**Lec.5 Oral Physiology Dr.Muna**

**2. Formed elements:**

The formed elements suspended in the blood plasma form 45% of the blood volume including: ***Red blood cells, White blood cells, and platelets.***

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**The blood: Formed elements**

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1. **A. Red blood cells (Erythrocyte):**

Erythrocytes or red blood cells (RBCs) are small cells, about 8.5 μm in diameter 2 μm in thickness at the edge and 1 μm in the center. The mature cell shaped like non nucleated biconcave disc with depressed centers. This shape provides the maximum surface area for the cell and the greatest possible diffusion for the passage of the gases.

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Numbers: average number in adult male is range from 4.5-6 million cells/ mm3

average number in adult female is range from 4.3- 5.5 million cells/ mm3

• The average half-life of RBC is about 90-120 days.

• The red blood cell contains hemoglobin (Hb) is the RBC protein that has important function in gas transport O2 and CO2 transport depending on the presence of the respiratory pigment hemoglobin that makes red blood cells red, binds easily with oxygen, and most oxygen carried in blood is bound to hemoglobin.

• The normal value of Hb in adult male is about 13-18 gm/100 ml.

in adult females is about 12-16 gm/100ml.

• The main function of Hb is able to combine with oxygen to from compound is called Oxyhaemoglobin. The presence of Hb in the red blood cells increases the oxygen-carrying capacity of blood to have high concentration of oxygen that occurs in the capillaries which breaks down into oxygen and Hb to diffuse into the tissue and then to the cell where there is low concentration of oxygen.



Erythrocytes have important function of oxygen transport because they:

1.Contain haemoglobin which able to combine oxygen.

2. Have no nucleus so there is more space for haemoglobin molecules.

3.Are shaped biconcave discs that increase the surface area for oxygen exchange.



1. **B. White blood cell (Leukocytes):**

**Leukocytes** are nucleated cells. Leukocytes are far less numerous than red blood cells.

Numbers: average number in **adult** is range from **4000 -11000** cells/ mm3

Leukocytes are grouped into two major categories on the basis of structural and chemical characteristics:

1. **Granular leukocytes (Granulocytes):** contain obvious cytoplasmic granules



which include:

**- Neutrophil**: 60–70%

**- Eosinophil: 2–4%**

**- Basophil:** 0.5–1%

-The half-life is **12 hour – 3 days.** They have 2-3 lobes in the nucleus.

**2. Non-granular leukocytes (non-granulocytes):** lack obvious granules



which include:

- Lymphocytes: 20-25%

- Monocytes: 3–8%

The half-life is **100 – 300 days** under normal condition.

1. A. **T lymphocytes (T- cells)** function in the immune response by acting directly against virus-infected cells and tumor cells.

B. **B lymphocytes (B - cells)** give rise to plasma cells, which produce **antibodies** (immunoglobulins) that are released to the blood.

**Immunoglobulin G (IgG):** This is the most common antibody. It's in blood and other body fluids, and protects against bacterial and viral infections. IgG can take time to form after an infection or *immunization.*

• **Immunoglobulin M (IgM):** Found mainly in blood and lymph fluid, this is the first antibody the body makes when it fights a new infection.

C. Platelets



**Platelets** are also called ***thrombocytes*** which are not cells but they are cytoplasmic fragments of cells with no nucleus is originated in red bone marrow lasts about 7 days. In blood smears, each platelet exhibits a blue-staining outer region and an inner area containing granules that stain purple. They carry of chemicals that essential in the normal blood clotting.

The function of platelets is to stop bleeding and clot formation when the blood vessle ge damage like cut the pletelets bind together and form colt and stop bleeding

• Numbers: average number in **150.000- 400.000**/ mm3 of blood.