Packed Cell Volume (PCV) or Hematocrit (HCT)

Hematocrit is defined The percentage by volume of packed red blood cells in a given sample of blood after centrifugation. The hematocrit may also be referred to as Packed Cell Volume (PCV) or erythrocyte volume fraction (EVF).

To pack the RBC using the centrifuge force. Forcing all red cell below and plasma above, by centrifugal force.

Measurement of hematocrit (Hct) or packed cell volume (PCV) is the most accurate and simplest of all tests in clinical hematology for detecting the presence and degree of anemia or polycythemia. In comparison, hemoglobin estimation is less accurate, and RBC count far less accurate.

Methods for test detecting:

•Microhaematocrit

•Electronic cell counting

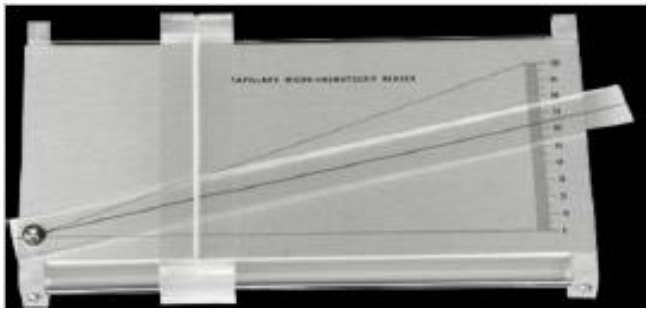
Materials using:

•Microhaematocrit tube (capillary tube) 75mm in length and 1mm in diameter which contains heparin and show a red ring at the end of the tube.

•Microhaematocrit centrifuge device.

•Plastic seal to seal one end of Microhaematocrit capillary tube.

•Microhaematocrit reader.



Microhematocrite Reader

Microhematocrite Centrifuge

Procedure:

1. Clean your finger with 70% alcohol and let dry.

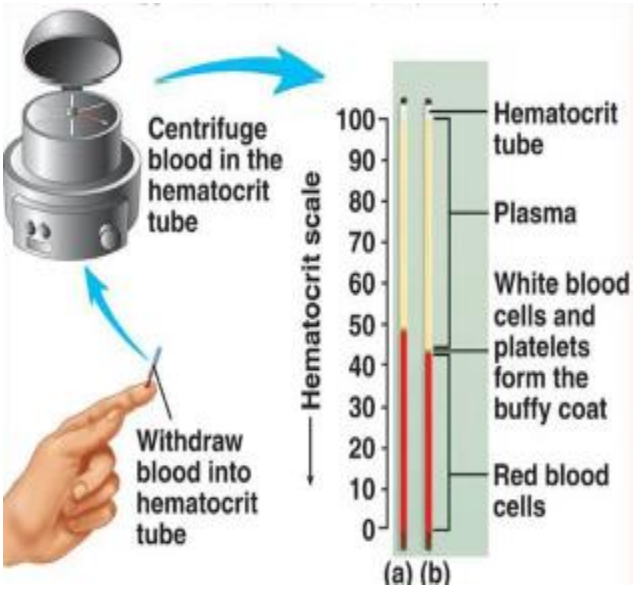
2. Prick finger with lancet, near the tip but not too close to the nail. Prick so that blood flows freely. Try squeezing up from your wrist if blood does not flow after pricking finger.

3. Place the tip of a capillary tube onto a drop of blood on your finger.

4. Call your instructor to seal the tube.

5. The instructor will spin the tubes in a centrifuge (5 minutes at 10000 rpm),.

7. Using a special reading device (since the capillary tube is not graduated).



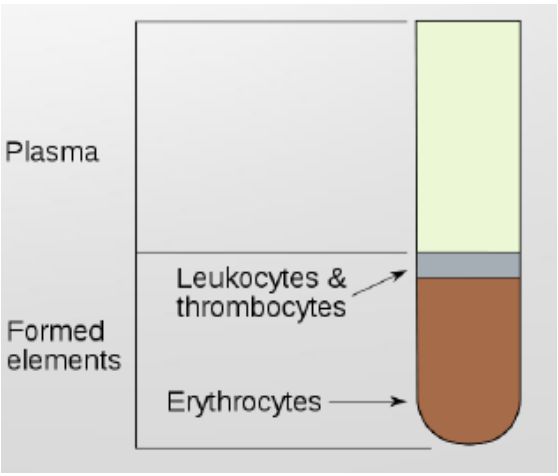
Results:

Note that the blood has been separated into 3 layers:

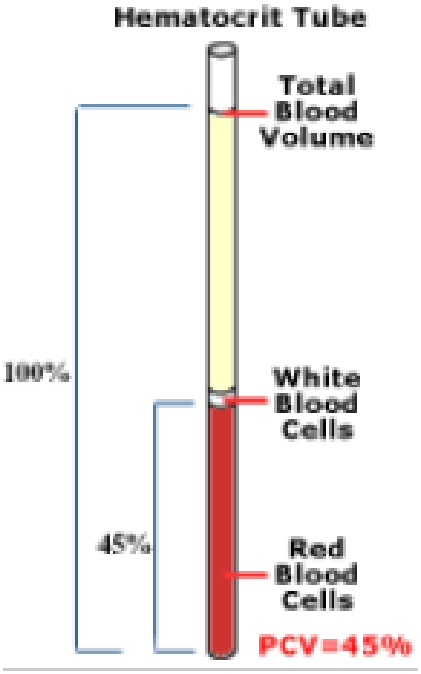
1-A tall upper layer of clear plasma—amber slightly yellow-colored. It should not be pink or red which would indicate hemolysis of red cells in the sample or within the body in hemolytic diseases.

2-A greyish-white, thin layer (about 1 mm thick) the so-called "buffy layer", consisting of platelets (thrombocytes) above and leukocytes below it.

3-A tall bottom layer of red cells.



Results extraction:



Hct% = {Height of RBCs (mm) / Height of RBCs and plasma (mm)} ×100

For example, if the height of packed red cells is 45 mm, then

= 45/ 100 ×100 = 45 percent.

It also means that out of 100 volumes (or parts) of blood 45 volumes (or parts) are red cells and 55 volumes (or parts) are plasma. Thus, out of 1 liter of blood, 450 ml are red cells and 550 ml are plasma.

Normal volume:

The normal values of PCV vary according to the age and sex of the individuals. The normal ranges are:

Male 0.37 – 0.47 % Female 0.40 – 0.54%.

Purpose of test; if PCV lower than normal value:

1-(anemia)

2-A large number of white blood cells may be related with leukemia

3-Acute kidney disease (lower Erythropoietin production lead to less RBCs production by the bone marrow).

4-Pregnancy may lead to women having additional fluid in blood.

And if PCV more than normal value:

That may refer to **Polycythemia.**

References:

1-Bull, B. S., & Hay, K. L. (2001). Is the packed cell volume (PCV) reliable? *Laboratory Hematology*, *7*, 191-196.

2-World Health Organization. (2000). *Recommended method for the determination of packed cell volume by centrifugation* (No. WHO/DIL/00.2). World Health Organization.

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