

Erythrocytes count (Total Count of RBC)

The RBC is the number of red blood cells in a given volume of whole blood. It is usually determined using an automated counter or manual haemocytometer counts. RBC Normal Values : Males 4.7 to 6.1 million cells per microliter & Females 4.2 to 5.4 million cells per microliter.

Objective: To enumerate the total count of RBC/cumm of a given blood sample.

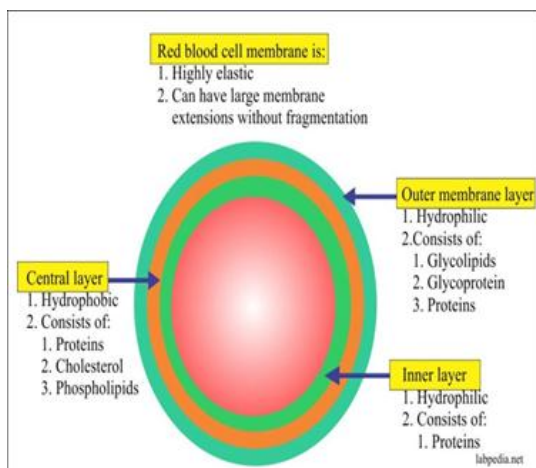
Method: Hemocytometry method

Significance

- It performs some functions such as transportation of O₂ and CO₂
- Each RBC cell have 280 million hemoglobin molecules.

Low RBC Count □ Known as anemia □ Acute or chronic bleeding □ RBC destruction (e.g., hemolytic anemia, etc.) □ Nutritional deficiency (e.g., iron deficiency, vitamin B12 or folate deficiency) □ Bone marrow disorders or damage □ Chronic inflammatory disease □ Kidney failure.

High RBC Count □ Known as polycythemia □ Dehydration □ Pulmonary disease □ Kidney or other tumor that produces excess erythropoietin □ Smoking □ Genetic causes (altered oxygen sensing, abnormality in hemoglobin oxygen release) □ Polycythemia vera



Red Blood Cells (erythrocytes)

1. Function

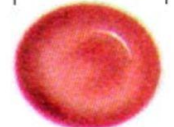
erythrocyte as a **bag for hemoglobin**

- O₂ → transport, reactive oxygen species (ROS)
- CO₂ → transport, formation of HCO₃⁻
- H⁺ → transport, maintaining pH (35% of blood buffering capacity)

2. Structure

- large surface (for diffusion of gases)
- cytoskeletal proteins (for elasticity)
- membrane as an osmometer (Na⁺/K⁺-ATPase)

7 μm



Top View shows RBC to be circular



Side view shows RBC to be a biconcave disc

Requirements: Hemocytometer, cover slip, microscope, RBC diluting fluid, Haeyem’s solution or Physiological saline 0.85% Nacl.

Procedure

1. Take the blood in to RBC pipette up to 0.5 marks
2. Immediately draw the RBC diluting fluid up to mark 101.
3. Rotate the pipette between thumb and other fingers with finger eight (8) movements. This gives a dilution of 1:200.
4. Clean the counting chamber of hemocytometer and cover slip
5. Place the cover slip in position over the counting chamber by gentle pressure
6. Expel a drop of blood on to the counting chamber by holding the pipette at an angle of 45°.
7. Allow the hemocytometer for 2-3 min to settle down the RBC in counting chamber

Counting: Counting rules

- Count less than 40 × microscope objective
- Count cells touching the left and top side lines.
- Don’t count cells touching the bottom right side lines.
- Count first left to right direction, then to vise verse.

Calculation

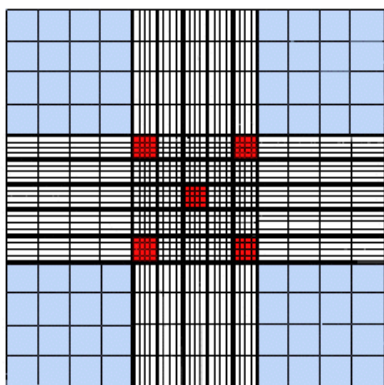
Volume of one small square = $1/20\text{mm} \times 1/20\text{mm} \times 1/10\text{mm} = 1/4000\text{mm}^3$

