University of Al-Ameed
College of Pharmacy

Physiology

PACKED CE`LL VOLUME (PCV)

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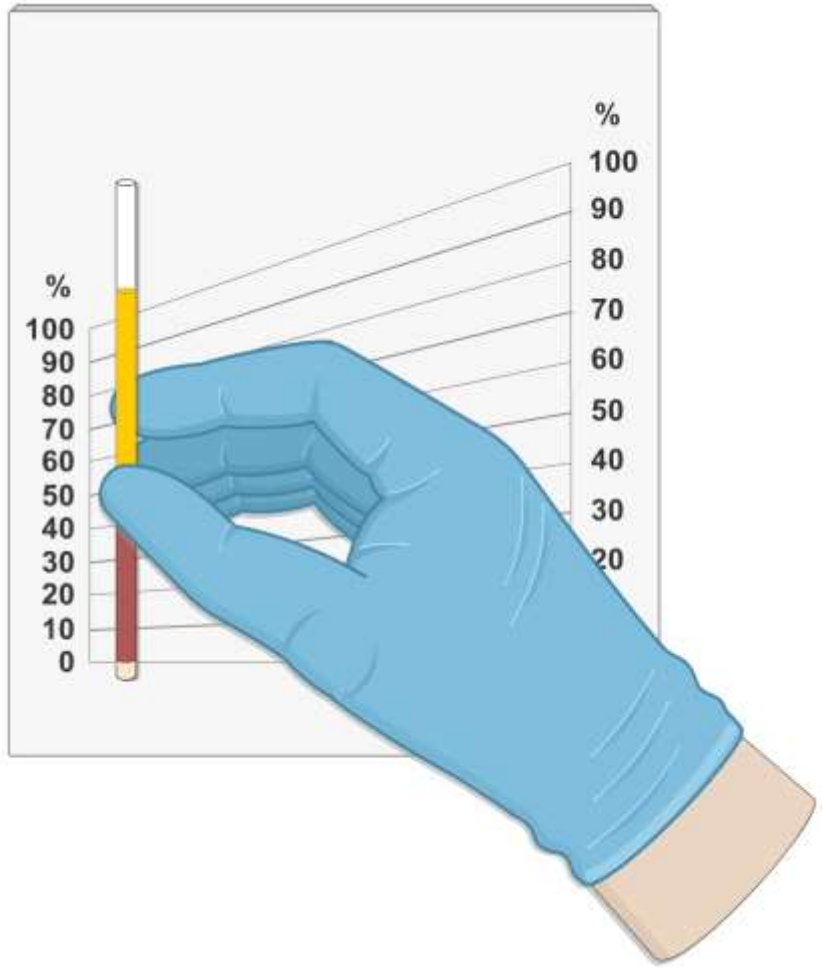
Packed cell volume (PCV)



What is packed cell volume (PCV) or Hematocrit

Packed cell volume (PCV) refers to the percentage of cellular elements (Red blood cells RBCs, White blood cells WBCs, and platelets) in the whole blood.

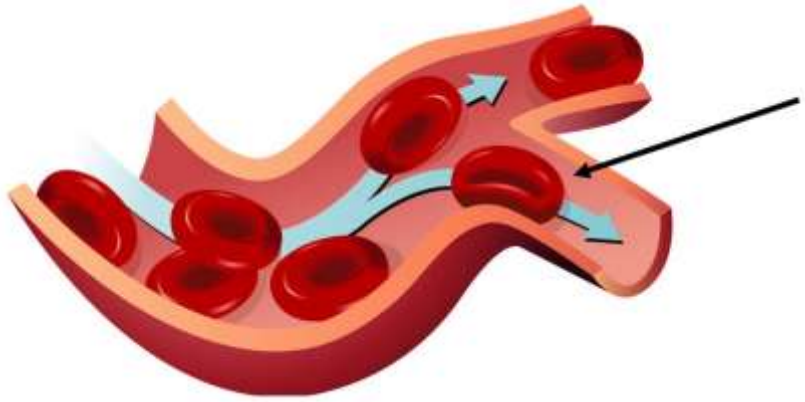
The value is expressed as a percentage %.

