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Lec.5

Estimation of Packed cell Volume (PCV)

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Hematocrit (Ht or HCT) or Packed cell Volume (PCV)

•Packed cell volume (PCV) is the proportion of blood volume that is occupied by red blood cells.

Or The PCV is the measurement of relative mass of red cells presentin sample of whole blood

•The increase in PCV value means increase the number of red blood cells per unit volume

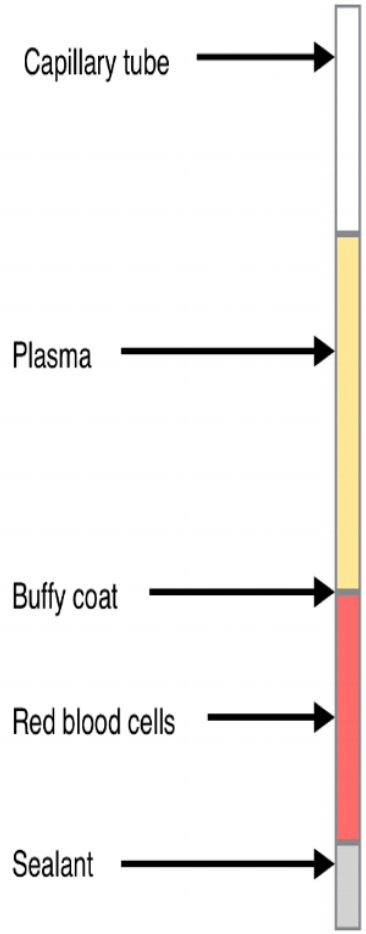
of the suspension

In a centrifuge blood is separated into three layer including :

1.The mass of the erythrocytes at the bottom which is referred to as packed corpuscles volume (P.C.V).

2. White or gray layer of leukocytes and thrombocytes immediately above the red corpuscles mass that referred to as the buffy coat.

3. The blood plasma



Decreased PCV

- A decreased PCV reflects a low number of circulating red blood cells and is an indicator of a decrease in the oxygen-carrying capacity or of over hydration. Examples of conditions causing a low hematocrit (anemia) include:

1-bleeding 2-kidney disease 3- vitamin-B12 deficiency

4-Hemolysis 5- Bone marrow disorders such as leukaemia ,lymphoma

6-Some medicines– including chemotherapy 7- pregnancy

Increased PCV

A increased PCV may reflect an absolute increase in the number of erythrocytes, or a decrease in plasma volume, in conditions such as:

1- Severe dehydration – e.g. in case of burns, diarrhea or excessive use of diuretics

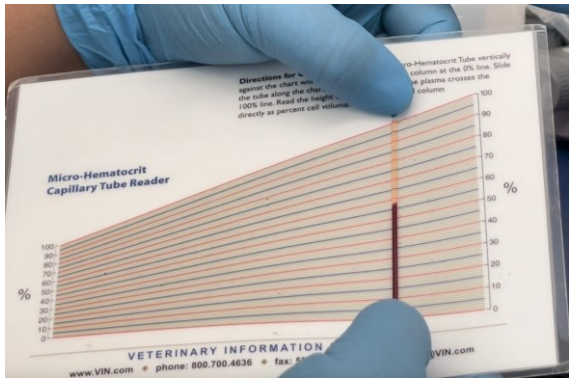
2- Erythrocytosis – excessive red blood cell production

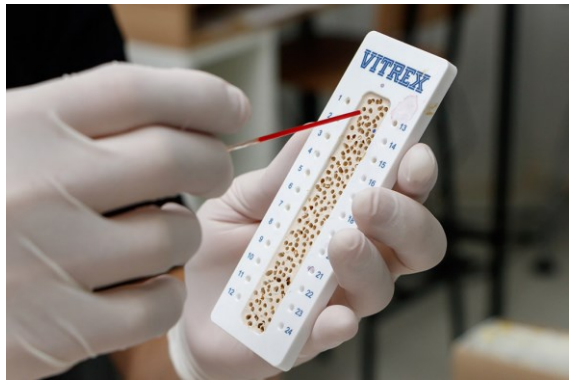
3- Polycythemia vera – abnormal increase of blood cells

