

White Blood Cells count

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White blood cells (Leukocytes)

- A type of blood cell that is **made in the bone marrow**
- WBCs (Leukocytes) are round shaped, nucleated cells. They are found throughout the body including the blood and lymphatic system.
- they are much fewer in number than red blood cells, accounting for **about 1 percent of your blood.**
- White blood cells are part of the body's **immune system.**
- They help the body **fight infection and other diseases.**

- **White blood cells count** is important in the diagnosis of disease

-Normal Value

Infants 15,000-20,000 cell/mm³

Children 4,500-13,500 cell/mm³

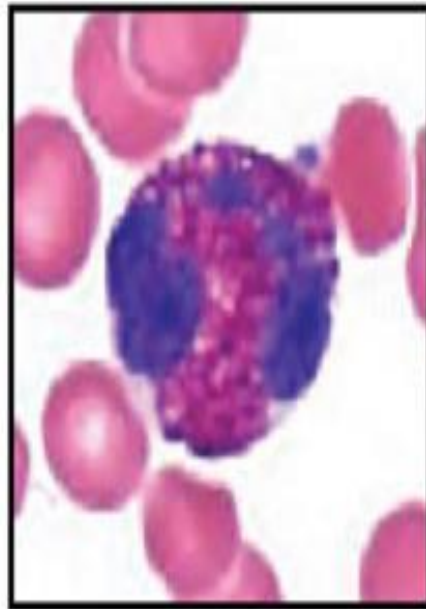
Adult 4,000-11,000 cell/mm³

Types of White blood cells

1. Granulocytes



Basophil

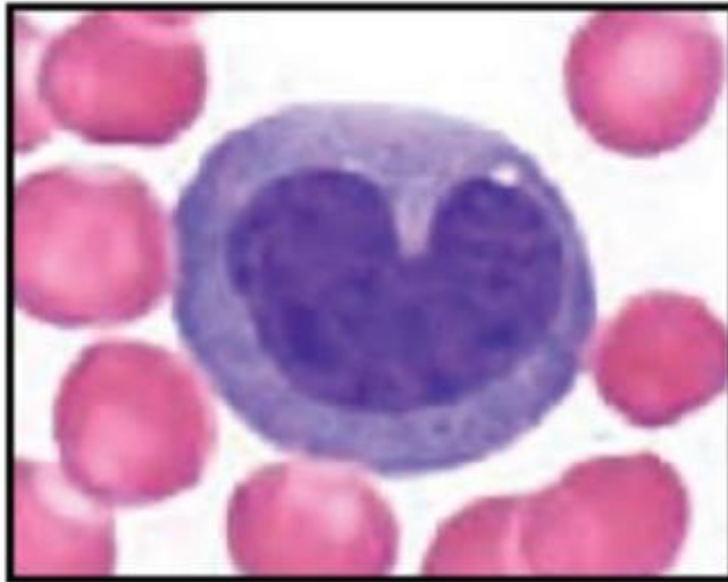


Eosinophil

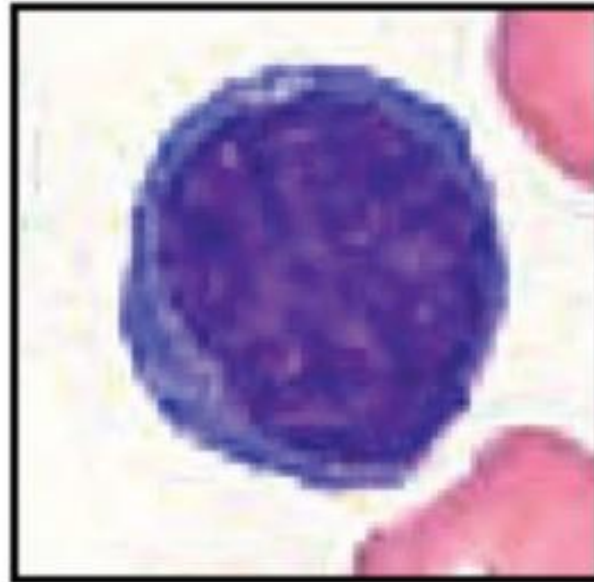


Neutrophil

2. Agranulocytes



Monocyte



Lymphocyte

Increased WBC

Increased in numbers of WBC called **(Leukocytosis)**
it is due to: -

