



Al-Mustaqbal University College
Anesthesia Techniques Department

First Class

Bio Chemistry

First lecture



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Blood and blood constituents

What is Blood?

- Blood is a connective tissue
- Its volume is 5-6 L in males and 4-5 L in females
- It is slightly alkaline, with a pH of ~ 7.4
- Its color varies from bright to dark red
- It has a salty metallic taste

Function

Three major functions

- Transportation
- Regulation
- Protection

Transportation

- **Respiratory**

Red blood cells or erythrocytes transport Oxygen from lungs to cells and Carbon dioxide from cells to lungs

- **Nutritive**

Blood absorb nutrients from digested foods in gastrointestinal tract and transport to all the cells in body.

- **Excretory**

Metabolic wastes, excess water and ions, and other molecules not needed by the body are carried by the blood to the kidneys and excreted in the urine.

Regulation

- **Hormonal** : Blood carries hormones from their site of origin to distant target tissues, where they perform the regulatory functions

- **Temperature** : Blood is responsible to carry body heat to the surface in high temperature environment as well as to keep body heat in within low temperature environment.

Protection

- **Clotting** :The clotting mechanism protects against blood loss when vessels are damaged

- **Immune** :The immune function of blood is performed by the leukocytes that protects against many disease causing agents.

Composition of the Blood

- Blood consists of formed elements that are suspended and carried in a fluid called plasma

- ❖ Suspension of *cells* in plasma (carrier fluid)

45% Cells

55% Plasma

- ❖ Cells

Red cells (erythrocytes) 99%

White cells (leukocytes)

AND < 1% Platelets (thrombocytes)

- The formed elements

- Erythrocytes Oxygen transport

- Leukocytes Immune defence

- Platelets Blood clotting

Plasma

- Straw colored fluid made of water (~90%), other contents include:

- Proteins make the bulk of the solutes:

Albumins (60%), manufactured in the liver are the most abundant

Globulins (36%) are immune bodies

Fibrinogen (4%) for blood clotting

- Nutrients: glucose, amino acids, lipids, cholesterol

- , PO_4^{3-} , HCO_3^- , Cl^- , H^+ , Mg^{++} , Ca^+ , K^+ Electrolytes: Na^+ , SO_4^{--}
- Waste: urea, creatinine, uric acid, bilirubin
- O_2 , N_2 , CO_2 Gases: O_2
- Protein bound hormones
- Plasma without clotting factors is called “serum”

Functions of plasma proteins

- 1 .Coagulation of blood – Fibrinogen to fibrin
- 2 .Defense mechanism of blood – Immunoglobulins
- 3 .Transport mechanism – α Albumin, β globulin transport hormones, gases, enzymes, etc.
- 4 .Maintenance of osmotic pressure in blood
- 5 .Acid-base balance
- 6 .Provides viscosity to blood
- 7 .Provides suspension stability of RBC
- Reserve proteins .8