University of Mosul

College of Nursing

Undergraduate Studies

Medical Physiology/ practical part

2021/2022

Article teachers

Dr. Farah M.Ghazal

Dr.Duaa M.Al-nafoly

Lecture/ Amera A.Ahmed

Lecture / Najwa M.Ahmed

Lecture /Doha N.Saad

Lab (1) Microscope

Microscope: instrument that produces enlarged images of small objects, allowing the observer close view of minute structures for examination and analysis.

The aim of the microscope:

1. To magnify the object.
2. To display the object in great detail.

The magnifying power of a microscope is an expression of the number of times the object being examined appears to be enlarged. It is usually expressed in the form 10x The resolution of a microscope is a measure of the smallest detail of the object that can be observed. Resolution is expressed in linear units, usually (um).

The objective and ocular lenses are responsible for magnifying the image of the specimen being viewed.

Total magnification = Objective magnification X ocular magnification

So for 10X objective and 10X ocular, Total magnification 10 X 10 = 100X (this means that the image being viewed will appear to be 100 times its actual size). For a 40X objective and 10X ocular, Total magnification 10 X 40 = 400X.

Types of Microscope

- Light microscope
- Dark field microscope.
- Phase contrast microscope
- Fluorescence microscope
- Electron microscope (TEM,SEM)
- Atomic force microscope(AFM).

Basic parts of the microscope:

1. Eye piece (ocular) (monocular, binocular)
2. Tube
3. Revolving nose piece. Objective lenses.

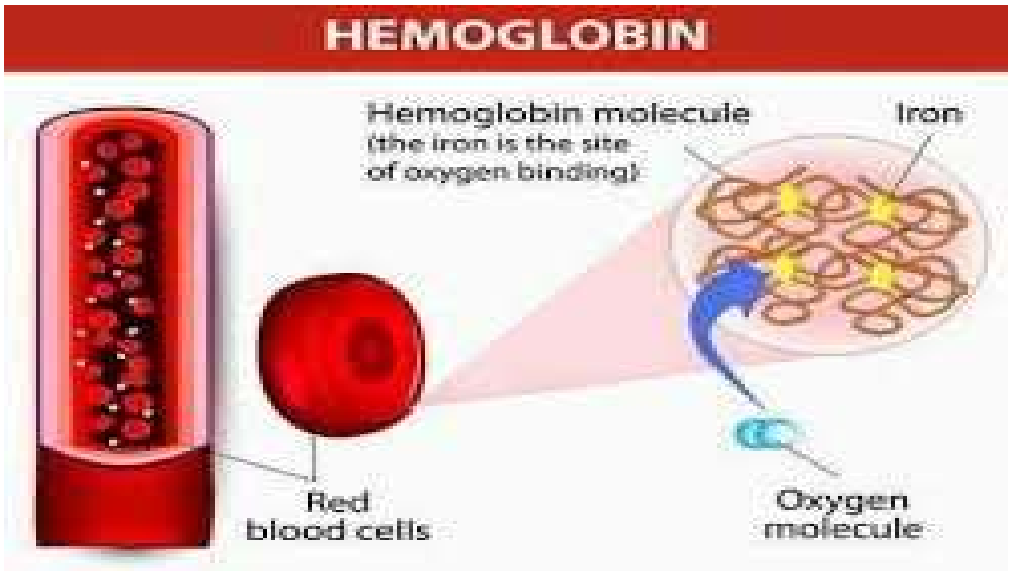
a) low power 4x, 1Ox.
b) high power 40x.
c) oil immersion lenses l00x.

4. Stage.
5. Condenser.
6. Coarse adjustment.
7. Fine adjustment.
8. Arm.
9. Base or foot.

Lab (3) **Estimation of Hb Sahli method**

Hemoglobin

- **The red blood cells contain the protein called hemoglobin**
- **It gives them ability to carry oxygen.**
- **Each red blood cell contains approximately 300million of hemoglobin molecule**
- **One molecule of hemoglobin can bind to four oxygen molecule.**
- **Hemoglobin is a chromo protein consisting of the colorless globin and four red colored heme molecules.**
- **Hemoglobin is a metal complex, containing an iron atom in the center of a porphyrin structure. Hemoglobin molecule.**