Clinically, it is the most accurate and simplest of all tests in clinical hematology for detecting the presence and degree of anemia or polycythemia

Packed cell volume (PCV) principle

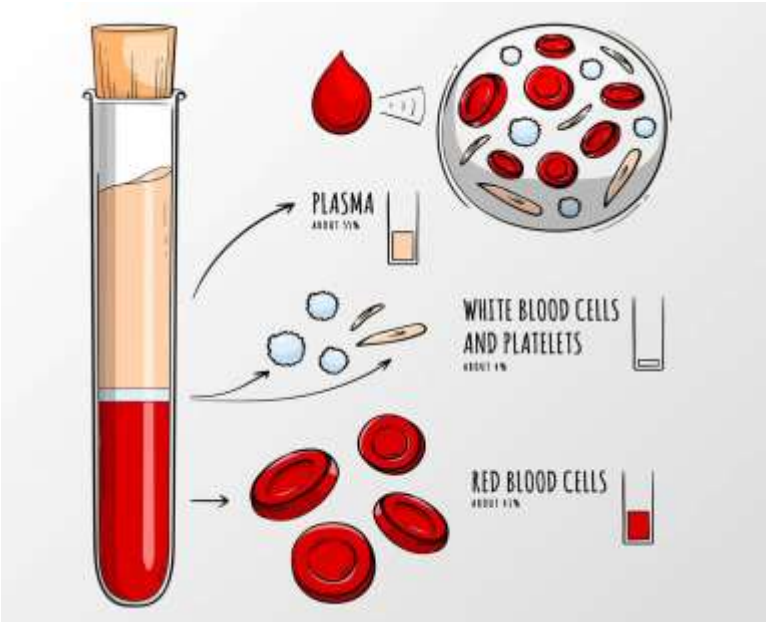
Since the volume of white blood cells (WBCs) and platelets is very less, the packed cell volume PCV value is considered equivalent to the volume of packed red cells or it is called hematocrit (Hct) value.

For example, a packed cell volume (PCV) of 40% means that there are 40 milliliters of cells in 100 milliliters of blood



methods used for determination of PCV

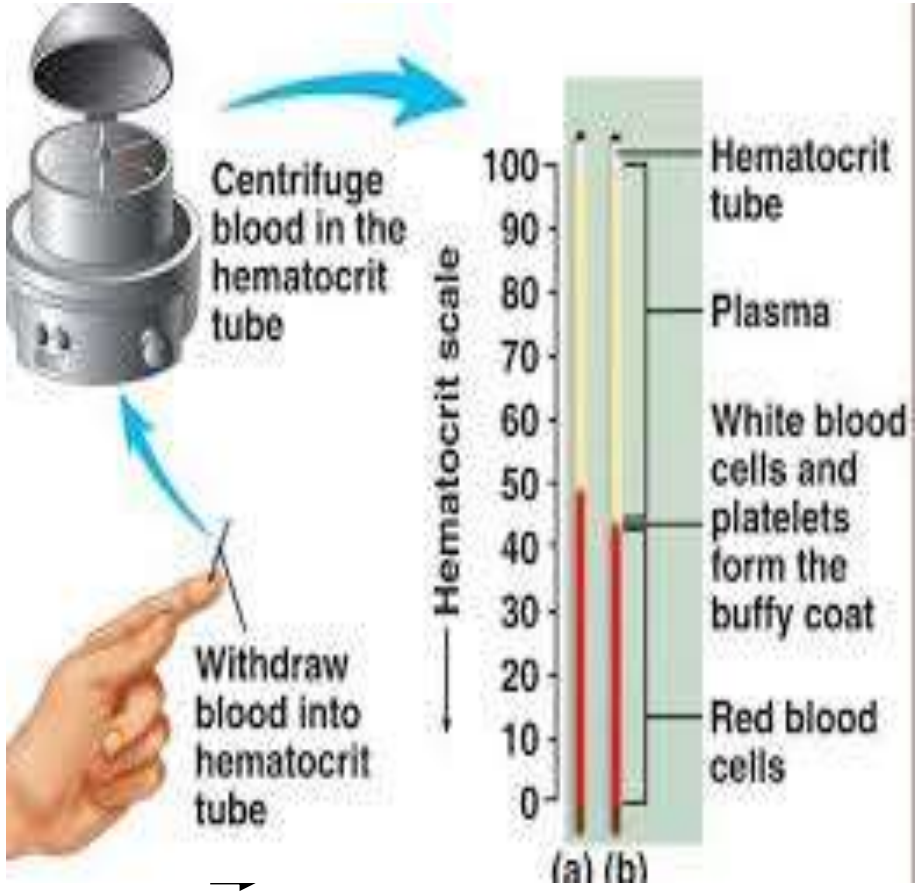
- Macrohematocrit method (Wintrobes method)
- Microhematocrit method
- Electrical method
- Indirect method



methods used for determination of PCV

A / **WINTROBE'S method**

It is graduated 0 to 10 cm from above downwards on one side (for erythrocyte sedimentation rate ESR) and 10 to 0 cm on the other side (for hematocrit Hct/ packed cell volume PCV) test



