SAWA UNIVERSITY

Fundamentals of fluids detection and secretions

The Blood

جامعة ساوة

كلية العلـــوم

قسم علوم الأدلة الجنائية

المرحلة الثانية

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رقم المحاضرة 3

The Blood

Blood: is a fluid of a connective tissue. It makes up about 7% of body weight (about 5.6 liters in a 72 Kg man). This proportion is less in women, while in children is greater (gradually decreasing until the adult level is reached). It circulates continually around the body, allowing constant communication between tissues distant from each other.

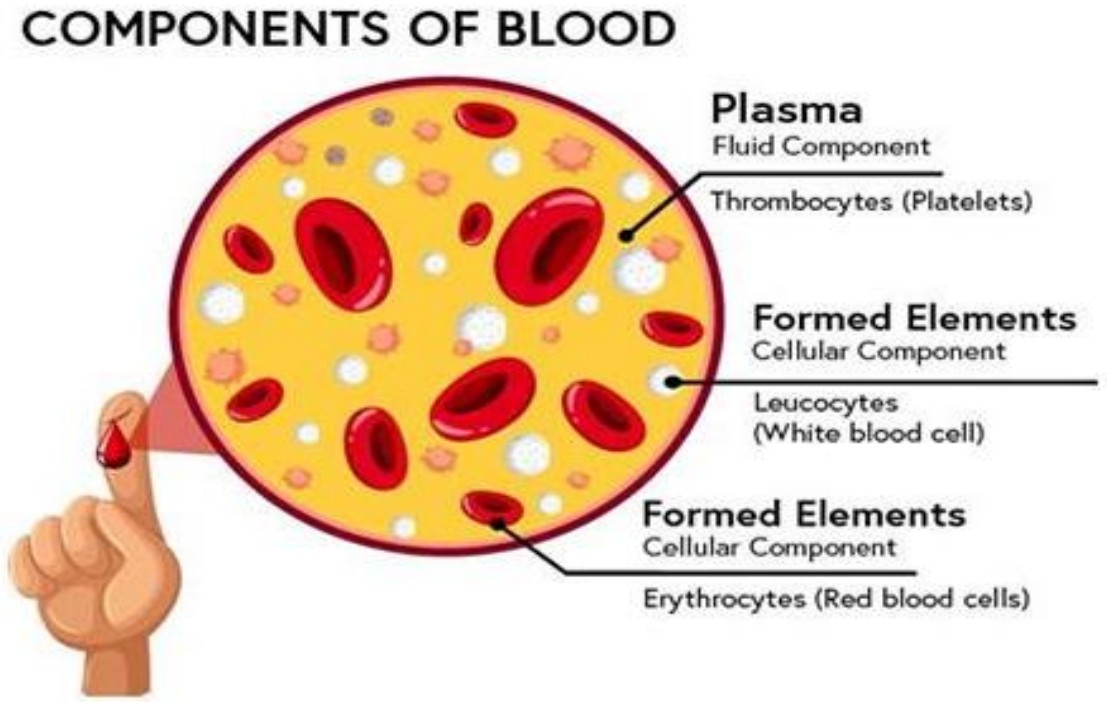


Figure (1): components of blood

Functions of the Blood

1. The main function of the blood is to maintain intracellular homeostasis by:

a) Carries O2 and nutrients (glucose, amino acids, lipids, and vitamins) to the cells.

b) Carries CO2 and other wastes (nitrates, creatine, nucleic acid) away from the cell.

2. Providing intercellular communication in the body: carries hormones (secreted by endocrine glands) to the target organs.

3.Protection and defense: it allows cells and immunological proteins to transport from place to place where need them.

4. Self-repair mechanism: Clot formation.

5. Maintenance of body temperature.

6. Regulation of pH and osmosis.

Blood Components

- Blood is composed from two fractions:
  1. Plasma: Non-living extracellular matrix composes about 55% of total blood volume.
  2. Formed elements (living cells): composes about 45% of total blood volume. Red blood cell (RBC) or erythrocytes, white blood cell (WBC) and Platelets.

