



# Estimation of Hemoglobin

Physiology lab 5

March 2019

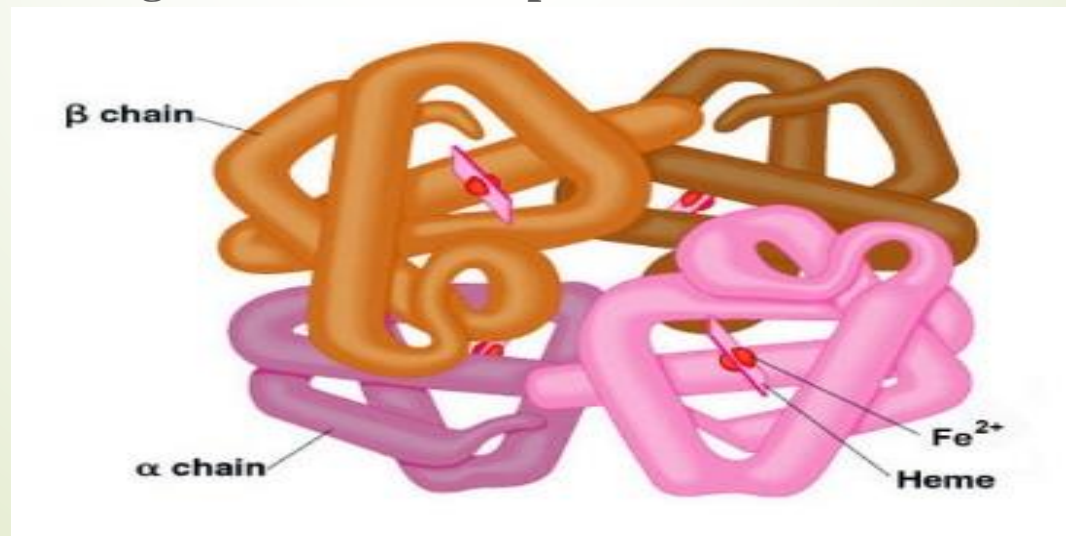
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# Hemoglobin

- Found in the RBC.
- Responsible for carrying oxygen to all cells in the body.
- Also binds to carbon dioxide and carries it to the lungs from the cells to be released.
- Buffer against change in  $[H^+]$
- Hemoglobin detection can also gives the health care worker an idea about:-
  - Patient's oxygen carrying capacity
  - Current blood loss and recovery from blood loss
  - Treatment of RBC disorders, like anemia.

# Hemoglobin

- Makes up 98% of the protein found in the RBC and Gives blood its red color.
- Composed of two parts....
  - ✓ Heme , 4 iron atoms in the ferrous state ( $\text{Fe}^{2+}$ ) and porphyrin ring
  - ✓ Globin , 4 protein chains
- The most common globin forms are alpha and beta chains.



## **Variant forms of hemoglobin**

**Oxyhemoglobin**: hemoglobin combined with oxygen.

**Carbaminohemoglobin**: hemoglobin combined with CO<sub>2</sub>.

**Methemoglobin**: Ferrous iron is converted into ferric iron.

## **Normal value**

**Male 13.5-17.5 gm/dl**

**Female 11.5-15.5 gm/dl**

**Newborn 21 gm/dl**

## Medical application

The body will respond for the decrease in haemoglobin level (for slightly lower than normal haemoglobin levels) as a compensatory mechanism:-

- The heart will beat faster and more forcefully.
- The lungs breath rate will increase.

when the level drops too low for us, we start to feel **tired, breathless** and may start to run into problems with too little oxygen getting to important organs like the **heart and brain**.

This can cause **palpitations, angina (chest pains), headache or dizzy spells**.

## Medical conditions

Anemia :- is a decrease of hemoglobin concentration.

