Lecture 6 : Manual and automated Red Blood Cell (RBC's) COUNT

The RBC counting: The count of red blood cells, is the number of red blood cells in mm^3 of whole blood.

RBC count - Normal Values :

- Men: 4.5-6.2 × 10^6/mm3
- Women: 4.0-5.5 × 10^6/mm3
- at birth: 4.0-6.0 × 10^6/mm3
- 3 years – 10 years: 4.0-5.0 × 10^6/mm3

The RBC counting performed by :

1. Manually by Heamocytometer
2. The blood cells automatic analyzer (Part of CBC ;group of tests)

Importance OF RBCS counting :

RBCs count less or more than normal , It is a screen test anemia or polycythemia

1. Rbc count using Haemocytometer :

Materials:

- Venous blood mixing with EDTA or capillary blood with heparin
- Improved neubauer's counting chamber with Coverslips
- RBC pipette and RBC Diluting solution (Hayem's Fluid), the purpose of this fluid: its isotonic solution diluted blood, prevent lysis and blood sedimentation)
- Compound Microscope

Principle: The blood is diluted 200 time with RBCs diluting fluid (1\200) in practice (20ul blood and 4 ml dilution).

Procedure:

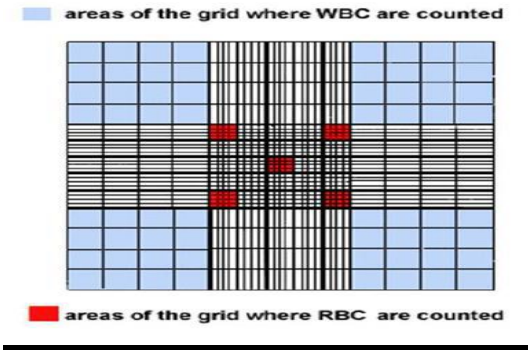
1. Draw blood by micropipette 20 ul.
2. Mix the blood with diluting fluid 4ml.
3. Mix the contents in glass tube for 2 min.
4. Introducing the sample into the Neubauer chamber (10ul from mixture).
5. To count the RBCs the microscope must be switched to 40X objective
6. Count RBCs from R marked 5 squares
7. Rbcs count in*10.000 cells of blood

Calaulation:

$$\text{Count (/l)} = \frac{\text{No. of the counted cells.}}{\text{Volume of the blood (µl)}} \text{ dilution X } 10^6.$$

$$\text{Count (/l)} = \frac{N}{0.02} \text{ X 200 X } 10^6 \text{ / l.}$$

Number of red cells count / l = N x 10,000



Causes of decreased RBC count:

- Impaired red blood cell (RBC) production
- Increased RBC destruction (hemolytic anemia's)
- Blood loss
- Fluid overload (hemodilution)

Causes of high red blood cell count:

- High altitudes , Hypoxia, Smoking, Dehydration
- Polycythemia vera (often a hereditary problem)
- Congestive heart disease, Certain lung diseases
- Erythropoietin doping by athletes to boost their performance
- Some types of anemia has high RBC count such as β-thalassemia

Physiological effect on Rbc count: -

1-age 2-sex 3-Activity 4-nutrition 5-pregnancy 6-brest feeding 7-psychological Emotions

2. Automated Red blood cell count:

Electronic counter is based on the principle of aperture impedance method.