- 1- Bacterial infection, Inflammation, Parasites and Leukemia
- 2- Physiology leukocytosis as exercise
- 3- Pregnancy

Decreased WBC

Decreased in numbers of WBC called (**Leukopenia**) it is due to:-

- 1- Viral infection, Radiation, Chemotherapy
- 2- Pneumonia, typhoid fever
- 3- Treatment with certain drugs

Experiment of White Blood Cells count

. The Principle

- The blood is diluted **20 times** with the WBCs diluting fluid .
- The leukocytes are then counted in **4 corners squares** of **the improved Neubauer chamber.**

Purpose

The WBCs count is **to determine the number of circulating WBCs in the body**

Apparatus and Reagents

- 1- Hemocytometer counting chamber (Neubauer chamber with coverslip).
- 2- WBCs counting pipette.
- 3- Rubber tube with a plastic mouth piece for drawing the fluid into a pipette.
- 4- Microscope
- 5- Diluting fluid.
- 6- Disposable blood lancet, sterile cotton, & 70% alcohol

Diluting fluid (Thomas solution)

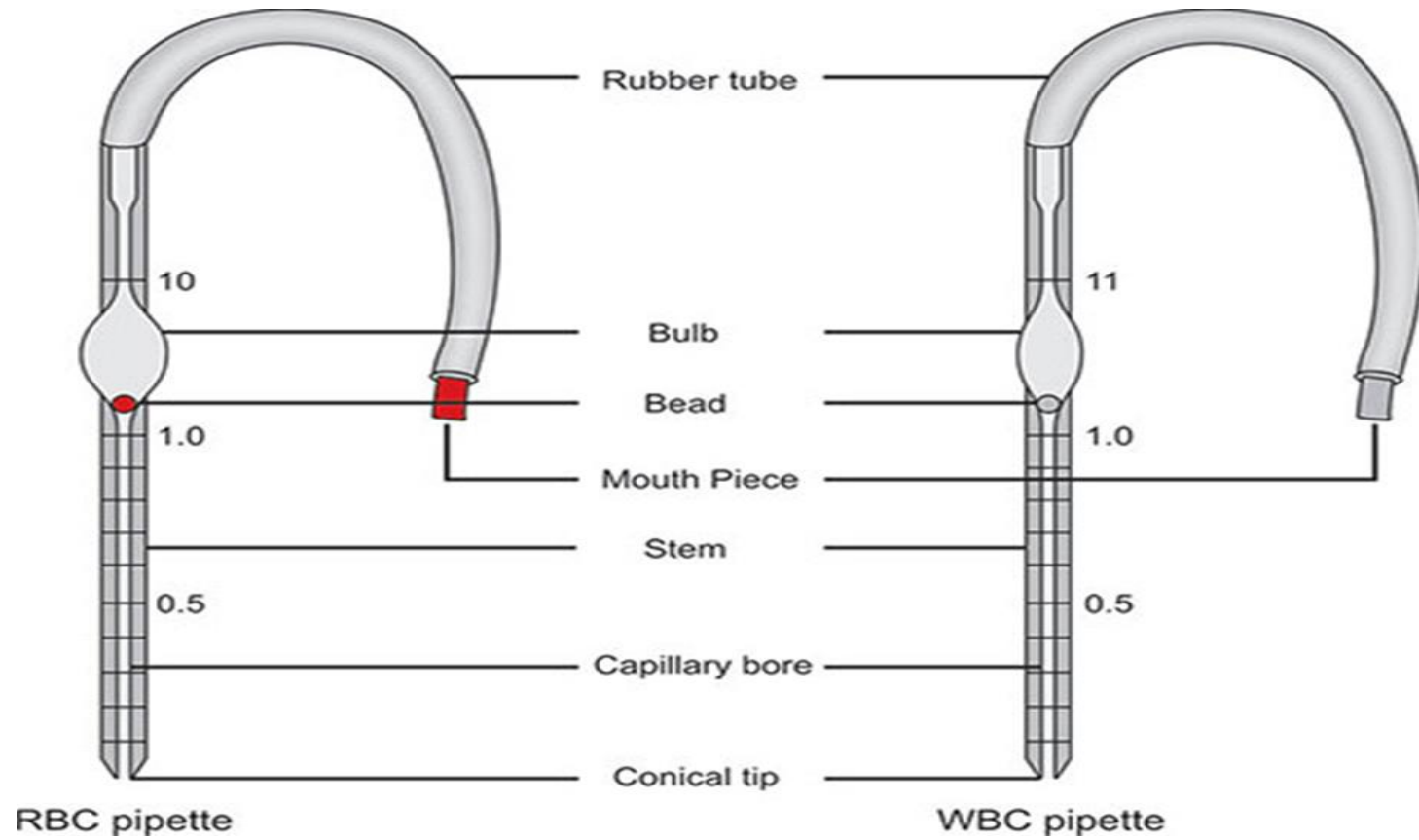
This fluid is used for diluting the blood, it is composed of:

- 1- **Glacial acetic acid (1.5 ml)** (hemolyzes RBCs without affecting WBCs).
- 2- **Gentian violet (1% solution)** (1.5 ml) (stains the nuclei of WBC).
- 3- **Distilled water** to (100 ml).

pipette

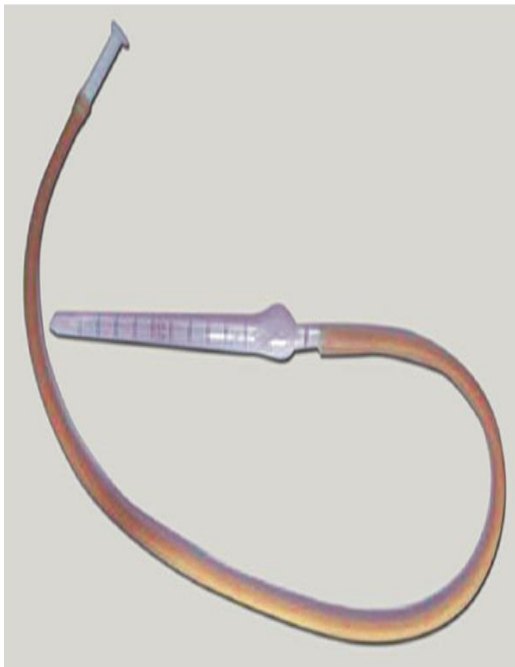
--**WBC pipette** have white bead in the bulb and its mark (**0.5**, **1**, **11**)

--**While RBC pipette** have red bead in the bulb and its mark (**0.5**, **1**, **101**)



Procedure

1- Ensure that **Hemocytometer chamber**, **coverslips** and **lenses of the microscope** are clean, **WBC pipette** is dry.



