

HAEMOPOIETIC SYSTEM BLOOD

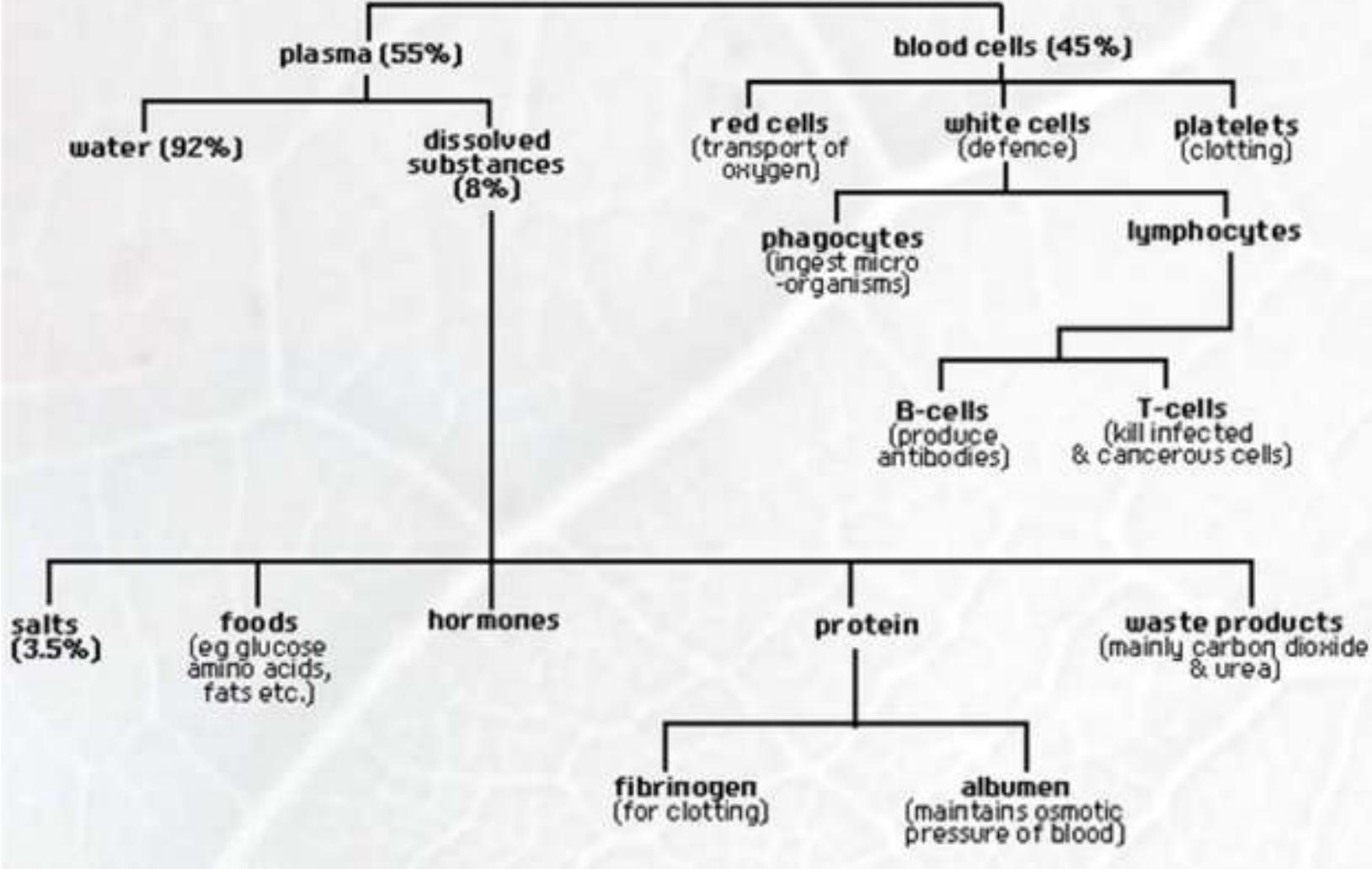
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Definition

- Blood is a body fluid in humans and other animals that delivers necessary substances such as nutrients and oxygen to the cells and transports metabolic waste products away from those same cells.
- The coloring matter of blood (hemochrome) is largely due to the protein in the blood responsible for oxygen transport