Volume of 80 small square = $80 \times 1/4000\text{mm}^3 = 1/50\text{mm}^3$

Total number of RBC = Cells counted (N)/Volume of all squares × dilution factor

Total RBC = $N (\text{cell counted})/1/50\text{mm}^3 \times 1/200 = N \times 10,000$

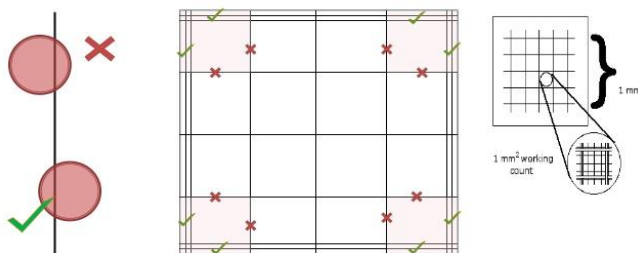
■ areas of the grid where WBC are counted

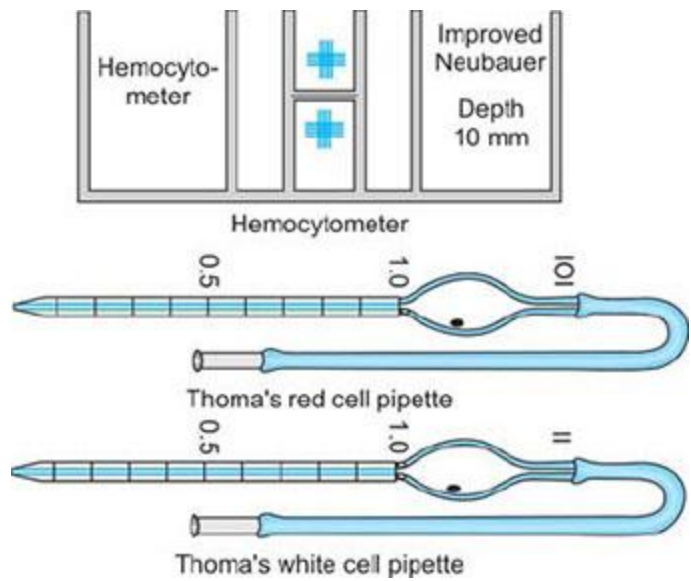
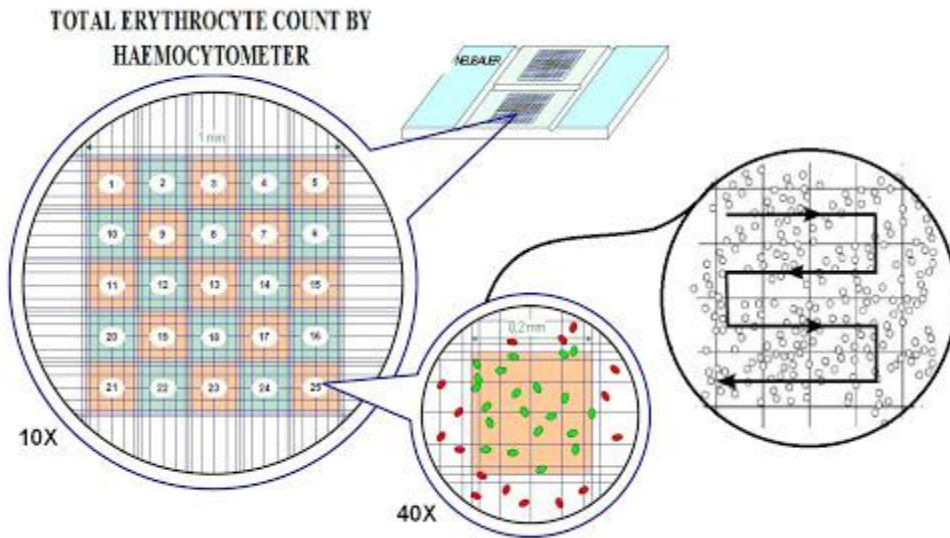


■ areas of the grid where RBC are counted

How to count ?

- Count all cells within 16 squares and those lying on middle lines, EXCEPT ...





1. <https://www.slideshare.net/drgauhar1/cbc-43258873>
2. Jelalu Kemal .(2014).Laboratory Manual and Review on Clinical Pathology.. OMICS Group eBooks,USA.