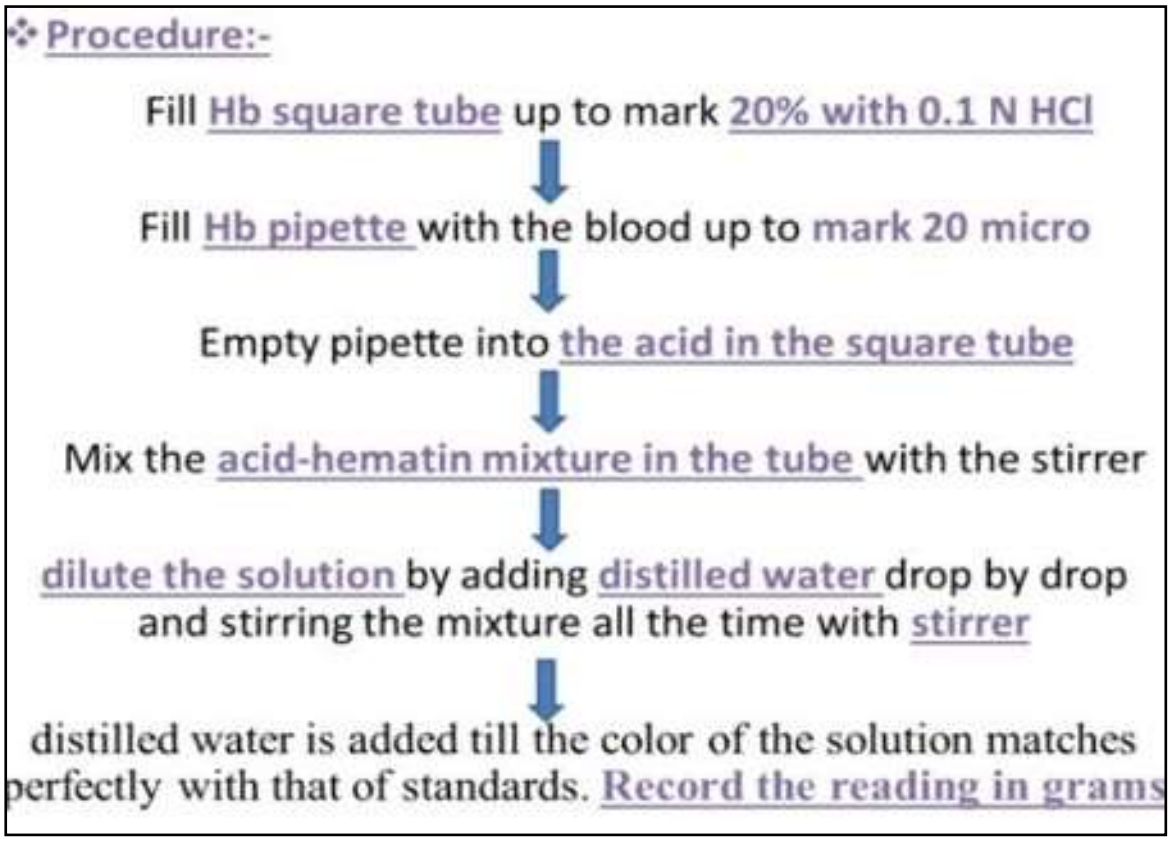


Sahli method

*** Principle: -The blood sample mixed with an acid solution so that hemoglobin converted to brown colored acid hematin. This is then diluted with water till the brown color matches that of the brown glass standard. The hemoglobin value is read directly from the scale.**

Requirements: -

1. Sahli type of hemoglobin meter
2. Hemoglobin pipette
3. Hemoglobin tubes
4.0.1N HCL
5. Dropper
6. Stirrer



Normal Value of Hb

Newborns: 17 to 22 gm/dL
One (1) week of age: 15 to 20 gm/dL
One (1) month of age: 11 to 15 gm/dL
Children: 11 to 13 gm/dL
Adult males: 14 to 18 gm/dL
Adult female: 12 to 16 gm/dL

Abnormal value:-

If your hemoglobin level is lower than normal, you have anemia., which can include:

- **Iron deficiency**
- **Vitamin B-12 deficiency**
- **Bleeding**
- **Cancers that affect the bone marrow, such as leukemia**
- **Kidney disease**
- **Liver disease**
- **Hypothyroidism**
- **Thalassemia**

Lab (4)

P.C.V " Packed Cell Volume"

Packed cell volume of whole blood

PCV (Hematocrit): is defined as the volume occupied by erythrocytes in given volume of the whole blood sample.

Principle:

-Hematocrit is usually determined by spined a blood-filled capillary tube in a centrifuge.

-Specimen: Venous blood anticoagulated with EDTA or capillary blood collected directly into heparinized capillary tubes can be used.

Equipment

- **Capillary tubes, heparinized for finger sticks (red tip) or plain for anticoagulated blood (blue tip)**
- **Clay-type tube**
- **Micro hematocrit centrifuge**
- **Micro hematocrit reader**

Procedure

1. Fill two capillary tubes approximately three quarters full with blood anti-coagulated with EDTA or heparin. Alternatively, blood for heparinized capillary tubes may be collected by capillary puncture. Wipe any excess blood from the outside of the tube

2 .Seal the end of the tube with the colored ring with nonabsorbent clay

3. Balance the tubes in the centrifuge with the clay ends facing the outside away from the center, touching the rubber gasket.

4.Tighten the head cover on the centrifuge and close the top. Activate the centrifuge for 5minutes between 10,000 and 15,000rpm

5. Determine the HCT by using a micro hematocrit reading device Read the level of RBC packing; do not include the buffy coat (leukocytes and platelets when reading.