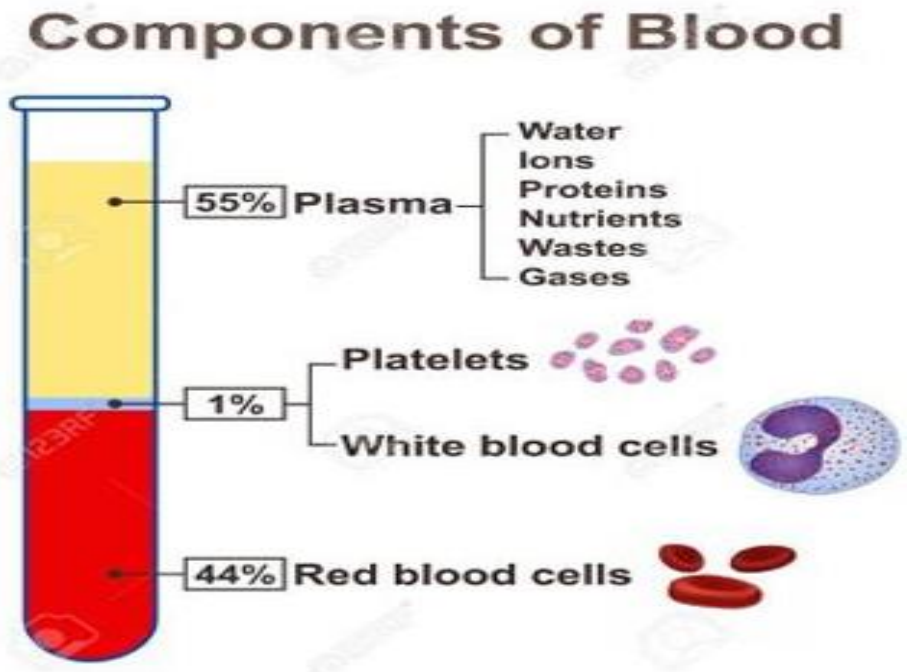


Figure (4): compositions of blood

Plasma

Plasma: is the liquid part of blood clear straw-colored fluid. It consists of liquid solvent mostly water and solutes without the formed elements, 93% water, 7% solutes,1000 of different solutes and most solutes are proteins (=plasma proteins)

also: salts, ions, gasses, hormones, nutrients, wastes, enzymes can be found in the blood.

serum = plasma without clotting factors.

plasma proteins

plasma proteins comprise about (8% of blood), it composed of:

1. Albumins:

- Albumin (with other proteins) contribute to viscosity, osmotic pressure and blood volume.

- It helps buffer the blood.

- it transports many solutes by binding to them:

eg. drugs, penicillin, pigments, fatty acids, bile salts.

2. Globulins

- Some are antibodies, part of immune system.

- -Some help transport solutes.

- -Some involved in clotting

3. Fibrinogen

-Soluble precursor of fibrin = framework for clotting

Formed Elements

They comprise about 45% of whole blood.

➢ Erythrocytes (RBC) –most, 45%, of formed elements
➢ Leukocytes (WBC)
➢ Thrombocytes (Platelets)

- all three are produced by stem cell

Erythrocytes or red blood cell (RBC)
Properties:

- The main job is to carry oxygen to cells, also deliver carbon dioxide to lungs.
- It is most abundant of the three types of formed elements.
- Biconcave disc thin center, thick edges.
- Flexible easily deforms to fit through narrow capillaries.
- Average RBC lives 100-120 days.

Leucocytes or white blood cells

Leukocytes, also known as white blood cells, are immune system components. They circulate through our bloodstream to defend against bacteria, viruses, and other harmful foreign invaders. Just 1% of our blood is made up of white blood cells.

Properties:

- ➢ Slightly larger than RBC about 8µm diameter.
- ➢ They include nucleus, they are large, irregular and lobed nucleus.
- ➢ mainly function in protection of body as part of immune system,

attack and

destroy bacteria and pathogens, remove dead cells and tissues.

- ➢ Most WBCs are motile by amoeboid motion (pseudopodia)

Thrombocytes (Platelets)

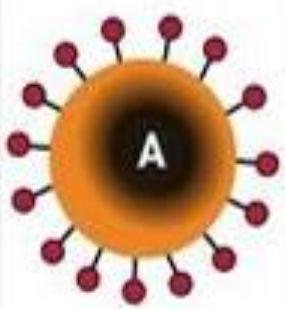
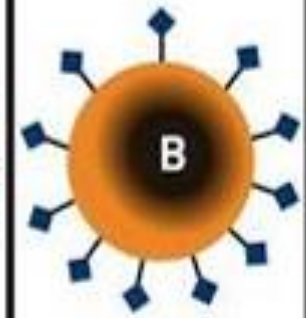
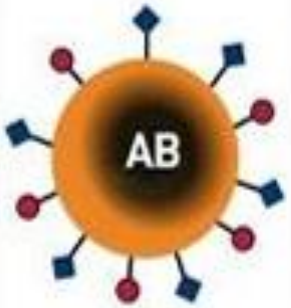
They are small, irregular shape cell fragments 2-4 µm diameter function:

blood clot.

Hematopoiesis or hemopoiesis

Is the process of formation of blood cells, i.e. RBC, WBC and platelets. The sites where it occurs are known as hemopoietic tissues (bone marrow, Liver, spleen.

Blood Group

	GROUP A	GROUP B	GROUP AB	GROUP O
Red blood cell type				
Antibodies in plasma	 Anti-B	 Anti-A	None	 Anti-A & Anti-B
Antigens in red blood cell	A antigen	 B antigen	 A and B antigen	None

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. Similarly, the plasma of different individuals contain two natural antibodies (proteins produced in response to antigens).

Rh Factor :

The Rhesus factor, or Rh factor, is a certain type of protein found on the outside of red blood cells. People are either Rh-positive (they have the protein) or Rh negative (they don’t have the protein).

Any questions?

Thank You