كلية الرشيد الجامعة / قسم الصيدلة
مختبر الفسلجة والامراض
المرحلة الثانية
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Determination of Packed Cell Volume (PCV or Hematocrit)

Physiology Lab.

2nd stage / 1st course

Lab. (4)

Done by:
Assis. Lecturer
Zeena Ayad Hussein

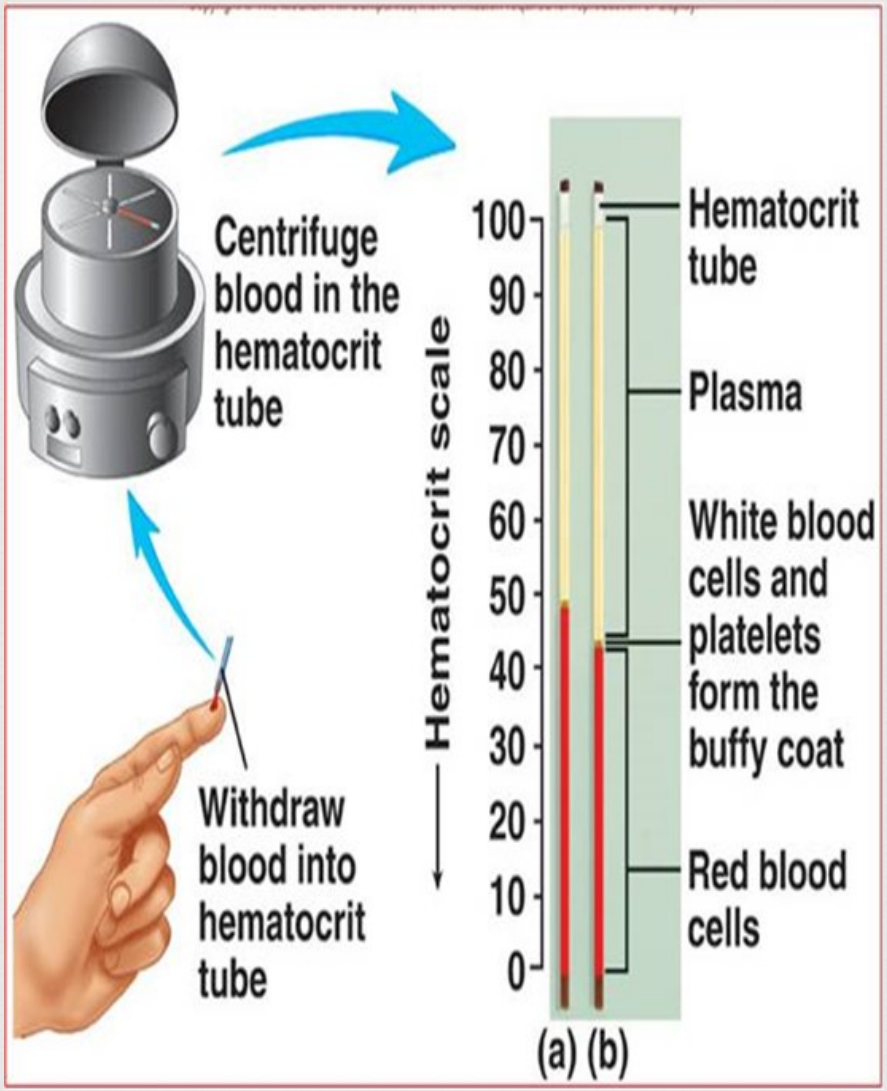
Definition:

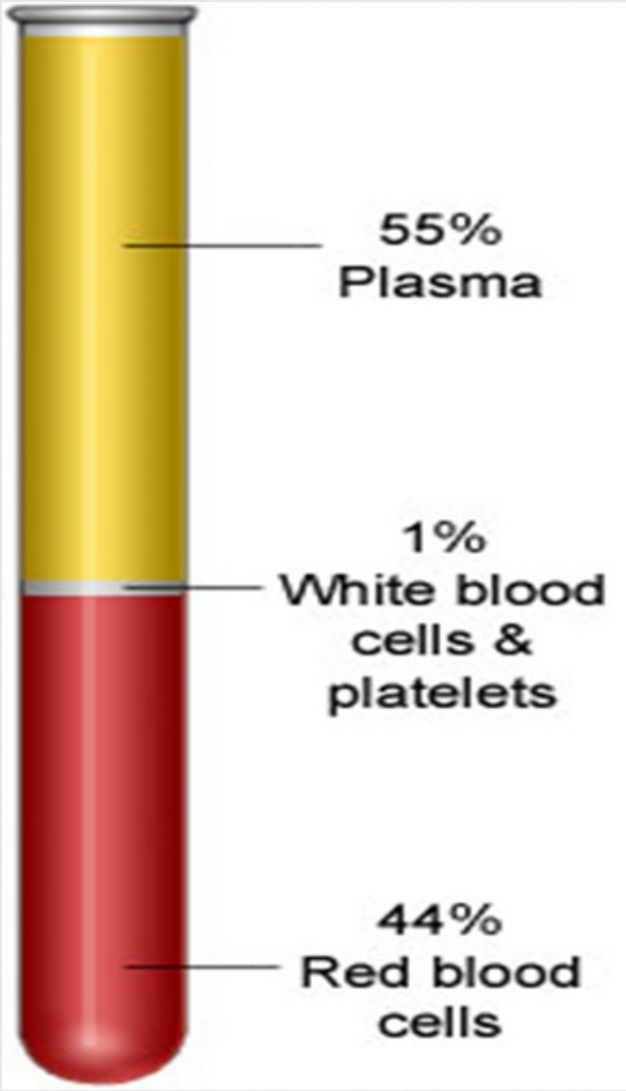
- **The hematocrit or packed cell volume** is a macroscopic observation of volume of the packed RBCs in a sample of whole blood, when measured by manual technique.
- **Advantages:**
  - Simple
  - Reliable
  - Fast
  - Used in evaluating and classifying various types of anemia

1- principle of the experiment:

- The packed cell volume (PCV), hematocrit, is a measurement of the ratio of the volume occupied by the red blood cells to the volume of the whole blood after centrifugation in a sample of capillary or venous blood expressed as a percentage.

- When whole blood is centrifuged the heavier particles fall to the bottom of the tube, and the lighter particles settle on the top of the heavier cells.





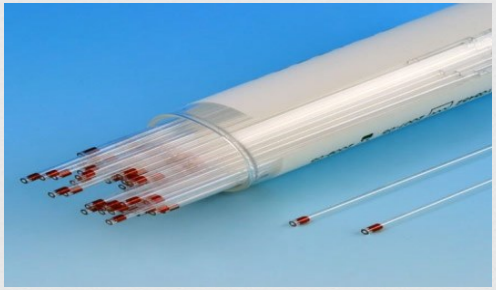
Packed Cell Volume (PCV)

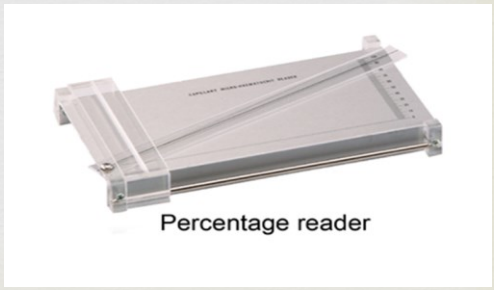
2- Aim of the experiment:

- **Uses or Aim of hematocrit or PCV:**
  - screen for anemia or polycythemia or other red cell volume alterations.
  - calculate the mean corpuscular volume (MCV)
  - calculate the mean corpuscular hemoglobin concentration (MCHC)

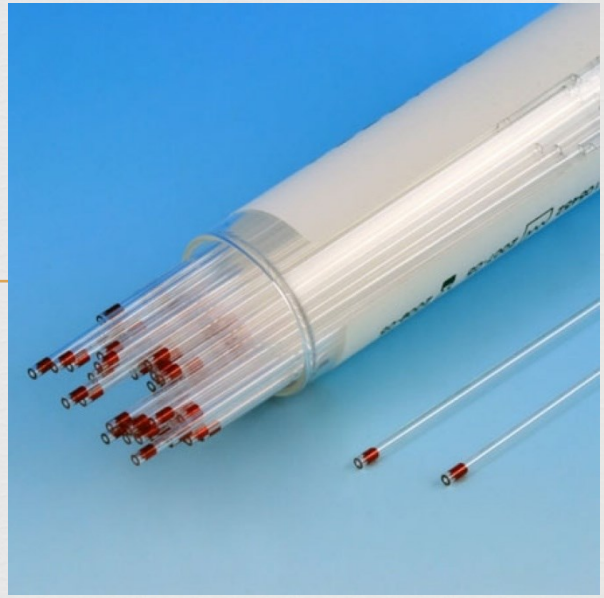
3- Equipment Used:

- 70% alcohol & cotton
- Sterile blood lancet
- Red capillary tube
- Sealing material
- Hematocrit centrifuge
- Reading device





3- Equipment used:



1. **Capillary tube:**
   - non- graduated
   - 1mm in diameter and 7 cm long
   - Inner surface lined with heparin (anticoagulant)
   - Open from both ends
   - Certain type of sealing material (like molding clay) is required for one end before the centrifugation

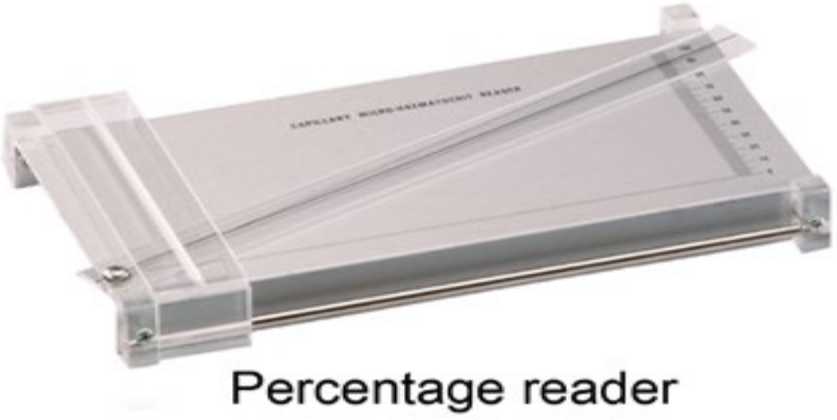
Note: capillary tube is sealed after filling with blood sample

2. Centrifuge:

- Special hematocrit (micro) centrifuge
- Capable of producing a centrifugation speed up to 5000 – 10000 rpm

3. Reading device:

- Since the capillary tube is not graduated
- Special reading device is required to measure the pecked cell volume



Percentage reader

Source of error in the experiment:

- Inclusion of the puffy coat in the reading
- Hemolysis of the specimen
- Inappropriate centrifugation time and speed
- Bad sealing
- Bad filling
- Increased amount of trapped plasma
- Irregular spinning
- Old samples
- Excess of anticoagulant
- Delayed reading the sample

Physiological Factors interfering or affecting PCV value

- **People living in high altitudes have higher hematocrit value as well as RBC count and Hb conc.**

  Because at high altitudes the oxygen tension and conc. is low, thus it stimulates the release of erythropoietin hormone from the kidneys and in return it stimulates the bone marrow to produce more RBCs

- **Men and women older then 60 years have lower hematocrit value**

  Because at older age the bone marrow becomes less active and converts from red to yellow bone marrow, thus producing less RBCs

- **Gender:** before puberty and after the age of 60 years, there is no significant difference between female and male in PCV value. While at the reproductive age, men tend to have higher PCV value then women
- **Severe dehydration** results in higher PCV value as in cases of vomiting and severe burns

  because the volume of plasma is reduced due to loss of water and proteins

- **Acute blood loss** results in a drop in PCV value after some time **because** of increased plasma volume
- **Posture:** PCV values in the recumbent position are lower than that in the upright position by about 5.7%
- **Diurnal effect:** PCV values in the evening are less than in the morning by about 10% because of plasma volume variation
- **Pregnant women** have lower PCV value **because** of the maternal circulation and hemo-dilution

- **Premenstrual phase:** the PCV value tends to be lower **because** of increased plasma volume due to hormonal effects that result in water retention
- **Shock:** causes increased PCV value due to hemoconcentration

Normal values of PCV	
New born	53% - 63%
Child	30% - 43%
Male	42% - 52%
Female	37% - 47%

Q/ in this experiment, why the red tip capillary tube is used and not the blue tip capillary tube?