Blood



It is composed of blood cells suspended in blood plasma. Plasma, which constitutes 55% of blood fluid, is mostly water (92% by volume), and contains dissolved proteins, glucose, mineral ions, hormones, carbon dioxide (plasma being the main medium for excretory product transportation), and blood cells themselves

Components of blood

Composition of blood. The blood is composed of cells, cell fragments and anaqueous solution (plasma). Blood makes up about 8% of the human body weight. It contains erythrocytes, leucocytes, thrombocytes (platelets) and plasma

Blood Cells



Monocyte



Lymphocyte



Neutrophil



Eosinophil



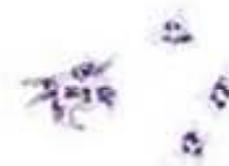
Basophil



Macrophage



Erythrocyte



Platelets

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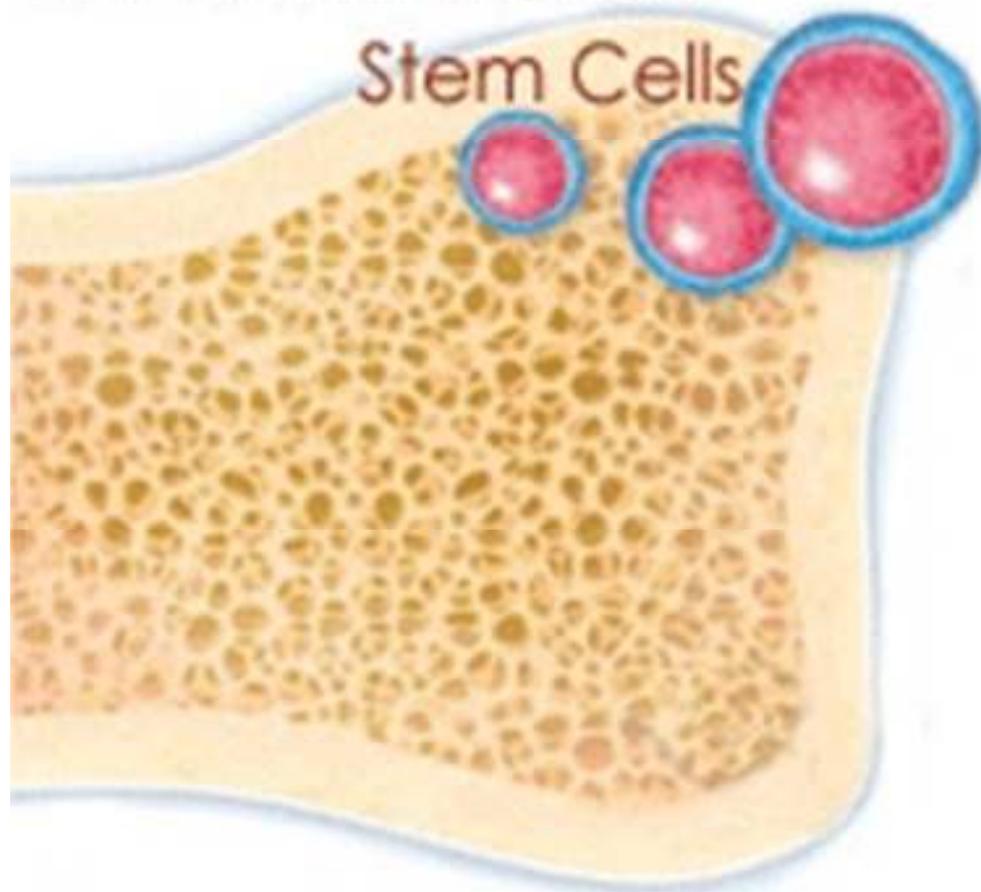
Plasma

- About 55% of blood is plasma, The blood plasma volume is of 2.7–3.0 liters.
- A liquid called plasma makes up about half of the content of blood.
- Plasma contains proteins that help blood to clot, transport substances through the blood, and perform other functions.
- Blood plasma also contains glucose and other dissolved nutrients.

Blood cells are produced in bone marrow:

- Red cells, white cells and platelets are made in the marrow of bones, especially the vertebrae, ribs, hips, skull and sternum.
- These essential blood cells fight infection, carry oxygen and help control bleeding.

Healthy bone marrow contains stem cells.
Bone marrow stem cells mature into red blood cells,
white blood cells and platelets.



