

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



العنوان

Hematology

10 th and 11 th modular unit



The Blood: it is one kind of body tissue (a special connective tissue) consists of a fluid of complicated and variable composition like plasma and cells. It is alkaline solution.

The advantages of blood:

- 1- Transporting and Carrying (gases, enzymes, hormones)?**
- 2- Balancing (water, PH, temperature)**
- 3- Immunity (cellular, humoral)**

Body has 4-5 L. of blood (For donor 450 ml; for laboratory 20-25 ml)

Hematology

Studying of blood and in routine hospital laboratory is concerned largely with abnormalities of the blood. Some of their functions are to detect anemia and diagnosis the exact type of anemia; other important aspects of routine hematology are the investigation of coagulation defects and the control of treatment in such disease as coronary thrombosis and Leukemia.

The techniques of hematology are concerned mainly with the cellular formed elements of blood, their number or concentration. cells and the structural the relative distribution of various types of or biochemical abnormalities that promote disease.

Blood consists of

- **Plasma Proteins** (has many specific functions)

Salt

Metabolic substance

- **Cells Erythrocytes (R.B.C.)**

Leuckocytes (W.B.C.)

Thrombocytes (palates)

Plasma is a complex solution and variable composition of **proteins, salts and metabolic substance**, and which are suspended blood cells. ,and acts as a transport medium carrying its constituents to specialized organs of the body .**As blood passes through the intestinal circulation, nutrients are absorbed into the plasma and carried to the liver and other tissues. As the blood passes the kidneys waste product of metabolism are filtered off into the urine.**



Erythrocytes: R.B.C.(Red Blood Cells)

- **R.B.C** were **consist 45% of the total volume of the blood**
- they contain a high concentration of **haemoglobin (Hb)**
- The Oxygen(O_2)carrying pigments which give the blood it is red color
- Unstained,
- **Non-nucleated**,pale greenish-yellow,
- **Biconcave discs**
- Their **size 6.7-7.7 μ m in diameter average 7.2 μ ,**

in **thickness 1.7-2.7 μ average (2.1 μ)**

- There are approximately **5million cells/cu.mm**, the normal range **depending on the age and sex.**

Male (men) 4.5-6.5million cells/cu.mm,

Female (women) 3.9-5.6 million cells /cu.mm.

- They **survive 110 days**
- **Removed by phagocytic cells of reticuloendothelial system (RES).**
- The **essential function of the blood erythrocytes: are to take up O_2 from the lungs via the heart and transport it to the all tissues, and to bring and transport CO_2 in the opposite direction.**
- **The cells contains a substance known hemoglobin (Hb) which has the power of combination reversibly with oxygen.** In the lunges the haemoglobin in the red cell combines with oxygen, and releases it to the tissues of the body during

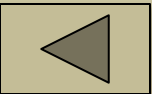
- **Normal Hb of adult molecule is an extremely efficient O₂ carrier when Hb concentration increase so the capacity of carrying will increase and vesa varsa.** There is no direct binding of CO₂ to Hb but RBC, also transport it by converting

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CO₂ to bicarbonate which diffuses from the cell, some exchanging with Cl⁻, some is bound to deoxygenated Hb amino acid groups and some (5%) is simply carried in solution.

Leukocytes W.B.C.(White Blood Cells) were

- **much fewer in number and smaller in number than RBC**
- **there are several different forms exist**
- **each of them have different functions**
- **nucleated cells**
- some capable of **amoeboid movement**
- The normal range is **4000-11000 cells/cu.mm.**
- The **function of leukocytes is act as one of body defenses** as they are capable of **phagocytosis (ingestion of bacteria and other harmful particles)** their main function is to act as one of the body's defenses. Some of the white cells are also connected with antibody formation. So some of them can



Producing antibodies

- Engulfment by phagocytosis
- Secretion an allergic substance

these functions is to **defense against the (bacterial, viral ,parasitic ,fungal)** In bacterial infection or other infection they are produced in a large number called **Leucocytosis** that is mean the count is **above 11000 cells /cu.mm**, while **Leucopenia** means decrease in WBC the count **bellow 4000cells /cu.mm**

- unstained leukocytes appear colorless

but a thin blood film, stained by the Romanowsky method, can be seen to contain white cells of three main types;

-WBC in stand blood film by the Romanowsky method can be seen contain white cells of three types and can classify to

Granulocytes (Polymorphonuclear cells (Neutrophil , Eosinophil ,Basophil) -

A granulocytes

- (Lymphocyte ,
- Monocytes)

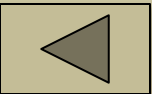


Platelets thrombocytes

- They are **small tissue particles 2-3 micron in diameter**
- **Non nucleated oval or round cells**
- Which **arise in the bone marrow** by (budding off) the cytoplasm of **megakaryocytes**.
- **Function** of the Blood Platelets: they are important in the **coagulation of the blood**. They are intimately concerned with the blood clotting process. Platelets are capable of **sticking together when touching a rough surface such as a cut blood vessel, there by forming a physical barrier, preventing bleeding** and subsequently releasing substances which hasten blood coagulation.
- A **decrease in platelets** is **called thrombocytopenia** and may cause either an **internal or external haemorrhage**
- An **increase in platelets** is **called thrombocythaemia** and may **fellow haemorrhage, surgery and fractures of bones**.

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