Procedure

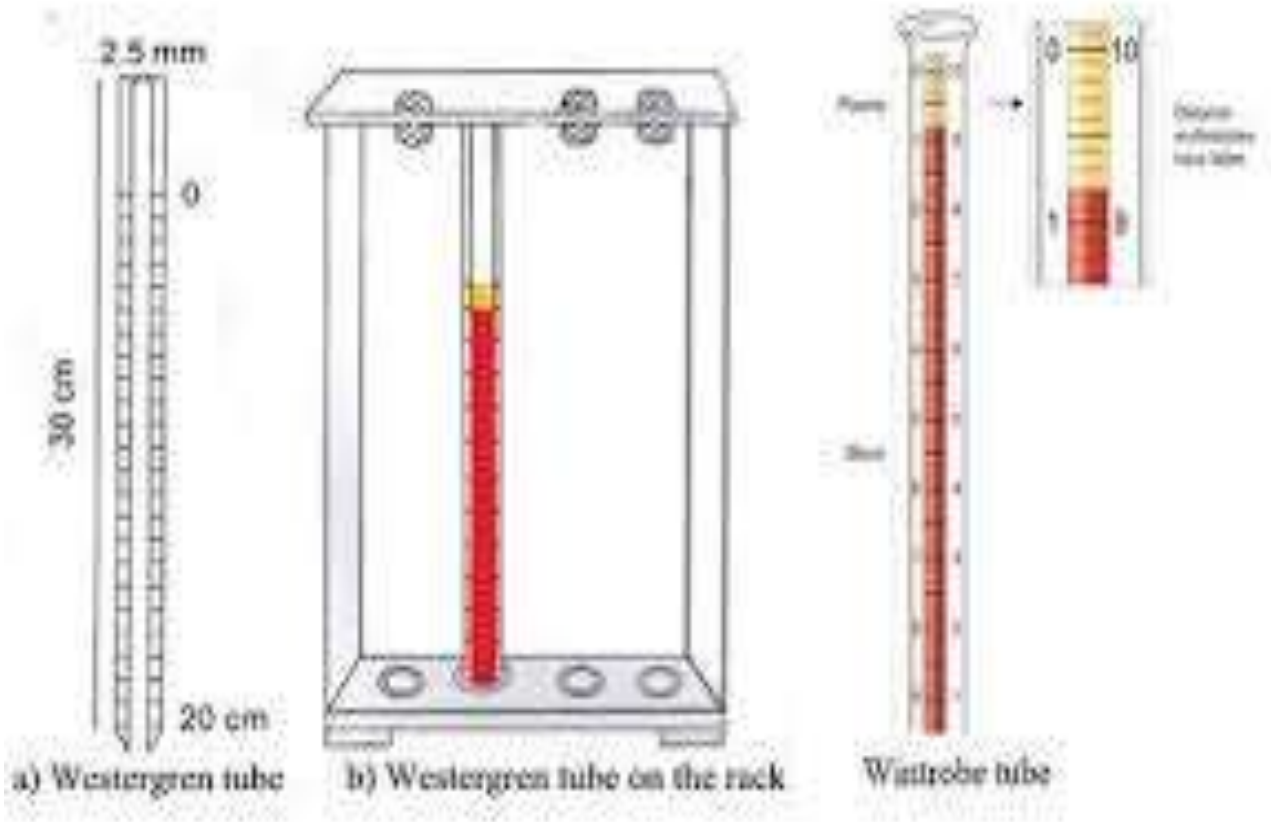
2 ml of venous blood is collected and mixed with EDTA powder in the proportion of 1.5mg/ml

- Blood is drawn into Pasteur pipette and introduced in the Wintrobes tube from the bottom to 0 or 10 mark above
- Place the Wintrobes tube in the centrifuge machine and other Wintrobes tube filled with water on the opposite side so as to balance it.
- Centrifuge the tube at the speed of 3000rpm for 30 minutes
- After 30 minutes stop the centrifuge, take out the tube and note the readings

Procedure

Calculation –

- Hematocrit = [Height of RBC's in mm/Height of RBC and plasma] X 10



methods used for determination of PCV

- B/ **The microhematocrit method**
- Microhematocrit tube(capillary tube):
- Heparinized tubes are red coded (sodium or ammonium heparin).
- Non-heparinized are blue coded
- 75 mm in length ,1 mm in diameter
- Blood sample.
- Clay
- Microhematocrit centrifuge.
- Packed cell volume (PCV) reader

Procedure for microhematocrit method

Fill a Hematocrit (heparinized) tube (¾ full) with blood sample.