Red blood cells
(RBCs)



White blood cells
(WBCs)



Platelets

Red blood cells

- Red blood cells are disc-shaped cells containing hemoglobin, which enables the cells to pick up and deliver oxygen to all parts of the body, then pick up carbon dioxide and remove it from tissues.
- Normal count-4.7 to 6.1 million (male)
4.2 to 5.4 million (female)

Life Cycle of Red Blood Cells

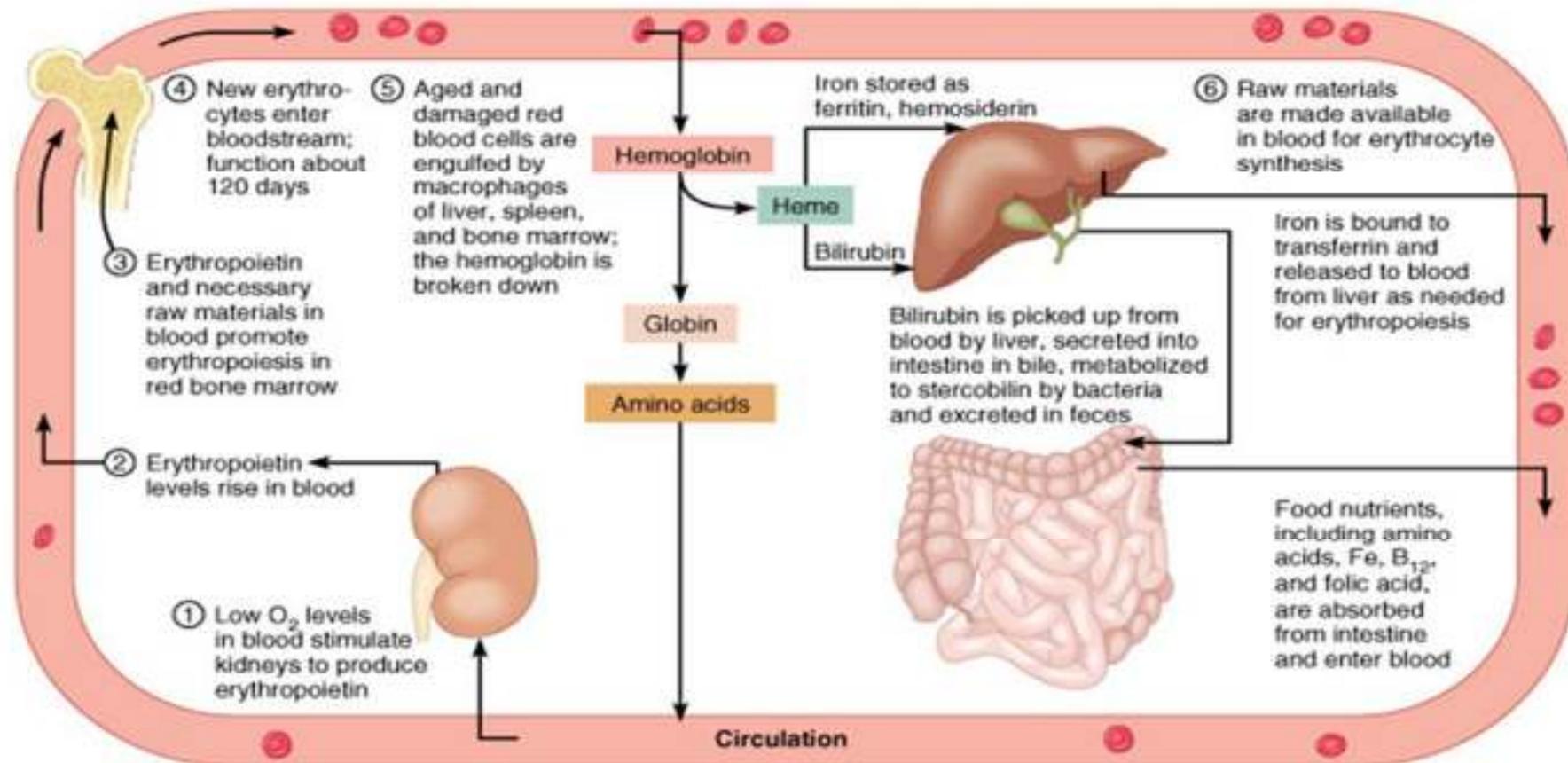


Figure 18.7

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Disorders of RBC

Anemias

Sickle cell anemia

Iron deficiency anemia

Thalassemia

Aplastic anemia

White Blood cells

White cells are the body's primary defense against infection.