2. Sterilize the tip of the middle finger of hand

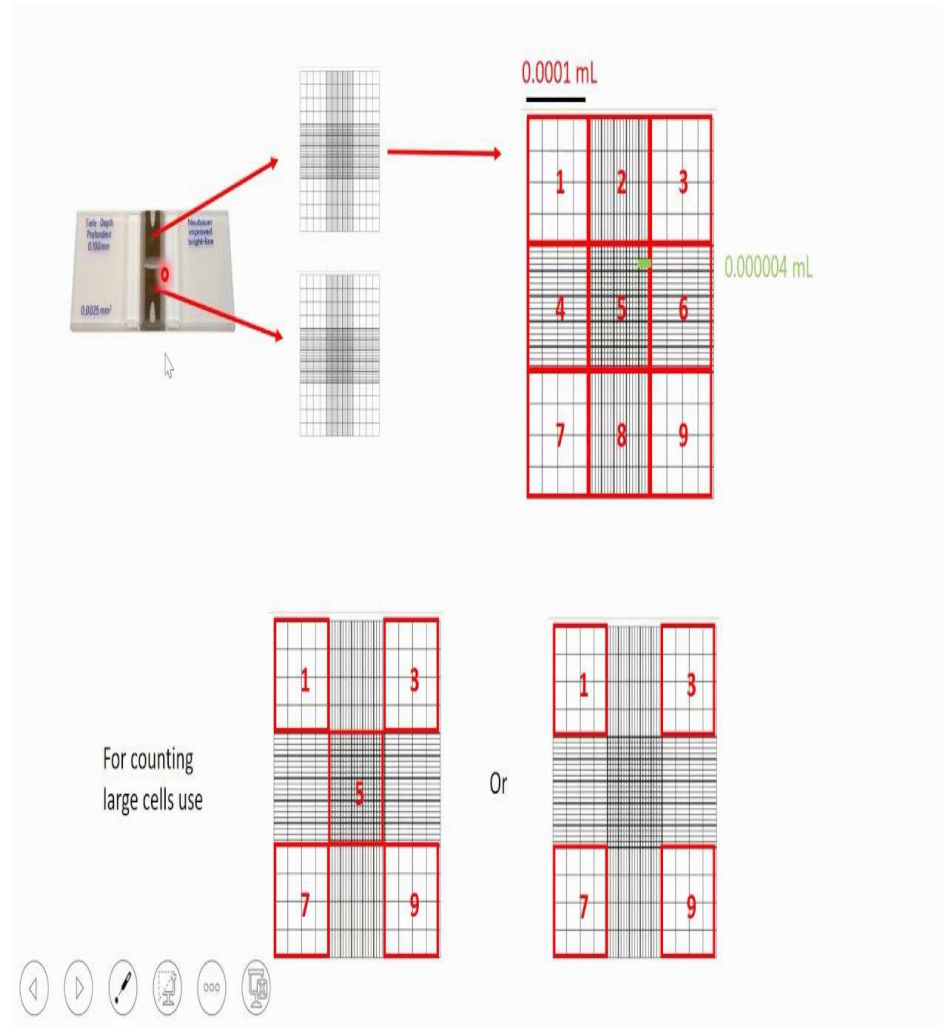
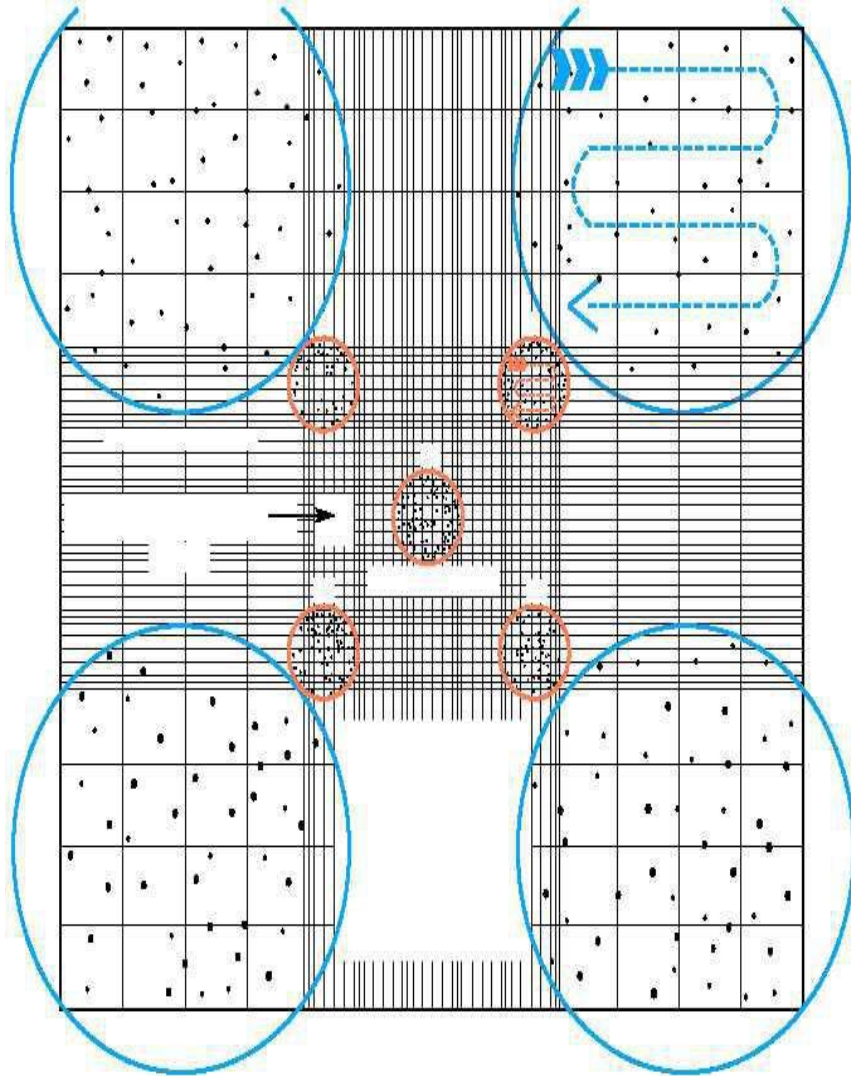


