- The action potential is conducted to the ventricular side by the AVN and AV bundle from where the bundle of His transmits it through the entire ventricular musculature. This causes the ventricular muscles to contract, (ventricular systole), the atria undergoes relaxation (diastole), coinciding with the ventricular systole.
- Ventricular systole increases the ventricular pressure causing the closure of tricuspid and bicuspid valves due to

attempted backflow of blood into the atria. As the ventricular pressure increases further, the semilunar valves guarding the pulmonary artery (right side) and the aorta (left side) are forced open, allowing the blood in the ventricles to flow through these vessels into the circulatory pathways.

- The ventricles now relax (ventricular diastole) and the ventricular pressure falls causing the closure of semilunar valves which prevents the backflow of blood into the ventricles.
- As the ventricular pressure declines further, the tricuspid and bicuspid valves are pushed open by the pressure in the atria exerted by the blood which was being emptied into them by the veins. The blood now once again moves freely to the ventricles.
- The ventricles and atria are now again in a relaxed (joint diastole) state, as earlier. Soon the SAN generates a new action potential and the events described above are repeated in that sequence and the process continues. This sequential event in the heart which is cyclically repeated is called the cardiac cycle and it consists of systole and diastole of both the atria and ventricles.



- The heart beats **72 times per minute**, i.e., that many cardiac cycles are performed per minute. From this it could be deduced that the duration of a cardiac cycle is **0.8 seconds**. During a cardiac cycle, each ventricle pumps out approximately 70 mL of blood which is called the **stroke volume**. The stroke volume multiplied by the heart rate (no. of beats per min.) gives the cardiac output.

Cardiac output=stroke volume×heart beat

Therefore, **the cardiac output** can be defined as the volume of blood pumped out by each ventricle per minute and averages **5000 mL or 5 litres** in a healthy individual.

- The body has the ability to alter the stroke volume as well as the heart rate and thereby the cardiac output. For example, **the cardiac output of an athlete will be much higher than that of an ordinary man**

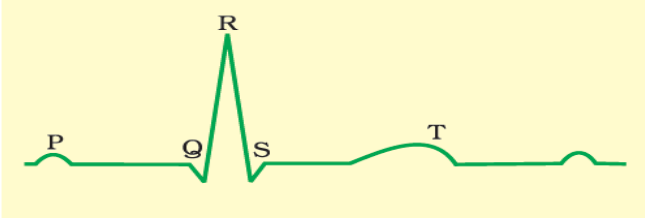
HEART BEAT

During each cardiac cycle two prominent sounds are produced which can be easily heard through a **stethoscope**.

- **The first heart sound (lub)** is associated with the closure of the tricuspid and bicuspid valves (It occurs during ventricular systole) whereas
- **The second heart sound (dub)** is associated with the closure of the semilunar valves (it occurs during ventricular diastole).These sounds are of clinical diagnostic significance.

ELECTROCARDIOGRAPH (ECG)

- **Electro-cardiograph** is a machine is used to obtain an **electrocardiogram** (ECG).
- ECG **is a graphical representation of the electrical activity of the heart during a cardiac cycle**.
- To obtain a standard ECG, a patient is connected to the machine with three electrical leads (one to each wrist and to the left ankle) that continuously monitor the heart activity.
- For a detailed evaluation of the heart's function, multiple leads are attached to the chest region.



Diagrammatic presentation of a standard ECG

Each peak in the ECG is identified with a letter from P to T that corresponds to a specific electrical activity of the heart.

- **The P-wave**
  It represents the electrical excitation (or depolarisation) of the atria, which leads to the contraction of both the atria.
- **The QRS complex**
  It represents the depolarisation of the ventricles which initiates the ventricular contraction. The contraction starts shortly after Q and marks the beginning of the systole.
- **The T-wave**
  It represents the return of the ventricles from excited to normal state (repolarisation). The end of the T-wave marks the end of systole.

- by counting the number of QRS complexes that occur in a given time period, one can determine the heart beat rate of an individual.