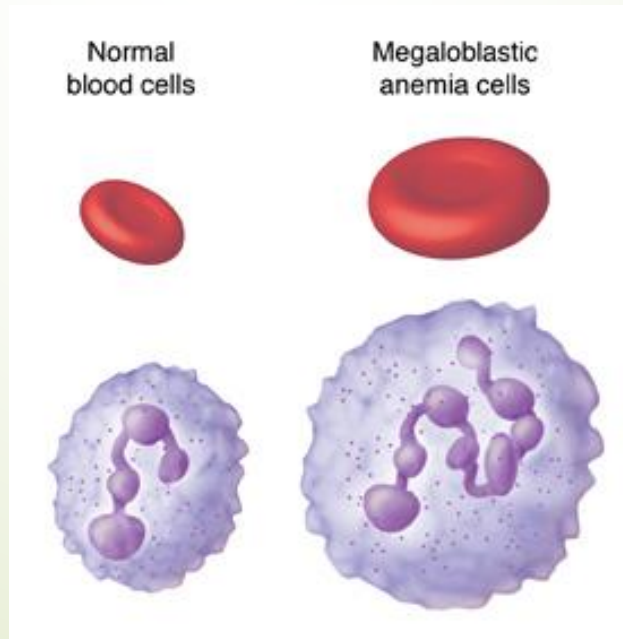
Polycythemia :- is an increase of Hb concentration.

## Types of anemia:

**Iron deficiency anemia:** commonest cause of anemia in most parts of the world cause either due to loss of iron due to bleeding or an inadequate diet or mal-absorption.

**Megaloblastic anemia:** caused by deficiency of vitamin B12 or folate deficiency or both of them.

**Pernicious anemia :-** an autoimmune destruction of gastric parietal cells leading to a lack of intrinsic factor which important for vitamin B<sub>12</sub> absorption in the gut.





## Hemolytic anemia includes

1- Hereditary spherocytosis:-

2- Glucose 6 Phosphate dehydrogenase deficiency

**Favism** (hemolytic anemia from the ingestion of the broad beans)

3- Hemoglobinopathies :

**Sickle cell anemia:**

**Thalassaemia:**

4-Acquired hemolytic anemia

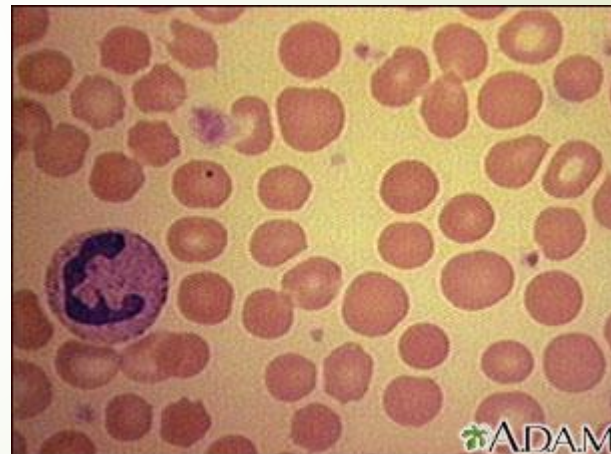
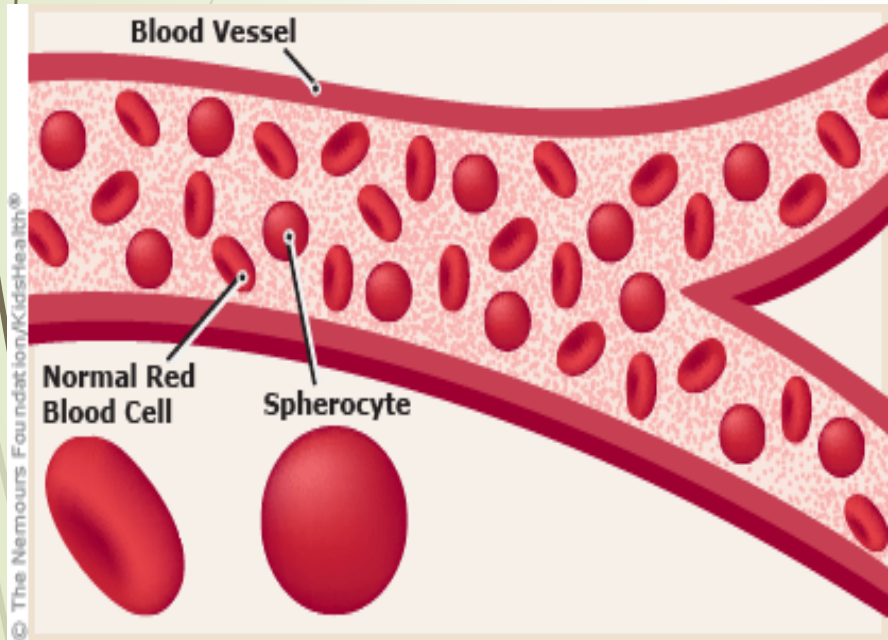
Autoimmune hemolytic anemia