Reference ranges:

-Newborn Infant/child 53-65% 30-43%

- Adult male 42-52%

- Adult female 37-47%

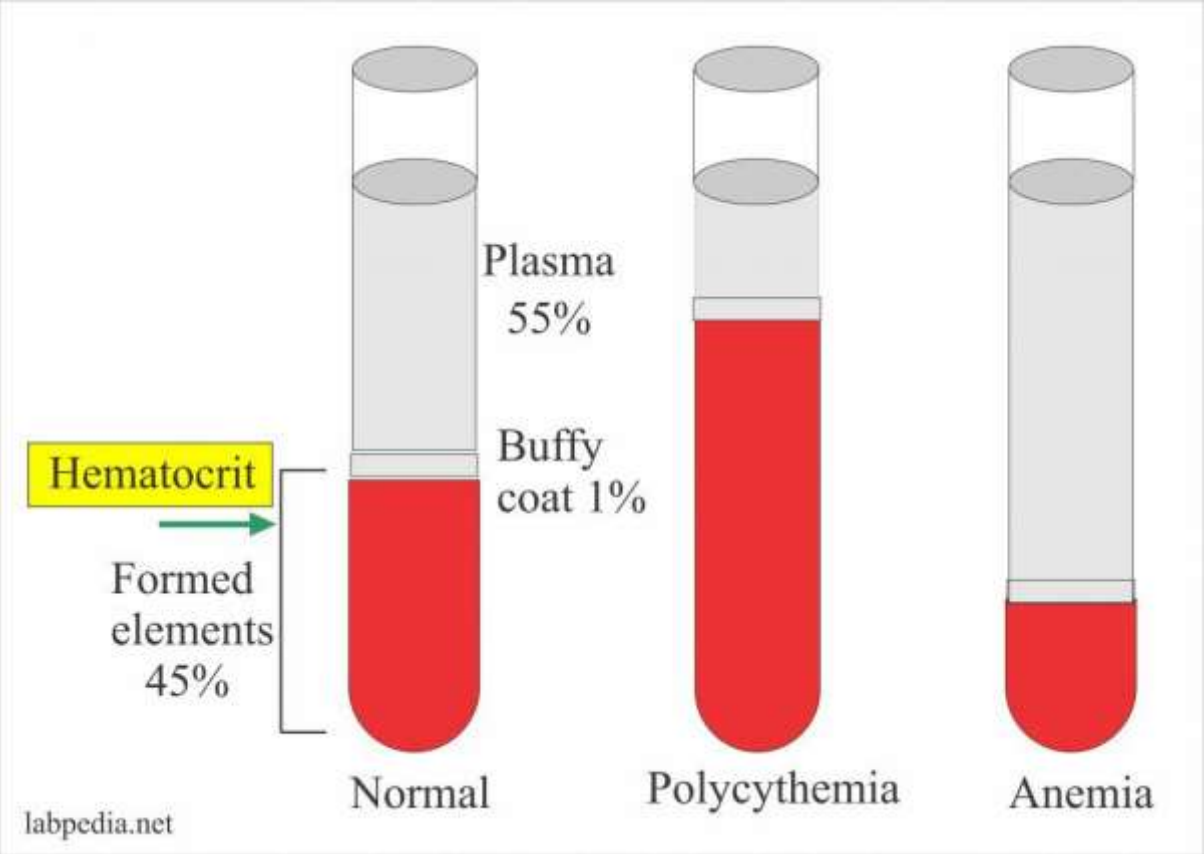
High Hematocrit Level \ High PCV

- **Polycythemia**
- **Heart or kidney problems**
- **Intake of anabolic steroids**
- **Dehydration**
- **Diarrhea**
- **Lung problems**
- **Burns**
- **Smoking, High altitudes**

Low Hematocrit Levels

The most common symptoms of low hematocrit levels are: fatigue, weakness, dizziness. Low hemoglobin levels and pregnancy is commonly associated with a decreased hematocrit range; Other causes are:

- **Anemia**
- **Nutritional deficiencies**
- **Bleeding**
- **Renal failure**
- **Pregnancy**
- **Medications**



Lab (5) **Blood Groups**

Human red blood cells have on their membrane antigens called "agglutinogens" while the plasma of blood contain antibodies called "agglutinins"

The blood grouping is based on two antigen present on the membrane of the red cells, they are "A" and "B" while the antibodies present in plasma are "anti - A" and "anti—B".

O: Type O individuals can donate blood to anyone, because their blood has no antigens. However, they can only receive blood from other type O individuals (because blood with any antigens is seen as foreign). A: Type A individuals can donate to other type A individuals and type AB individuals. Type A individuals can receive blood only from other type A individuals and type O individuals.

B: Type B individuals can donate blood to other B individuals and AB individuals. Type B individuals can receive blood only from type B individuals and type O individuals. AB: Type AB individuals can give blood only to other AB individuals, but can receive blood of any type. People who have matching blood groups are said to be 'compatible' This means they could give or receive each other's blood if necessary.