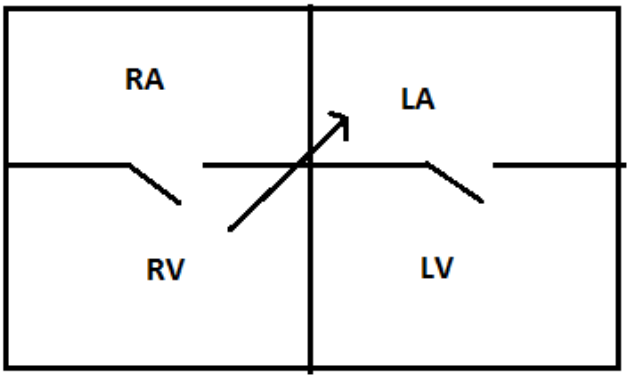
- Since the ECGs obtained from different individuals have roughly the same shape for a given lead configuration, any deviation from this shape indicates a possible abnormality or disease. Hence, it is of a great clinical significance.

- The sound "... pip... pip... pip..... peeeeeeeeeeeeeeeeeeeee" produce the ECG when the patient goes into **cardiac arrest (Heart stop beating)**

DOUBLE CIRCULATION

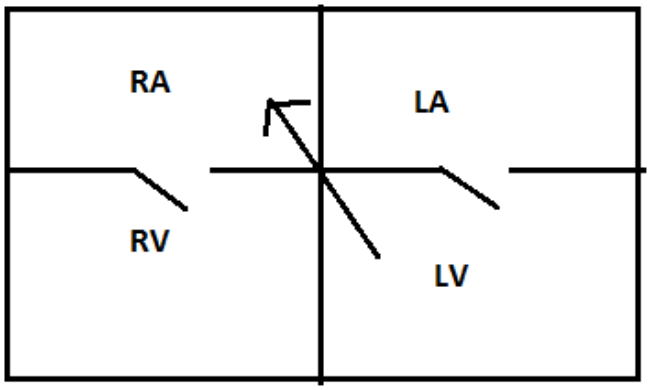
i) The pulmonary circulation

The blood pumped by the right ventricle enters the pulmonary artery.The deoxygenated blood pumped into the pulmonary artery is passed on to the lungs from where the oxygenated blood is carried by the pulmonary veins into the left atrium. This pathway constitutes the pulmonary circulation.



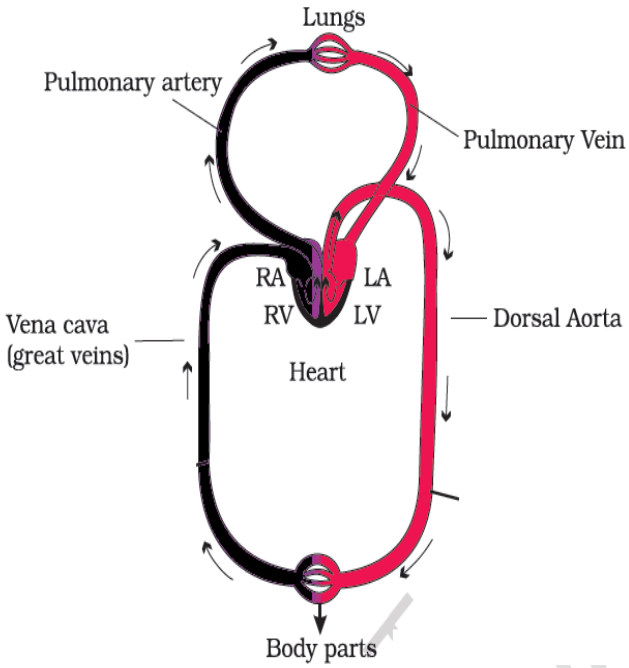
ii) The systemic circulation

The oxygenated blood entering the aorta. From the left ventricle is carried by a network of arteries, arterioles and capillaries to the tissues from where the deoxygenated blood is collected by a system of venules, veins and vena cava and emptied into the right atrium. This is the systemic circulation**. The systemic circulation provides nutrients, O2 and other essential substances to the tissues and takes CO2 and other harmful substances away for elimination**.



Coronary circulation

Coronary arteries are arteries, which supply the oxygenated blood (Pure Blood) to cardiac muscles.