4- Hemachromatosis – an inherited iron metabolism disorder

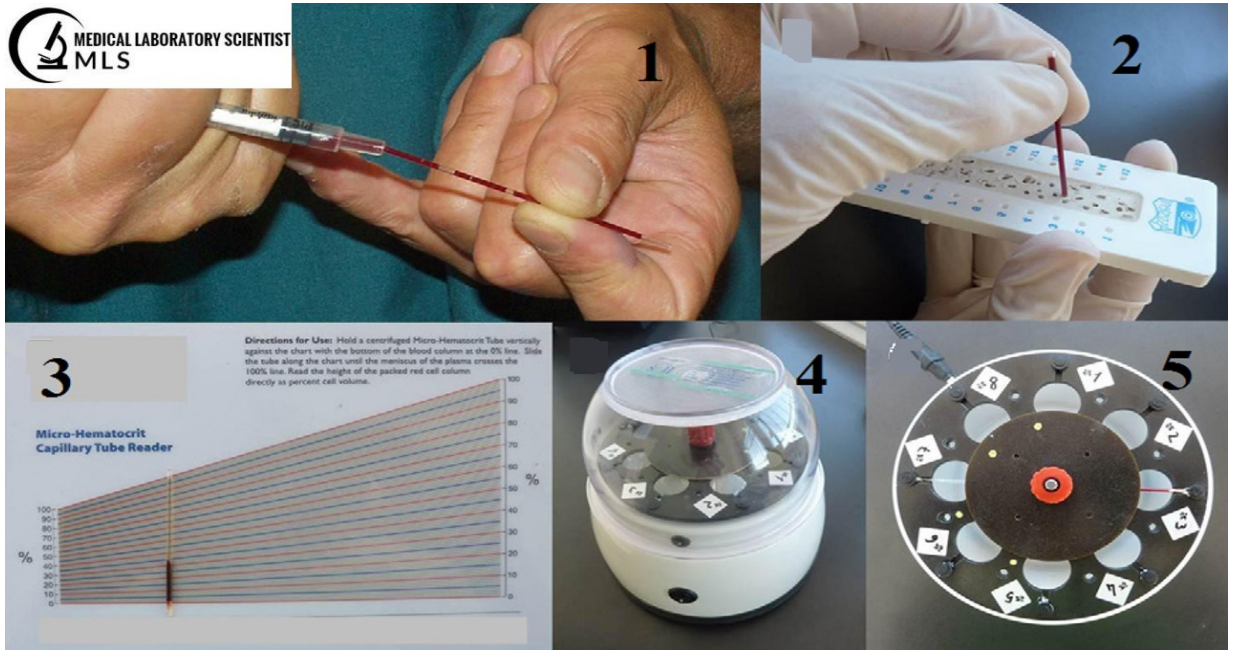
Apparatus and reagent

1. •Microhematocrit centrifuge.
2. •Whole blood in heparin or EDTA tube
3. •Microhaematocrit (capillary) tubes
4. •Plasticine clay
5. •Microhaematocrit reader





Simple Steps to Measure PCV (Packed Cell Volume):



1.Collect a blood sample
Use an EDTA tube or a finger prick.

2.Fill the capillary tube
Fill it about ¾ full with blood.

3.Seal the tube
Seal one end of the tube with clay (plasticine).

4.Place in centrifuge
Put two tubes opposite each other to balance the centrifuge. Clay end should face outward.

Simple Steps to Measure PCV (Packed Cell Volume):

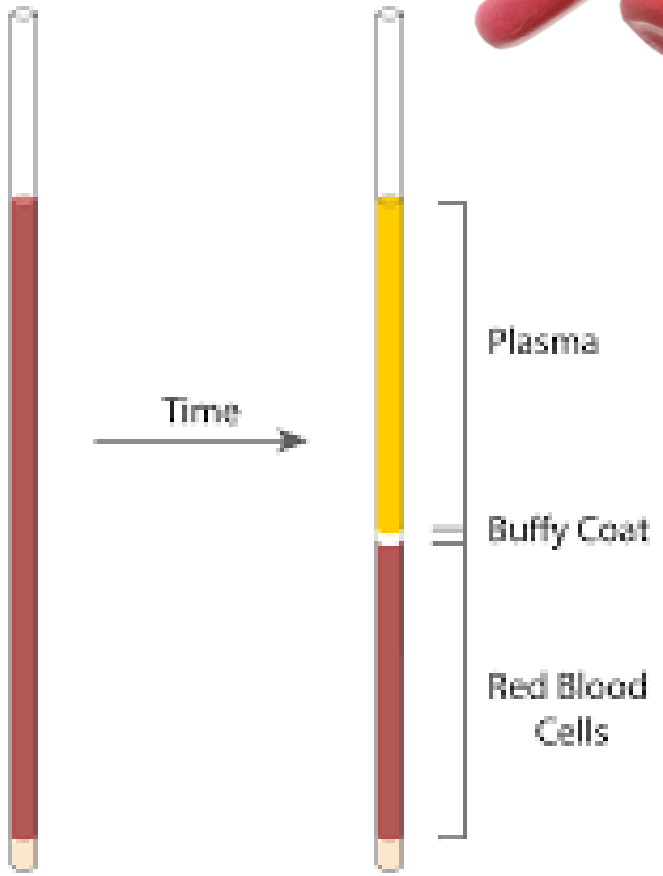
1.Spin the tubes

1. 3 minutes at 15,000 RPM
2. or 5 minutes at 10,000 RPM

2.Read the result

Use a hematocrit reader:

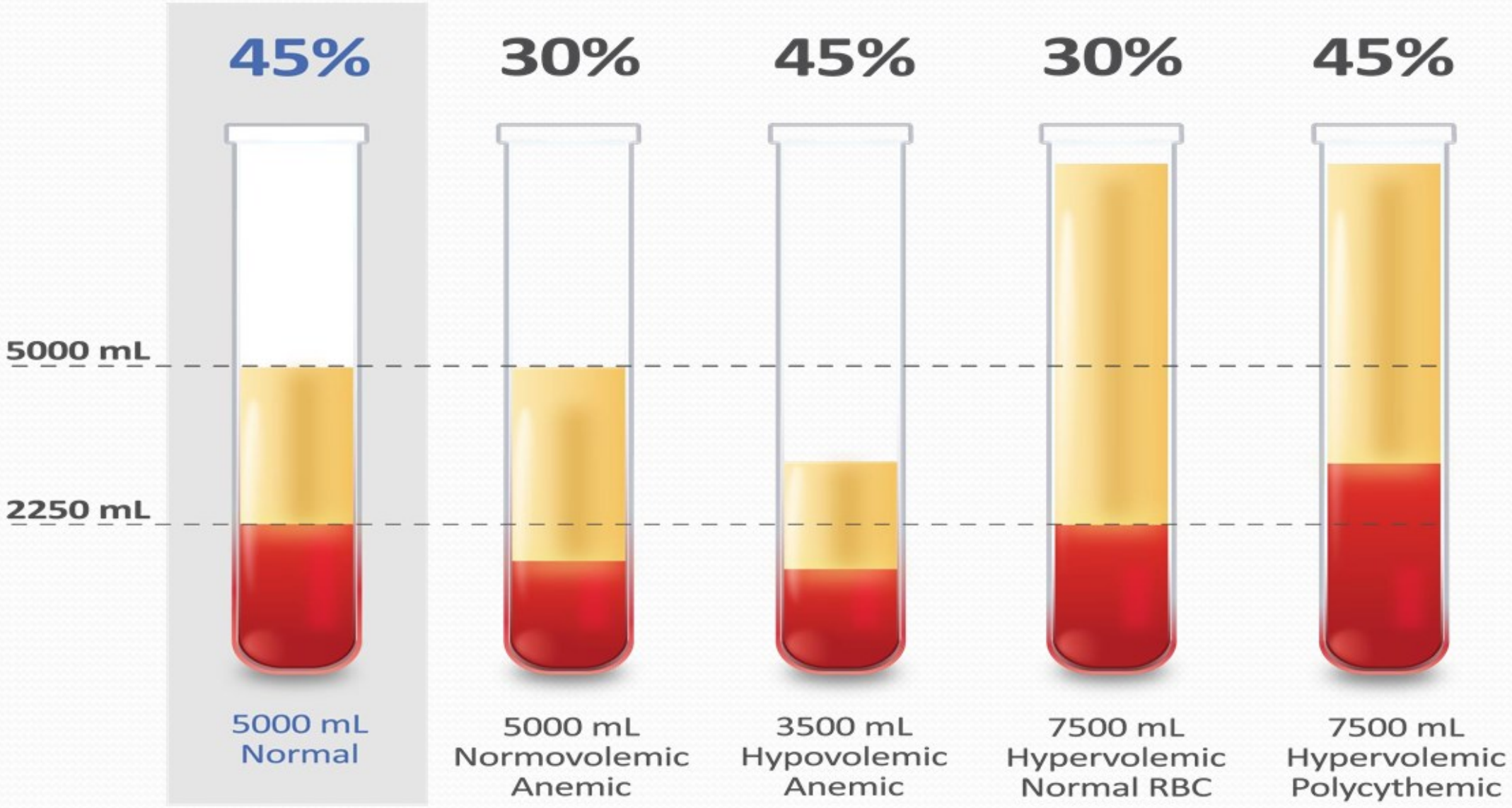
1. Set the clay end at 0%
2. Set the top of the plasma at 100%
3. Read the red cell level as the PCV value.



PCV Test Normal Range

The values of the PCV test normal range are:

- Between 35% - 48%
- The range of new born is 53%-65% while children is 30%- 43%
- The range for females is 35.5 %- 44.9%, and for males it is 38.3%-48.6%
- Low PCV in blood test results is less than 30%, and High PCV is more than 50%.


45%
30%
45%
30%
45%
5000 mL
2250 mL
5000 mL
Normal
5000 mL
Normovolemic
Anemic
3500 mL
Hypovolemic
Anemic
7500 mL
Hypervolemic
Normal RBC
7500 mL
Hypervolemic
Polycythemic
Hematocrit: % of RBC to TBV
Hemoglobin: 1/3 of Hematocrit
Plasma
Red Blood Cells