

ESR

Medical Laboratory Tuition

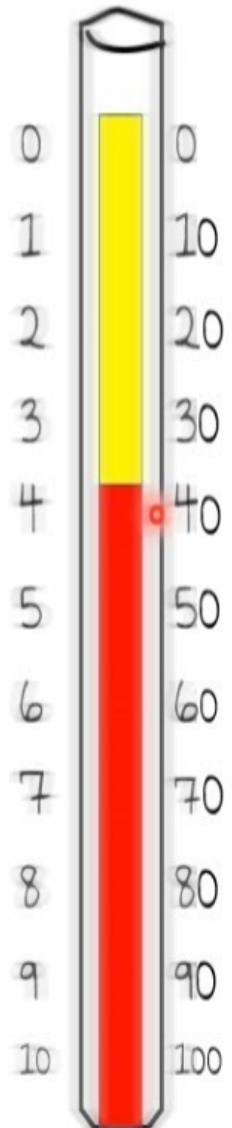
Erythrocyte Sedimentation Rate

Erythrocyte——RBC cell

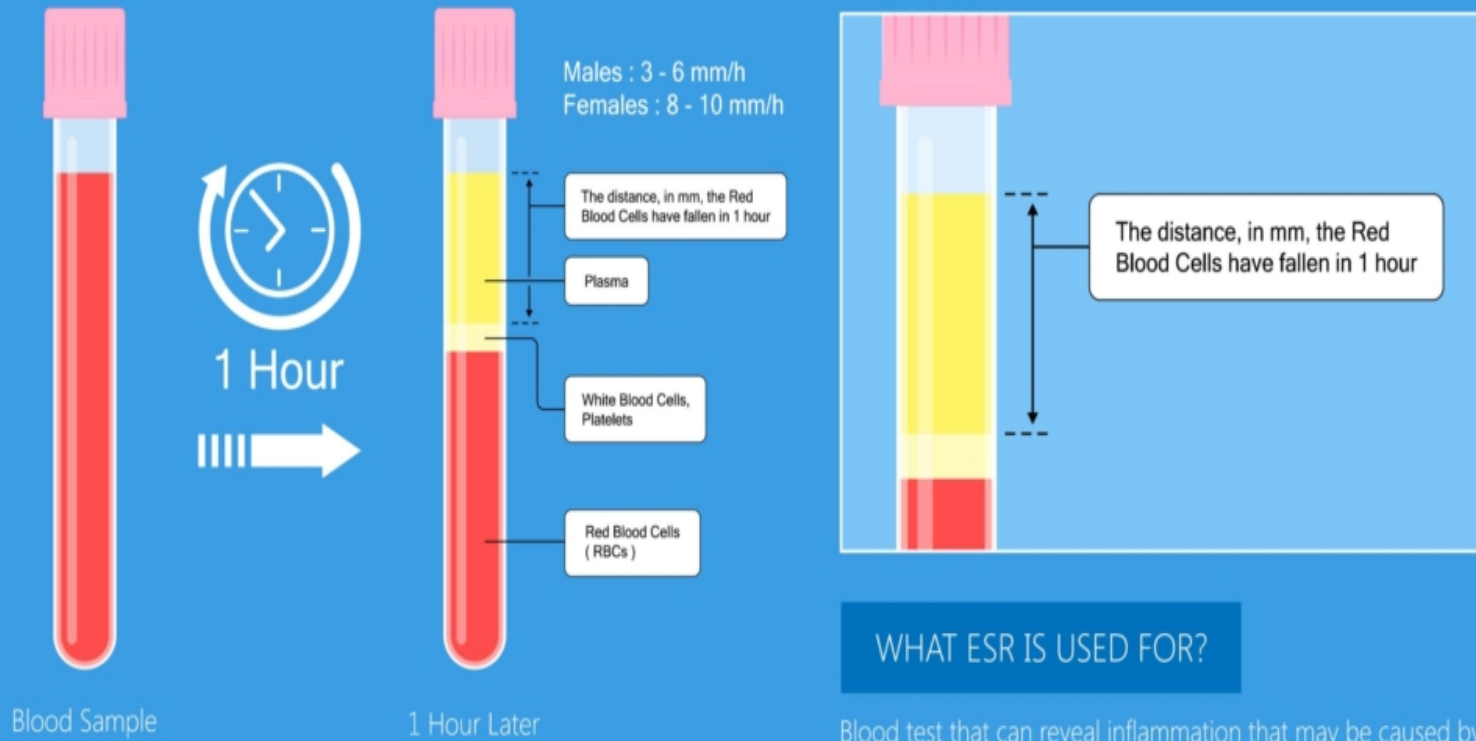
Sedimentation——Settle down of rbc's

Rate——Amount of rbc that settle down in given time 1 hour.

ESR



ESR Test (Erythrocyte Sedimentation Rate)



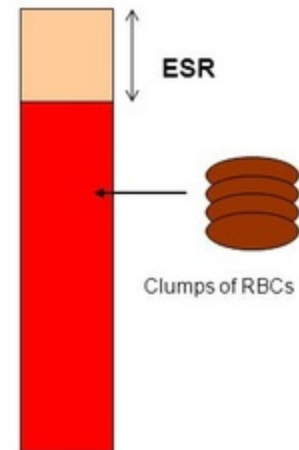
WHAT ESR IS USED FOR?