Portal circulation

Human being has two types of portal circulation namely

a.Hepatic portal system
b.Hypophyseal portal system

a)Hepatic Portal system

A unique vascular connection exists **between the digestive tract and liver** called hepatic portal system. The hepatic portal vein carries blood from intestine to the liver before it is delivered to the systemic circulation.

b)Hypophyseal portal system

A set of blood vessels that carry blood and regulatory hormones from **hypothalamus to adenohypophysis** (Anterior pituitary), where the target cells of the releasing hormones are located

BLOOD VESSELS

Blood vessels are ducts which carry blood. There are 2 types of blood vessels namely

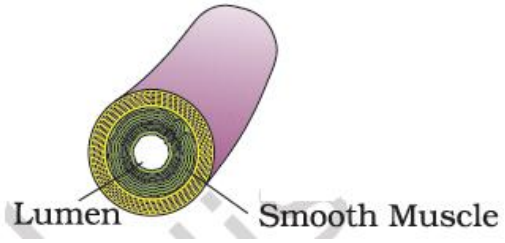
a.Artery **b.Vein**

Basically, each artery and vein consist of 3 layers

- An inner lining of Squamous endothelium- **Tunica intima**
- A middle layer of smooth muscle and elastic fibre-**Tunica media**
- An external layer of fibrous connective tissue with collagen fibre-**Tunica externa**

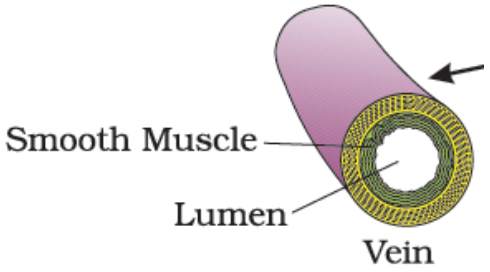
a.Artery

- Arteries are blood vessels which carry blood **from heart**.
- Most of the artery carry pure (Oxygenated blood) **except pulmonary artery** (Pulmonary artery carries impure blood).
- Lumen of artery is narrower compared to vein ,so the blood flows through artery under high pressure.



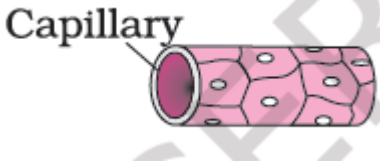
b).Vein

- veins are blood vessels which carry blood **to heart**.
- Most of the vein carry **impure** blood (deoxygenated blood) **except pulmonary vein** (Pulmonary vein carries pure blood).
- Lumen of vein is **wide**r compared to artery,so the blood flows through artery under low pressure. Veins possess valves.
- Tunica media is comparatively thin in the vein.



c.Capillaries

- Arteries and veins are connected by minute blood vessels called capillaries.



REGULATION OF CARDIAC ACTIVITY

- Normal activities of the heart are regulated intrinsically, i.e., auto regulated by **specialised muscles (nodal tissue), hence the heart is called myogenic**.
- A special neural centre in the **medulla oblangata can moderate the cardiac function through autonomic nervous system** (ANS).
- Neural signals through the sympathetic nerves (part of ANS) can increase the rate of heart beat, the strength of ventricular contraction and thereby the cardiac output.
- Parasympathetic neural signals (another component of ANS) decrease the rate of heart beat, speed of conduction of action potential and thereby the cardiac output.
- Adrenal medullary hormones can also increase the cardiac output.

DISORDERS OF CIRCULATORY SYSTEM

1. **High Blood Pressure (Hypertension):**
   - ♥ Hypertension is the term for blood pressure that is higher **than normal (120/80)**.
   - ♥ In this measurement **120 mm Hg** (millimetres of mercury pressure) is the **systolic, or pumping, pressure and 80 mm Hg is the diastolic, or resting, pressure**.
   - ♥ If repeated checks of blood pressure of an individual is **140/90** (140 over 90) or higher, it shows hypertension.
   - ♥ High blood pressure leads **to heart diseases and also affects vital organs like brain and kidney**
   - ♥ The BP can be checked by **sphygmomanometer**

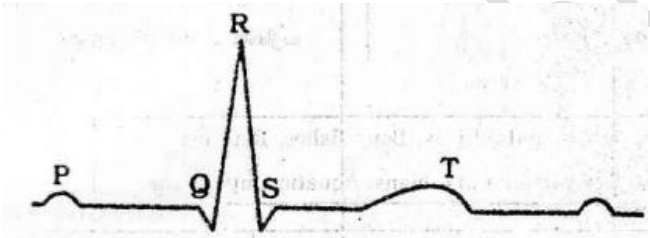
2. **Coronary Artery Disease (CAD):**
   - ♥ Coronary Artery Disease, often referred to as **atherosclerosis**
   - ♥ It affects the vessels that supply blood to the heart muscle.
   - ♥ It is caused by deposits of calcium, fat, cholesterol and fibrous tissues, which makes the lumen of arteries narrower.

