

Class Notes and Assignment - 8**Chapter 6: Life Processes**Human Transportation System: Part-3**BLOOD PLATELETS OR THROMBOCYTES:**

They are tiny, colourless, non-nucleated cell fragments of various shapes and sizes. The average count of platelets is 0.15 – 0.45 million per millimeter of blood. They are formed in the bone marrow and their life span is about 7 to 10 days.

Blood clotting:

Injury or leakage from a blood vessel can be very harmful due to loss of blood and fall in blood pressure. Platelets in the blood have the ability to plug these leaks by helping to clot the blood at the site of injury.

The events involved in blood clotting:

1. Release of **thromboplastin** by platelets.
2. In the presence of calcium ions, thromboplastin activates **prothrombin** (inactive form) to form **thrombin** (active form).
3. Thrombin acts on soluble plasma protein called **fibrinogen** and changes it into insoluble **fibrin**.
4. Fibrin makes a network of fibers over the damaged wall of blood vessel. This network or mesh traps blood cells and forms jelly-like mass called a **blood clot**. The clot contracts and solidifies and seals the point of injury. A liquid called serum is released in this process. Later an enzyme, plasmin helps to dissolve the clot.
5. The normal clotting time is 2.5 minutes for superficial cuts and 4-10 minutes for deeper cuts.

Significance of blood clotting:

1. Plugging or sealing the place of injury.
2. Stoppage of loss of blood from the body.
3. Maintaining the normal blood pressure and efficiency of the pumping system of the heart in case of an injury.