They can move out of the blood stream and reach tissues to fight infection

Normal count- 4,000–11,000

WHITE BLOOD CELL

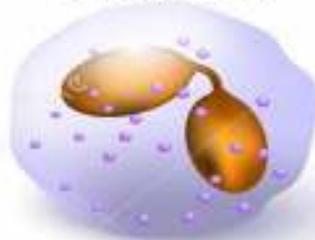
Granulocytes

Neutrophil



(phagocytosing a bacteria and other pathogens)

Eosinophil



(control mechanisms associated with allergy)

Basophil

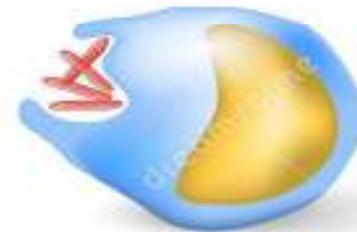
(contain histamine and heparin)



Histamine release from the basophils

Agranulocytes

Monocyte (phagocytosis)



Lymphocyte
(secretion of antibodies)



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Disorders of WBC

Leucopenias

Neutrophilia

Lymphocytopenia

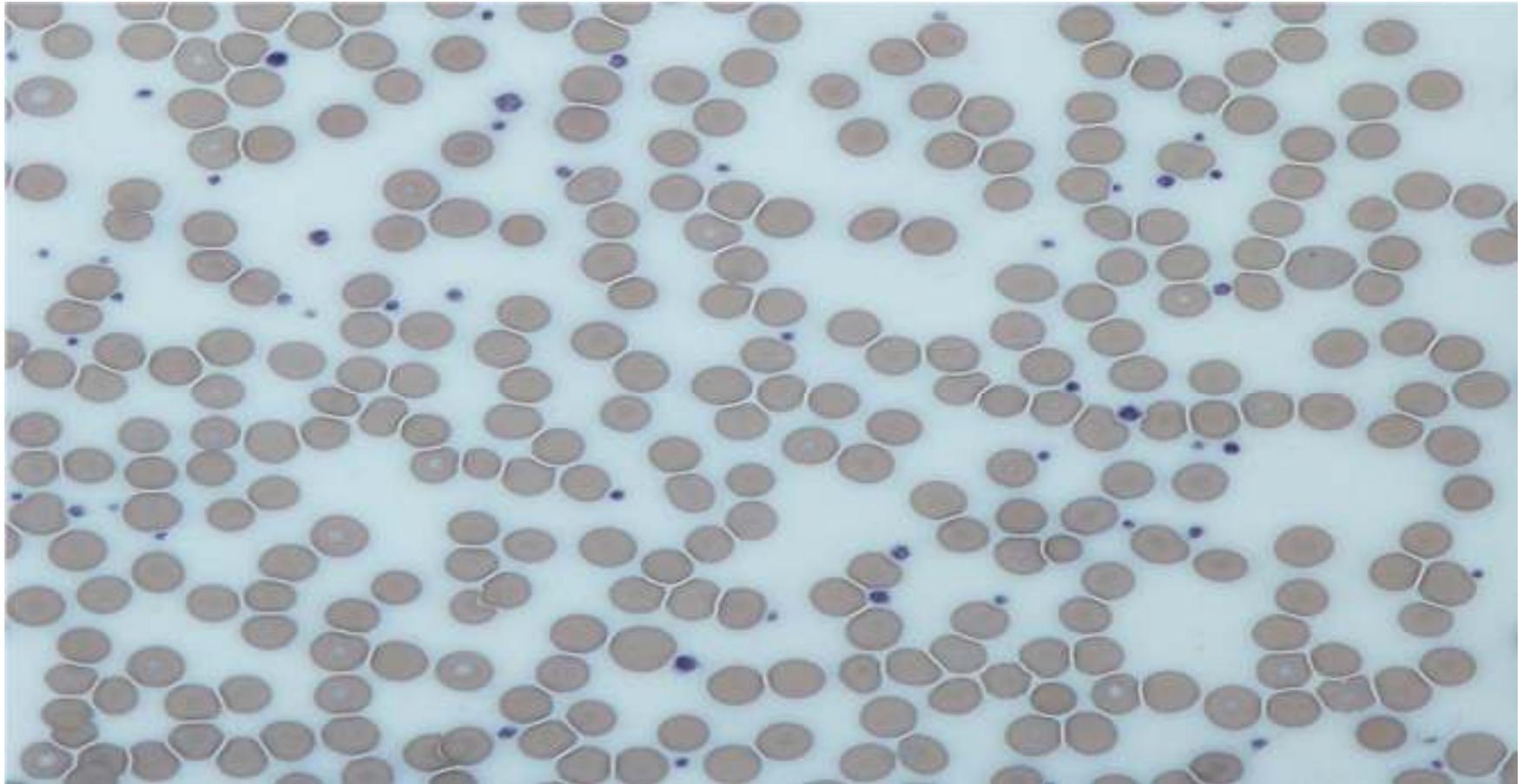