3. **Angina:**
   - ♥ It is also called **'angina pectoris'.**
   - ♥ A symptom of acute chest pain appears when no enough oxygen is reaching the heart muscle.
   - ♥ Angina can occur in men and women of any age but it is more common among the middle-aged and elderly.
   - ♥ It occurs due to conditions that affect the blood flow.

4. **Heart Failure:**
   - ♥ Heart failure means the state of heart when it is not pumping blood effectively enough to meet the needs of the body.
   - ♥ It is sometimes called **congestive heart failure** because congestion of the lungs is one of the main symptoms of this disease.
   - ♥ Heart failure is not the same as **cardiac arrest** (when the heart stops beating) or **a heart attack** (when the heart muscle is suddenly damaged by an inadequate blood supply).

Previous years question paper

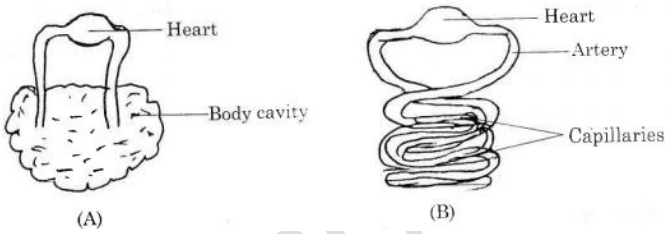
1. (a) Make a flowchart showing cardiac impulse conduction using appropriate terms given in bracket. (HSE-July-2019)(2)
   [SAN, Right atrium, AVN, AV Bundle, Bundle of His, Ventricle]
   (b) Which part known as pacemaker ?
2. Blood coagulation, is a mechanism to prevent the excessive loss of blood. (HSE-July-2019)(3)
   (a) Identify the enzyme help the conversion of inactive fibrinogen.
   (b) Mention the role of thrombokinase.
   (c) Which ion is necessary for blood clotting ?
3. Diagrammatic representation of a standard ECG is given below. (HSE-March-2019)(3)



   a) Expand ECG
   b) What does 'P','T' waves denote?
   c) Mention the clinical significance of ECG ?
4. a) Person with 'AB' blood group is called 'universal recipient'. Give a reason"
   c) List out any two disorders of human circulatory system.
   (HSE-March-2019)(2)
5. Copy the table and fill in the gap with appropriate words.
   (HSE-Model-2019(3)

Blood Cell	Type of Cell	Classification	Function
?	Granulocyte	?	Phagocytosis
	?	Basophil	?
		Lymphocyte	?
		Monocyte	?

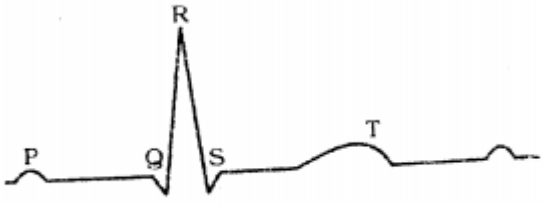
6. (HSE-Model 2019)(3)



   a. Name the above two diagram A and B.
   b. Write one example for each in which they belongs.
   c. The blood filled blood filled cavity-of cockroach is known as ……
7. Plasma without clotting factor is called…… (HSE Aug-2018)(1)
8. Classify the following terms under two suitable headings. (HSE Aug-2018)(2)