Hemolytic disease of newborn

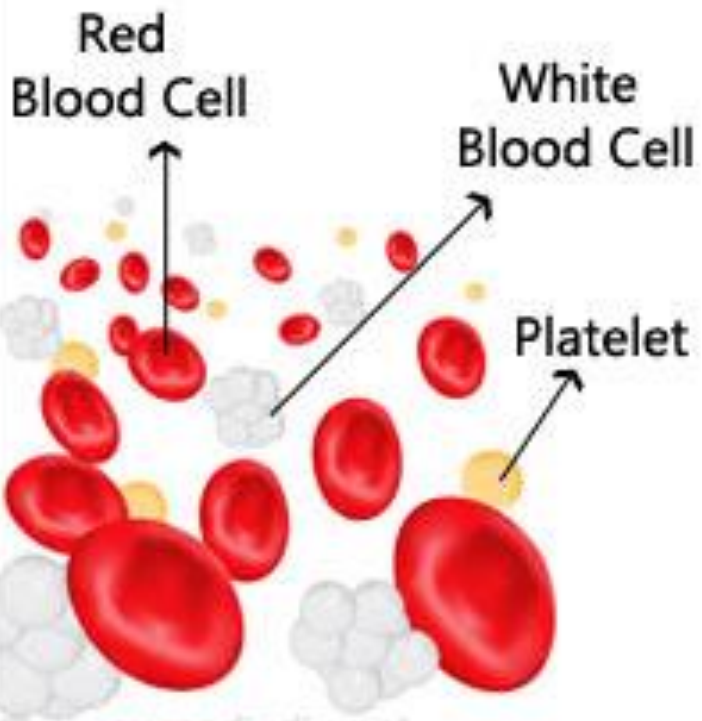
ABO incompatibility

Rhesus (Rh) incompatibility

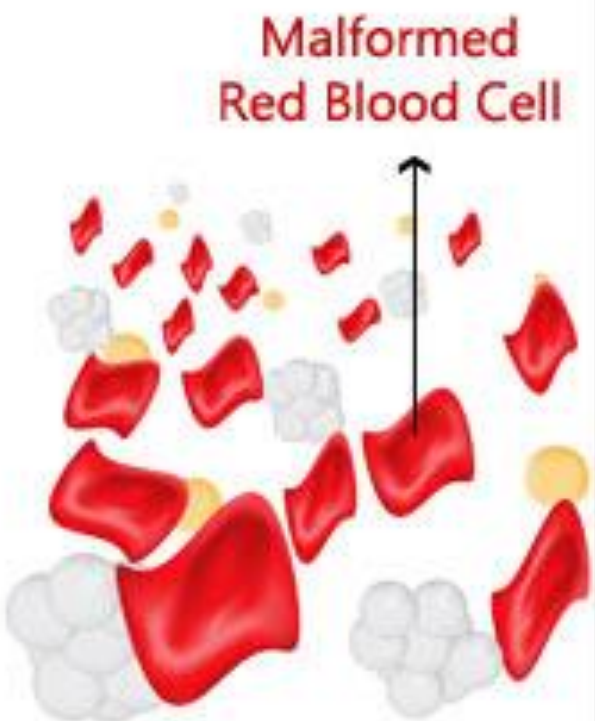
5-Anemia of chronic disease.



