Name of student: …… **Stage: First**

Lecture Name: Hemoglobin evolution **Number: 8**

Date: 21/ 5/ 2025 **Time: 8:30 AM** **Place: BC 101**

Hemoglobin is an iron-containing metalloprotein that transports oxygen in the red blood cells of humans. It gives the blood its red color. Hemoglobin carries oxygen from the lungs to the rest of the body (i.e the tissues) where it releases the O2 to burn nutrients to provide energy to power the functions of the body & collects the resultant CO2 to bring it back to the lungs to be releases to the atmosphere . Hemoglobin is the major constituent of the red cell cytoplasm, accounting for Hemoglobin

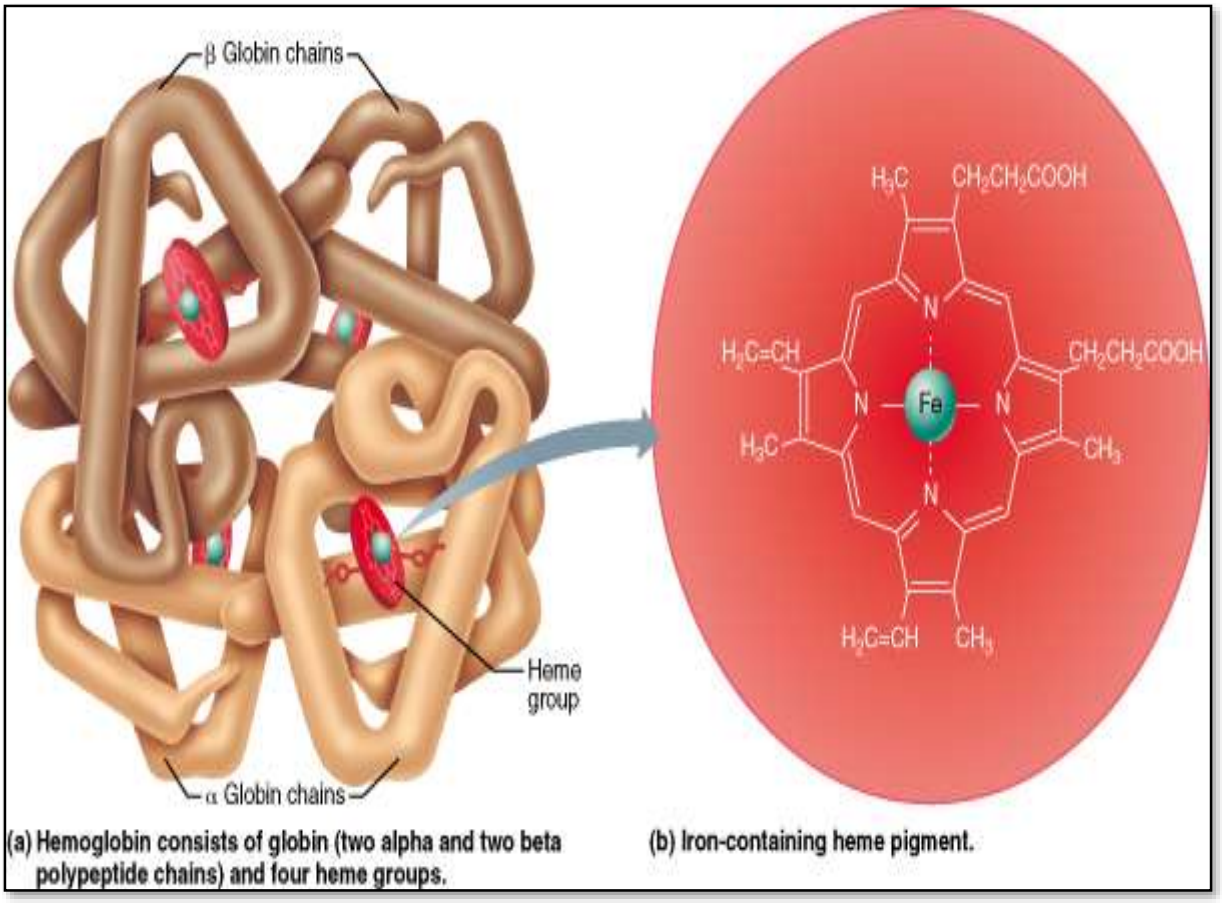
The name hemoglobin is the combination of heme and globin, reflecting the fact that each subunit of hemoglobin is a globular protein with an embedded heme (or haem) group. Each heme group contains one iron atom, that can bind one oxygen molecule. The most common type of hemoglobin in mammals contains four such subunits.

Hemoglobin (Hb or Hgb) is a red color pigment present in red blood cells (RBCs) comprises Fe and Globin protein.

HB consists of two parts:

1- Pigment heme (iron containing pigment), which constitutes (4%)

2- Protein globin (96%)



(a) Hemoglobin consists of globin (two alpha and two beta polypeptide chains) and four heme groups.

(b) Iron-containing heme pigment.

Hemoglobin consists of 4 heme groups, each is protein chain (2 pairs of polypeptides in each), 2 of those protein chains form hemoglobin molecule.

Normal level: **the normal value of Hb varies according to the age and sex of the individuals. The normal ranges are:**

Female: 12 - 16 g/dl

Male: 13 - 18 g/dl

Children: 11 - 16 g/dl

Pregnant women: 11 - 12 g/dl

Function of Hb:

1- Act as O2 carriers from the lungs to tissues and back transport of CO2 from tissues to lungs

2- Acts as buffer that helps regulate the PH of the blood

3- When it is broken down, it forms a bile pigment (which has a role in the digestion of lipids)

Significance of Hb estimation

1- Decrease in the haemoglobin below the normal range is an indication of anemia.

2- Causes for increase in the haemoglobin concentration:

Hypoxic states

Increased secretion of erythropoetin

Polycythemia vera

Estimation of hemoglobin

The Estimation of hemoglobin in the blood is commonly prescribed in various physiological and pathological conditions and as both diagnostic and prognostic test especially in case of suspected Anemia which can be caused by various factors.

Nowadays in many laboratories, the Hemoglobin estimation is done by using Automatic Hematology Analyzers but still in many other labs the following method is Commonly used to determine the Hemoglobin concentration in patient's blood.

A- Sahli's Method or Acid Hematin Method

B- Cyanmethemoglobin Method (CMG) Or Drabkin's Method for Estimation of Hemoglobin this measured using a spectrophotometer

Principle Sahli method:

- In this method, the blood Hb is converted to brownish hematin compound by the action of HCl. Each type of Hb must be converted to standard form and color which is and hematin.
- The higher the Hb conc. The intense the color of hematin will be, the intensity of the color is measured comparing it with standard solution of Hb.

Dropper

Sahli's paipette

Hemometer comparative tubes with double scales (g%) & (percent of normal)