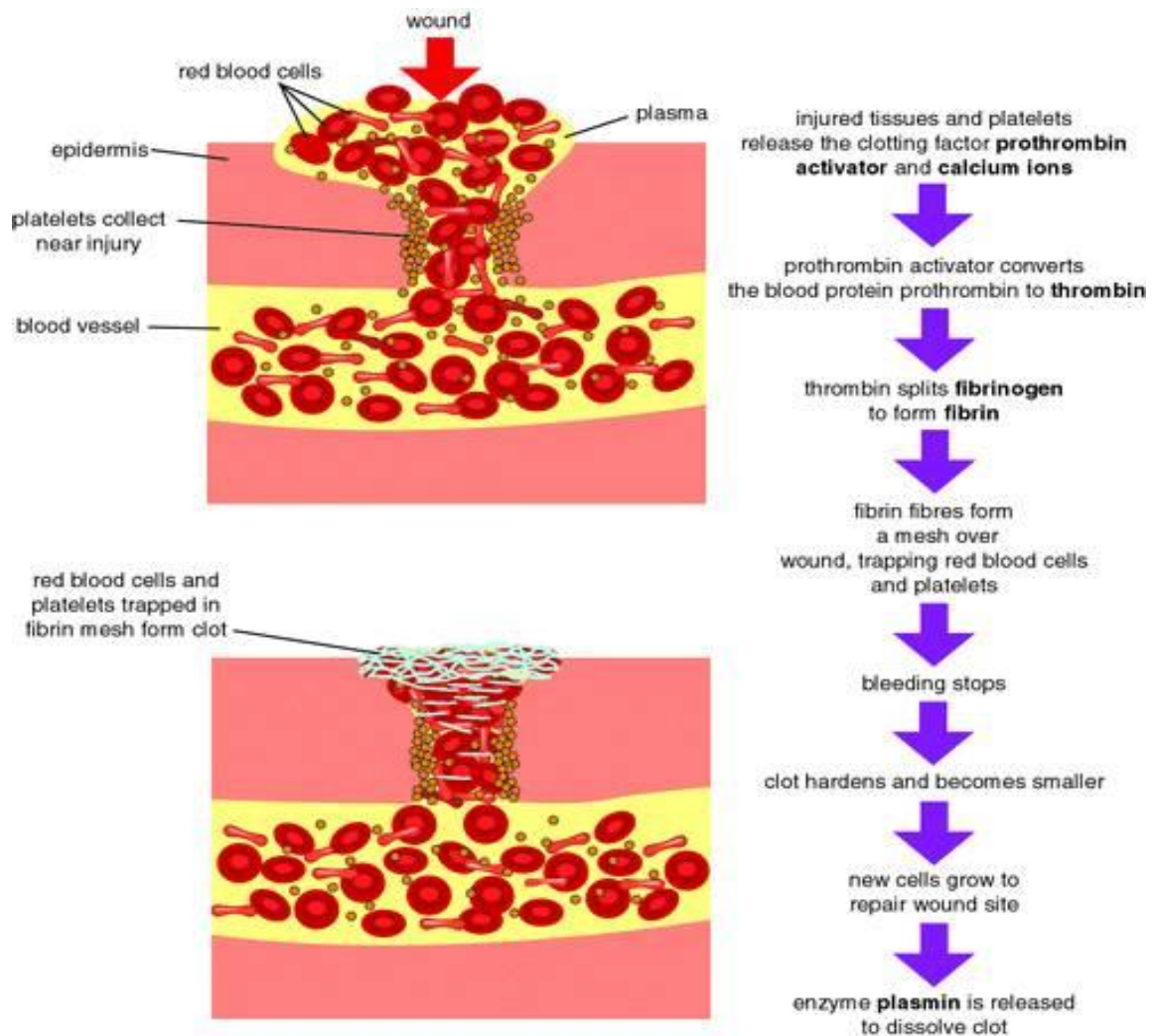


Figure: Events that take place during blood clotting or coagulation of blood

HEARTBEAT

Rhythmic expansion and contraction of heart is called a heartbeat. A heartbeat consists of two phases, namely Diastole and Systole. The expansion or relaxation of heart is known as **diastole** while the contraction is called **systole**. The rate of heartbeat in an adult person at rest is 70-72 beats per minute.

Heartbeat is controlled by a special mass of muscle that is capable of generating electrical stimulus for contraction of different parts of the heart. This patch of muscle present in the right atrium is called sinoatrial node (**SA node**). This is also called **pacemaker** of the heart.

PULSE

The repeated throbs/jerks felt in a superficial artery is called Pulse. For example, pulse can be felt by placing the fingers over the Radial artery. Pulse rate is the count of number of throbs or jerks per minute. Pulse rate is equal to the rate of heartbeat. Pulse rate increases during heavy exercise and also during high fever.

BLOOD PRESSURE

1. The force that circulating blood exerts on the walls of the blood vessels is called the **blood pressure**.
2. The phase of the heart beat when the heart contracts and pumps the blood in to artery is called ventricular systole. The maximum pressure at which the blood leaves the heart through the main artery during contraction phase is called **systolic pressure**.
3. The phase of heart beat when the relaxed heart allows the chambers to get filled with the incoming blood is called ventricular diastole. The minimum pressure in the arteries during the relaxation phase of heart is called the **diastolic pressure**.
4. The value of systolic pressure will always be higher than diastolic pressure because a contracting heart will always have higher pressure to ensure that the arteries maintain a steady flow of blood.
5. The blood pressure of a person is expressed in terms of millimeters of mercury written as mm Hg.
6. The normal systolic pressure is about 120 mm of Hg and diastolic pressure is 80 mm of Hg. It is depicted as **120/80 mm Hg**.
7. Blood pressure is measured with an instrument called **Sphygmomanometer**. Another instrument, **Stethoscope** is used by health professionals to hear the heartbeat.
8. High blood pressure is also called **hypertension**. It is caused by the constriction of small arteries which results in increased resistance to blood flow. It can lead to the rupture of an artery and internal bleeding.

LYMPHATIC SYSTEM

Lymph is the tissue fluid that is leaked from the blood capillaries in the extracellular space. It contains large protein molecules, digested fat, hormones and fragments of dead cells. It enters into another type of tiny tube- system lymph capillaries. This lymph drains into the blood and becomes a part of the main circulatory system.

Lymphatic system is the part of transportation system that is composed of a network of lymphatic capillaries, lymphatic vessels, lymph nodes and a light-yellow coloured liquid called lymph. The lymphatic system is connected with the veins of the circulatory system.