*Seal the opposite end into a clay sealant 3-4 times

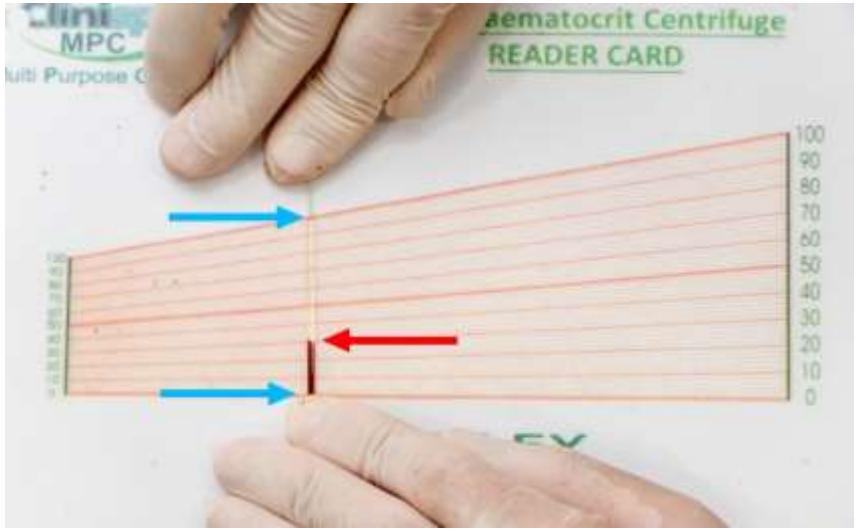
* Place the capillary tube in micro centrifuge, with plug end to the outside and centrifuge in 5min. at 10,000 R.P.M.

Following centrifuge three layers will be produced:

* Red Blood Cells are packed in the bottom .

*The Buffy Coat (WBC + Platelets) in the middle .

*The yellowish plasma on the top



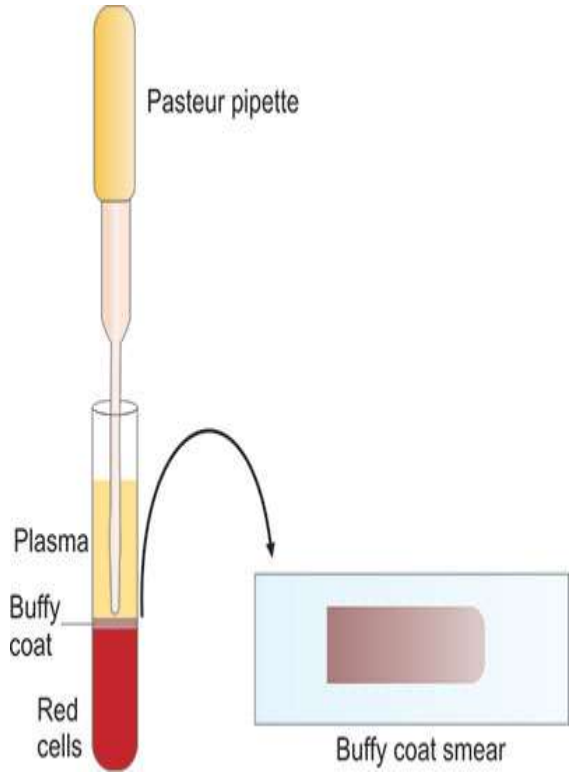
zones separated after centrifugation

- Top layer – Plasma (48 – 52%)
- Normally amber or pale yellow colour
- yellow – jaundice
- Pink or red colour indicates – hemolysis
- creamy white – hyperlipidemia
- Brown coloured – meth hemoglobinemia
- Cloudy (increased viscosity) – Multiple myeloma

zones separated after centrifugation

- Intermediate zone – Buffy coat – Zone of platelets and leukocytes (2% – 3% or 1mm thick)
- Greyish – white tan layer
- Smears prepared from buffy coat can be used to diagnose
- Sub leukemic leukemia
- Detection of plasma cells
- Hemoparasites

Lower most zone or bottom layer – Zone of packed RBC's (45% – 50%



Clinical significance of PCV

Clinical significance of PCV

The normal values of the packed cell volume

PCV:

Male is about 42% - 52%

Female is about 37% - 47%

Children 30% - 44%

*The PCV value is increased in polycythemia.

* It is decreased in anemia.

Medical applications

PCV is affected by the size, & the number of the RBCs & the plasma volume

PCV increases either relatively due to reduced plasma volume as in dehydration as in ::

alcohol, diuretic therapy, burn, or watery diarrhea in cholera .

or absolutely due to increased red blood cells mass either :

primarily as in polycythemia, or

secondarily due to chronic lung disease, smoking, high altitude, or some tumours.

Medical applications

PCV decreases either due to increased plasma volume as in over hydration or decreased red blood cells mass as in

*anemia

*pregnancy

*acute kidney & liver disease…..etc.

ان تكن شخص يثق فيه الناس اعظم من ان تكن شخص يحبه الناس

طلابي الأعزاء كونوا دائما محلا للثقة واهلا لها واسعدوا اهلكم ب نجاحكم واخلاقكم العاليه

Thank You