3. Suck the blood up to 0.5 marking of WBC pipette followed by the diluting fluid (Thomas solution) up to 11 marking without any air bubble.

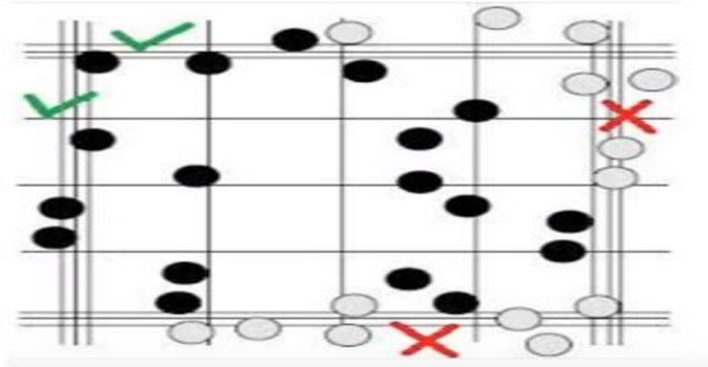
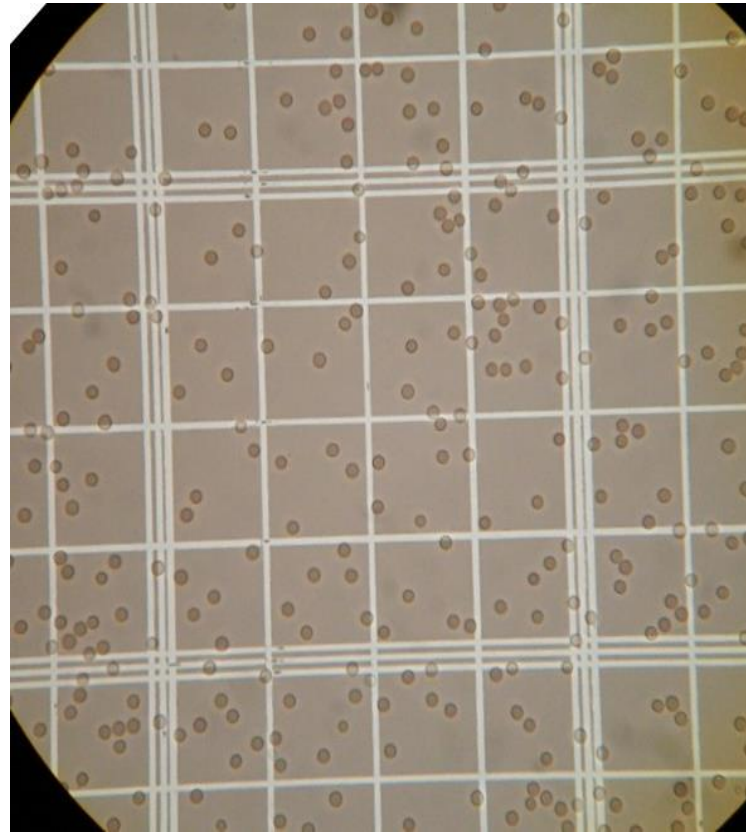
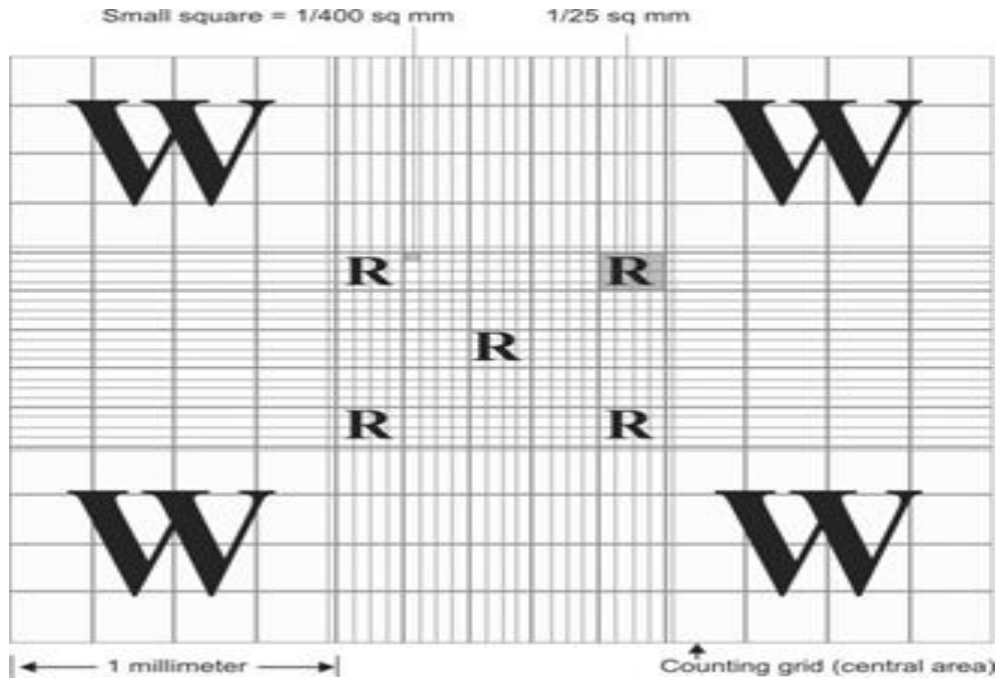
4. Mixing is done by rotating the pipette between the palms
5. After mixing the blood with diluting fluid, keep it aside for 3 minutes
6. Touch the tip of the pipette on the surface of the counting chamber in angle 45 degree.
7. Place the chamber on the stage of the microscope and allow 2 minutes for the cells to settle.
8. Scan the counting area with 10x objective lens then 40x objective

Mixing of sample





Calculation number of WBCs



Calculation

**The total number of WBCs/mm³
of**

4 squares = $N \times 50$.

**The total number of WBCs/mm³
of**

2 squares = $N \times 100$.