Lymph contains a special type of white blood cells called **lymphocytes** which help in fighting infection and diseases. The fine lymph capillaries which are close-ended, join to form larger lymph vessels. These lymph vessels have lymph nodes containing lymphocytes. The lymph nodes or lymph glands occur in several places, like tonsils, adenoids (in the back of the nasal cavity), spleen and thymus.

Functions of Lymph:

1. Protection of body against infections.
2. Acts as a middle man that exchanges materials between blood and tissue fluid.
3. Carries digested fat from the intestine.
4. The lymph capillaries are specialized to attract and localize germs. The germs are taken to lymph nodes for destruction.

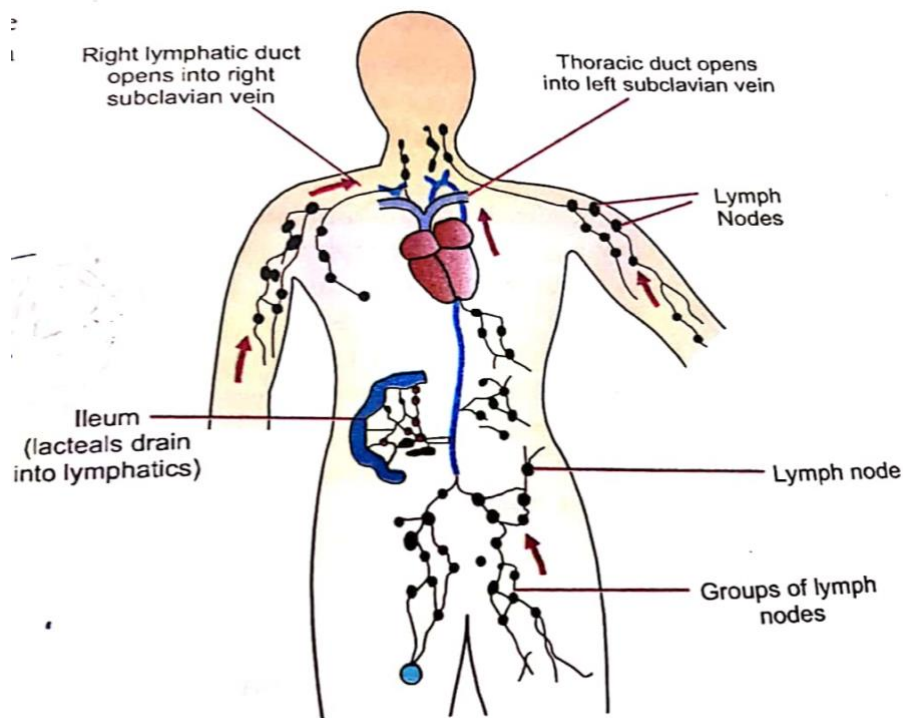


Figure: Human Lymphatic System

Differences between Blood and Lymph:

Description	Blood	Lymph
Colour	Blood is reddish in colour	Lymph is pale yellow in colour
Opacity	Blood is opaque	Lymph is semitransparent
Viscosity	It is quite viscous or thick	Viscosity is low
RBCs	It contains a large number of Red Blood Cells	RBCs are absent
Blood Platelets	Present	Absent
Leucocytes	The count is high	The count is low but lymphocytes are present in large numbers
Flow	Blood flows with greater speed due to presence of pumping organ i.e. heart	Flow of Lymph is slow
Direction	It is bidirectional, i.e. from heart to organs and organs to heart	Lymph flow is unidirectional, i.e. from tissues to major veins, namely right and left subclavian vein
Transport	Main transport medium of different materials in the body	Functions as a middle man between tissues and the blood

QUESTIONS:

1. Which instruments are used by health professionals to measure (a) Heartbeat (b) Blood pressure?
2. Write any four functions of Lymph. What is the difference between Blood and Lymph? (mention any five points)
3. How are platelets able to seal and heal the site of injury?
4. What is the normal blood pressure? How is hypertension caused?