Eosinophilia

Platelets

Platelets, also called **thrombocytes** (throm- + -cyte, "blood clot cell"), are a component of blood whose function (along with the coagulation factors) is to stop bleeding by clumping and clotting blood vessel injuries. Platelets have no cell nucleus.

Normal count-**200,000–500,000**

Platelet cells



Mechanism of coagulation of blood

Coagulation (also known as **clotting**) is the process by which blood changes from a liquid to a gel, forming a blood clot.

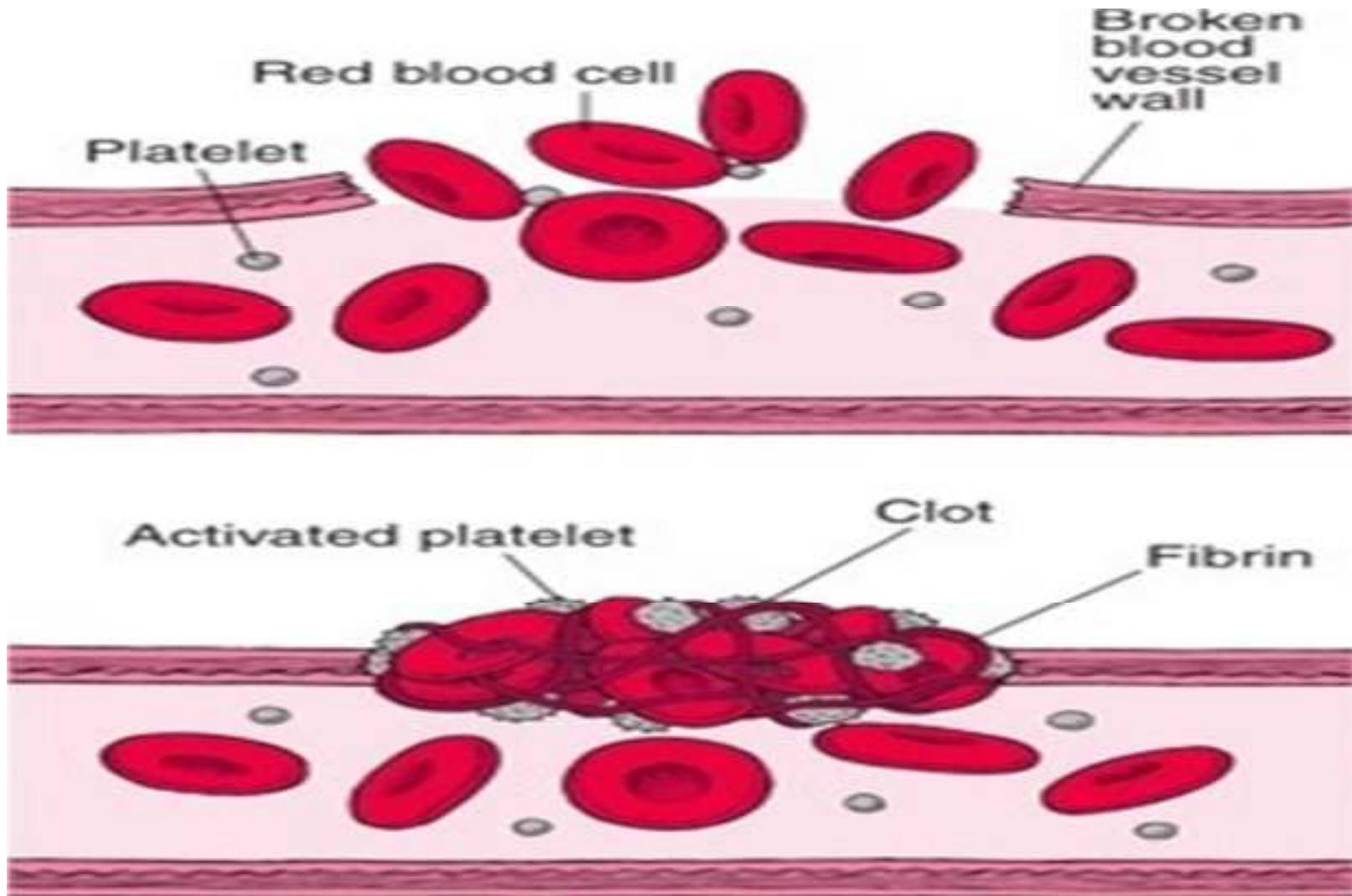
It potentially results in hemostasis, the cessation of blood loss from a damaged vessel, followed by repair.