## Normal



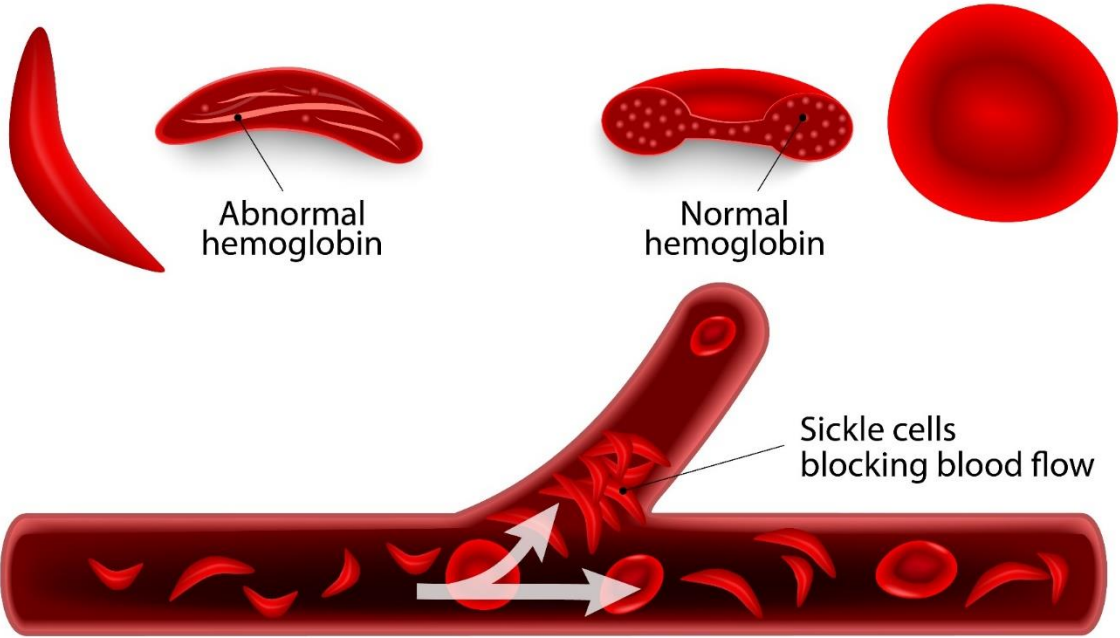
## Thalassemia



# ANEMIA

Sickle cell

Normal red blood cell



# Materials and Instruments

## SAHLI'S METHOD

All Hb is converted into acid hematine and the intensity of the color is measured by comparing it with the standered

Sahli Haemometer consists of

- ❖ A color standard
- ❖ Pipette marked to contain 20 microliter of blood.
- ❖ Graduated tube
- ❖ Distilled water (D.W.)
- ❖ 0.1 normal HCl
- ❖ Anticoagulated whole blood or capillary blood can be used.

# Sahli Pipette









## Procedure

- ✓ Fill the graduated tube to mark (2 or 10) with 0.1 normal HCl.
- ✓ Draw blood by hemoglobin pipette to mark 20Ml
- ✓ Dip the tip of the pipette in the graduated tube to blow the blood into the tube, mix content with stirrer.
- ✓ Place the tube in the hemoglobinometer for 10 minutes for complete reaction
- ✓ Add drop by drop D.W. until the color in the graduated tube is identical to the color of the standard.
- ✓ Read the result in gm/dl.



THANK YOU