

Haematocrit Determination (Packed Cell Volume-PCV)

The haematocrit (Hct) or (PCV) is the percentage of the volume of blood occupied by red cells. It is a screening test for anemia or polycythemia. When accurate measurements of hemoglobin and red cell counts are available, the absolute values for red cells can be calculated.

Manual Haematocrit Determination

A volume of anticoagulated or capillary blood is placed in a glass tube. The glass is then centrifuged so that the blood is separated into its main components: red cells, white cells, platelets and plasma. Ideally there should be complete separation of cells and plasma.

Haematocrit is the ratio of the height of the red cell column to that of the whole blood sample in the tube.

The two methods currently used for direct measurement of PCV are:

1. Macro- method using Wintrobe tubes
2. Micro- method using capillary tubes

The micro-method is more popular because:

- a) centrifugation lasts for a shorter time with this method and
- b) it results in better packing of the red cells.

Micro-hematocrit Method

Test Sample

Anticoagulated venous blood or capillary blood

Equipment

1. Micro haematocrit centrifuge
2. 75 mm long capillary tubes with an internal diameter of 1 mm. (Capillary tube with anticoagulant marked with red circle at one end for uncoagulated blood, but capillary tube without anticoagulant marked with blue circle for coagulated blood)
3. Plastic sealer or Bunsen burner

Procedure

Blood samples should be as fresh as possible and well mixed.

1. Using a capillary tube, allow blood to enter the tube by capillary action stopping at 10-15 mm from one end. Wipe the outside of the tube.
2. Seal the dry end by pushing into plasticine two or three times. If heat sealing is used, rotate the dry end of the tube over a fine Bunsen burner flame.
3. Place the tube into one of the centrifuge plate slots, with the sealed end against the rubber gasket of the centrifuge plate. Keep a record of the patient number against the centrifuge plate number.
4. Centrifuge for 5 minutes.
5. Read the PCV in the micro haematocrit reader.

The haematocrit result is expressed in either a percentage or liter per liter

Note: It is preferable to the test in duplicate.

Normal Ranges Adult males = 0.40 – 0.52 (40% - 52%)

Adult females = 0.37 – 0.47 (37% - 47%)

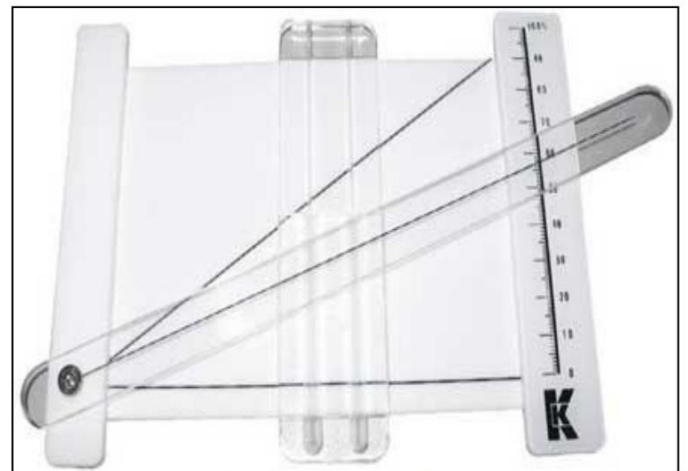


Figure 8: Micro-haematocrit Reader.

Automated PCV Measurement

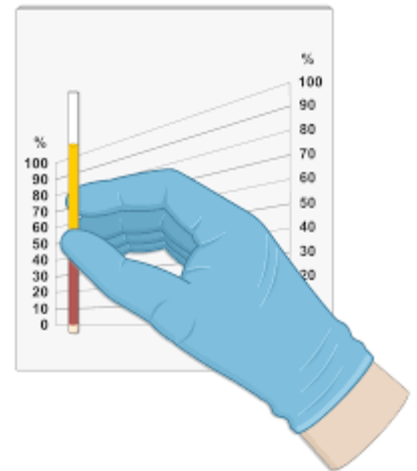
Modern automated blood cell counters estimate PCV by technology that doesn't involve packing red cells by centrifugation. For this reason, the International Council for Standardization in Haematology has suggested that the term haematocrit rather than PCV should be used for automated measurement. With automated instruments, the derivation of the RBC, PCV and MCV are closely interrelated. The passage of a cell through the aperture of an impedance counter or through the beam of light of a light-scattering instrument leads to the generation of an electrical pulse. The number of pulses generated allows the RBC to be determined. Pulse high analysis allows either the MCV or the PCV to be determined. The PCV can be derived from the MCV and RBC. Similarly, the MCV can, in turn be calculated.

Why Should You Test Hematocrit Levels?

Your doctor may test your hematocrit levels if you show signs of having anemia, polycythemia or erythrocytosis. Symptoms of anemia include fatigue, shortness of breath and dizziness. Symptoms of polycythemia include fatigue, itching, headaches, and sweating. Symptoms of erythrocytosis includes headaches, dizziness, shortness of breath, and nosebleeds.

High hematocrit may be due to:

- Bone marrow disease that causes abnormal increase in red blood cells (polycythemia vera)
- Congenital heart disease.
- Exposure to high altitude.
- Failure of the right side of the heart.
- Low levels of oxygen in the blood.
- Scarring or thickening of the lungs.



What does it mean if your hematocrit is low?

Suspected anemia is the most common reason for hematocrit testing.

Other conditions include

- Blood loss due to injury or illness
- Leukemia
- Hemolytic anemia
- Hyponatremia
- Kidney disease
- Thyroid disease