The mechanism of coagulation involves activation, adhesion, and aggregation of platelets along with deposition and maturation of fibrin

Clotting time

Clotting time is the **time** required for a sample of blood to coagulate in vitro under standard conditions. There are various methods for determining the **clotting time**, the most common being the capillary tube method.

Formation of clot



Platelet disorders

Thrombocytopenia

Thrombocytosis

Functions of blood

It supplies essential nutrients to cells, such as amino acids, fatty acids, and glucose.

Its white blood cells have antibodies which defend us from infection and foreign bodies.

It has specialized cells, such as platelets, which help the blood to clot (coagulate) when we are bleeding.

Ph of blood

Blood pH is regulated to stay within the narrow range of 7.35 to 7.45, making it slightly basic. Blood that has a pH below 7.35 is too acidic, whereas blood pH above 7.45 is too basic

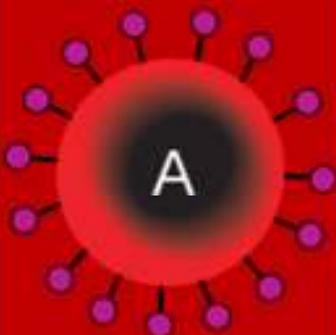
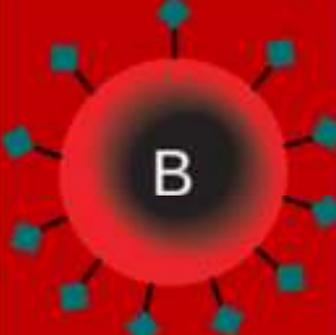
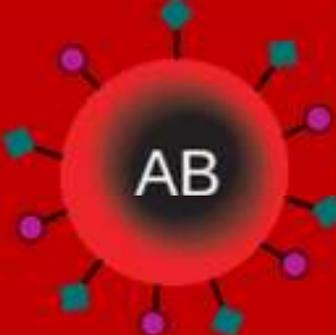
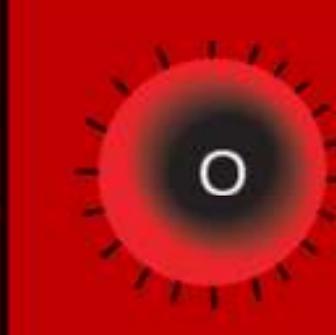
Blood group

A blood type (also called a blood group) is a classification of blood based on the presence and absence of antibodies and also based on the presence or absence of inherited antigenic substances on the surface of red blood cells (RBCs).

These antigens may be proteins, carbohydrates, glycoproteins, or glycolipids, depending on the blood group system. Some of these antigens are also present on the surface of other types of cells of various tissues

Several of these red blood cell surface antigens can stem from one allele (or an alternative version of a gene) and collectively form a blood group system. Blood types are inherited and represent contributions from both parents

Blood Grouping

| | Group A | Group B | Group AB | Group O |
|----------------------------|---|---|--|--|
| Red blood cell type |  A |  B |  AB |  O |
| Antibodies in Plasma |  Anti-B |  Anti-A | None |  Anti-A and Anti-B |
| Antigens in Red Blood Cell |  A antigen |  B antigen |  A and B antigens | None |

Thank You