Neutrophil, Monocyte, Eosinophil, Lymphocyte

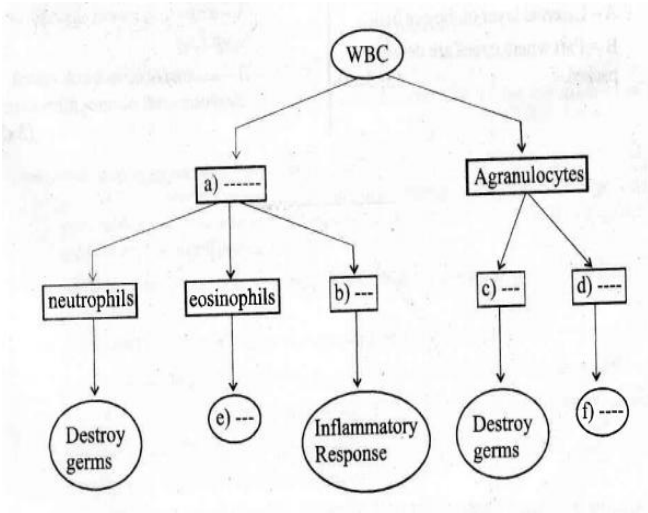
9. diagrammatic representation of a standard ECG is given below : (HSE-March- 2018)(2)



   a) What does the QRS complex denotes?
   b) Mention the clinic al significance of ECG.
10. Match the terms in column A with those in columns B and C (HSE-March- 2018)(3)

	A	B	C
a)	Neutrophils	2 – 3%	Immune response
b)	Eosinophils	20 – 25%	Phagocytic
c)	Lymphocytes	60 – 65%	Allergic reaction

11. Fill in the lanks suitably (HSE-Model-2018)(3)



12. SA node has the key role in the rhythamic activity of human heart. Give reason ? (HSE-July-2017)(2)

13. In the medical record of a patient blood pressure is notes as 140/90mm Hg. What does it indicate ? (HSE-July-2017)(1)

14. a)Select the correct statement regarding with ECG of man (HSE-March-2017)(1)

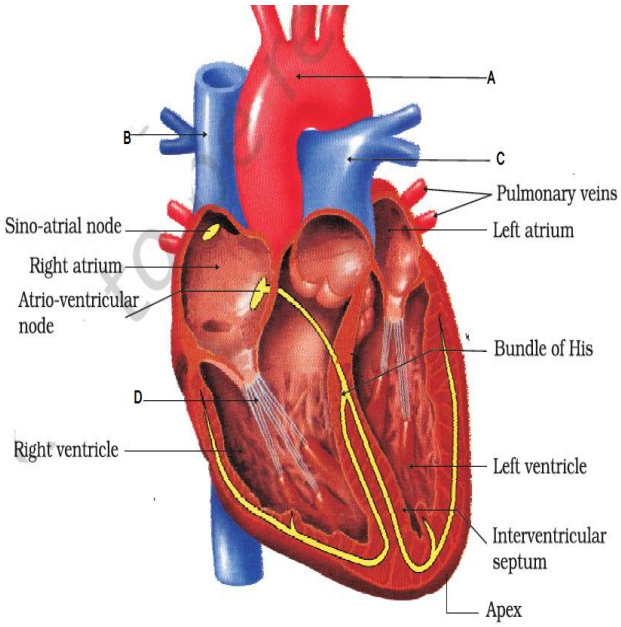
i)P-wave represent auricular repolarisation

ii)P- Wvae represent ventricular repolarisation

iii)P- wave represent auricular depolarisation

iv)P-wave represent ventricular depoalrisation

b)Observe the diagram and label A,B,C and D (2)



15. a)Fill Up A,B,C, D and complete the branching chart given below (HSE-Sept-2016)(3)

b)Write the function of paltelets ?

OR

In man normal ECG consist of 3 waves

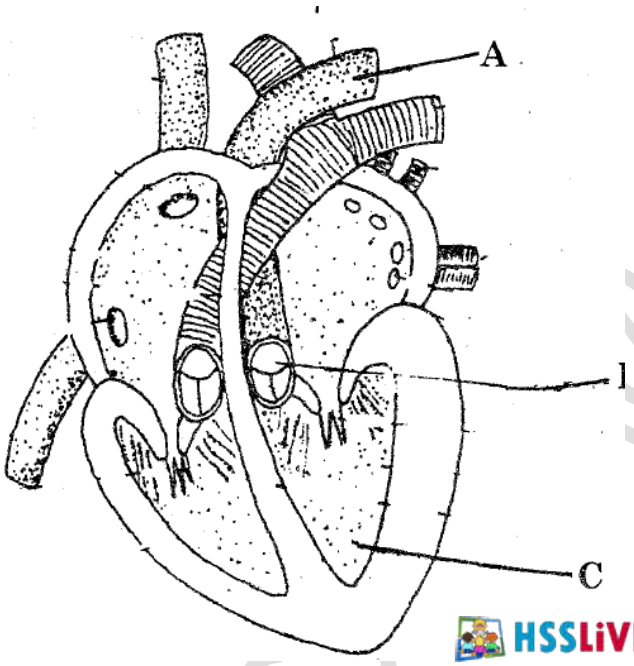
a)P wave b)QRS wave c)T wave

what does the above wave means ?

(HSE-SEPT-2016)(3)

16. Longitudinal section of the human heart showing internal structure is given below. Oserve the diagram and answer the following question.

(HSE-MARCH-2016)(3)



a)Label the parts marked as A,B and C?

b)Draw a flow chart showing double ciculation?

OR

17. "Sinu atrial node is called pacemaker of human heart"

a)justify the statement?

b)define cardiac cycle and cardiac output?

18. In a laboratory session your biology teacher exhiited blood smear(slide) of cockroach and human being under microscope. How will you distinguish them based on the nature of plasma and blood cells.? (HSE-SEPT-2015)(2)

19. Make a diagramatic sketch of human double circulation.Label the 3 associated organ and any one blood vessel (HSE-SEPT-2015)(3)

OR

20. Name the two types of heart valves and mention their function?

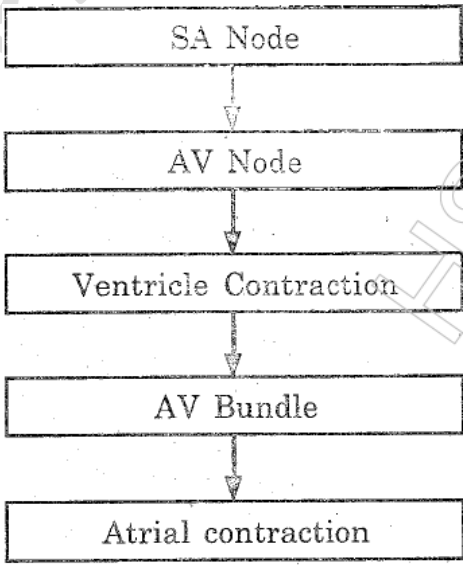
(HSE-SEPT-2015)(3)

21. Find the odd one and write the function

Neutrophil,erythrocyte,monocyte,lymphocyte,basophil,eosinophil

(HSE-MARCH-2015)(1)

22. Observe the flow chart and answer the questions given below



a)Draw the flow chart correctly?

b)what will happen if the SA node is not working properly?

(HSE-MARCH-2015)(2)

23. The sequential events in the heart which are cyclically repeated are called cardiac cycle (HSE-AUGUST-2014)(3)

a)What are the phases of cardiac cycle?

b)why do we call the human heart as myogenic?

c)what is the role of SAN (Sinu Atrial Node) on a human heart?

24. Answer the following in a few words

a)significance of pulmonary circulation in man?

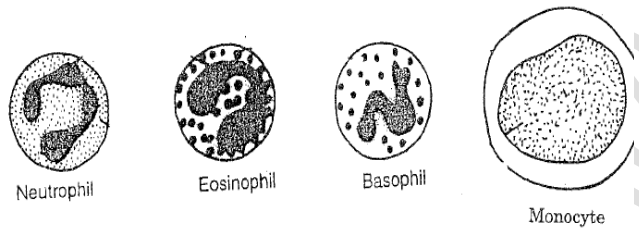
b)functions of erythrocytes

c)pacemake for a human heart and its significance?

d)Normal blood pressure of a human being and its variation during hypertension (HSE-MARCH-2014)(4)

25. Observe the blood cells and attempt the following questions

(HSE-2013-SEPT)(2)



a)which among the above cells least possily found when you observe a drop of blood?

b)write one function of any two types

c)categroise the WBC based on the presence or absence of protein granules?

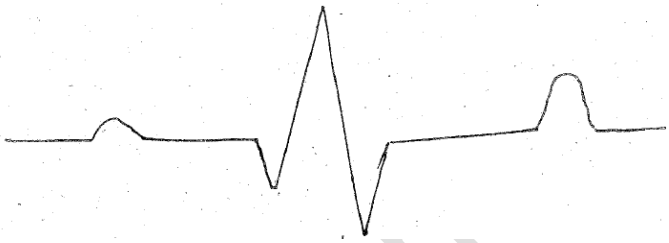
26. Due to developmental anormality the wall of left ventricle of an infant's heart has the same thickness as that of right ventricle. What would be its specific effect on circulation of blood?

(HSE-sept-2013)(1)

27. A person with A-ve blood group is injured severely in an accident. His relatives with A+ve and B-ve blood group were ready to donate blood for him. Infer the consequence if he recive the blood from him?

(HSE-march-2013)(1)

28. Observe the ECG (HSE-March-2013)(2)



a)Label P,Q,R,S,T in the graph

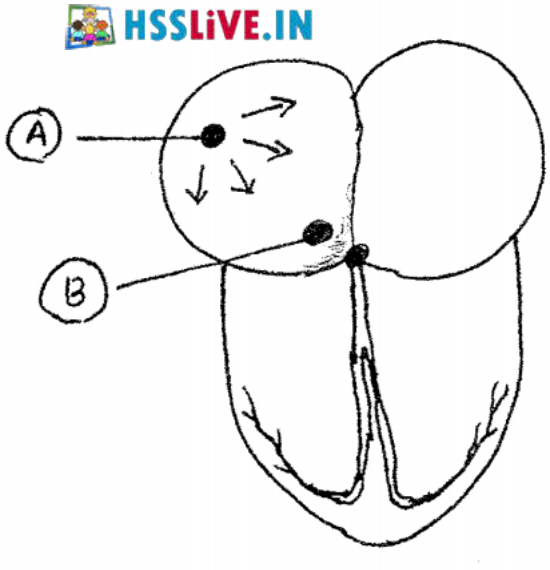
b)what does the T wave represent?

29. Is it possile to compare the water vascular system of phylum echinodermata to circulatory system of man in some aspects? Justify the statement ? (HSE-sept-2012)(2)

30. The blood pressure of a person is shown as 170/130mmHg. What would be his disease? How it affect his body?

(HSE-sept-2012)(1)

31. Observe the figure and answer the question (HSE-Sept-2012)(2)



a)Name the nodal tissue A and B

b)Why A is called pace maker

32. If a person having blood group A is given blood transfusion of blood group

B by mistake. What will be its effect? (HSE-march-2012)(1)

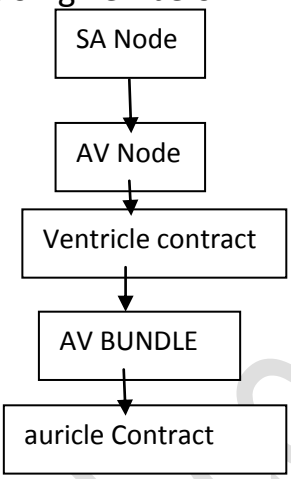
33. Stethescope is an instrument which is used to detect the sounds of the heart.
    a)Mnetion the two sound of the heart?
    b)give the cause of heart sound?
    (HSE-march-2012)(2)

34. Result of a project study related to a circulatory disorder to an area is given below (HSE-march-2011) (3)
    a)what is your observation?
    b)name any one circulatory disorder and its charecterstics?
    c)suggest any two measures to avoid these disorders?

35. The blood test report of a patient is given below (HSE-MARCH-2010)
    - RBC 5.5million/mm^3
    - Neutrophil 65%
    - Monocyte 5%
    - Basophil 1%
    - Eosinophil 15%
    - Lymphocyte 23%
    - Platelets 250000/mm^3

    a)Which constituent of his blood is abnormal?
    b)what is the normal function of that constituent?

36. Observe the flow chart and answer the question given below



    a)Re draw the flow chart correctly?
    b)What will happened if the SA node is not working properly?