Blood test that can reveal inflammation that may be caused by infection and some autoimmune diseases

ERYTHROCYTE SEDIMENTATION RATE (ESR)

- Specific weight of the RBC is higher than that of the plasma → in a stabilized blood, RBC slowly sink towards the bottom of the test tube -**sedimentation**
- **Factors increasing ESR**
 - ↓ Htc, ↓ blood viscosity
 - ↑ concentration of fibrinogen (i.e., pregnancy, vascular diseases, heart diseases), haptoglobin, lipoproteins, immunoglobulins
 - Macrocytic RBC
 - Extreme elevation of WBC count (leukemia)
- **Factors decreasing ESR**
 - ↑ Htc
 - Change in the RBC shape (i.e., sickle-cell anemia, poikilocytosis – nonuniformity of shape)
 - ↑ albumin concentration

Males – 3-6 mm/h
Females – 8-10 mm/h



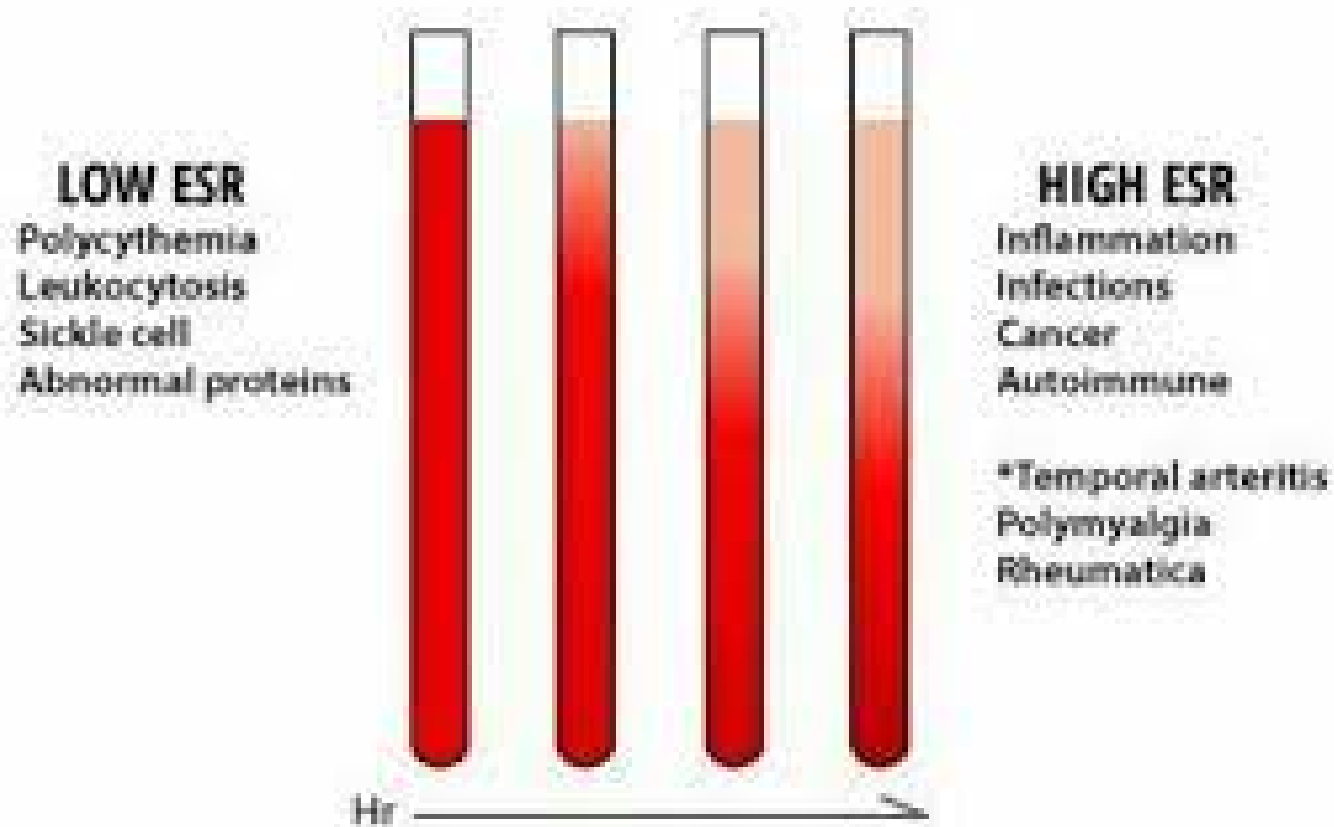


FIGURE: ESR TIMELINE

Introduction and principle

Blood is collected and mix with anticoagulant and allowed to stand in a special narrow vertical tube (30 cm in length and 2.5mm in width) called westergren tube for period of time (usually for 1 hr).

RBC by time will settle down (sediment) leaving clear plasma above.

ESR is the rate at which the RBC have settled down in millimeters in a given period of time (usually one hour).

(i.e the RBC stacked together into long chain called Rouleaux formation).

Normal range in adult men

0.15 mm/1hr

Normal range in adult

women 0.20mm/1hr

This test is not a specific test so it doesn't give an indication about the type of disease but its used for the follow up patient and the prognosis of the condition.

Note: RBC sediment by rouleaux formation, the RBC aggregate one on the top of the other, this will increase the speed of sedimentation.

Material and method:

1. westergren pipette it is graduated and open at both ends the graduated from 0-200 mm
2. westergren pipette rack equipped with leveling screws.

3. syringe for the withdrawal
blood from the vein of the
patient.

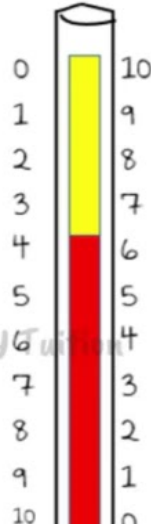
Procedure:

1. with draw 2cc of blood from the patient vein using the syringe.
2. put 0.4cc of anticoagulant in plain test tube.
3. add 1.6cc blood to the plain test tube and shake it for mixing.

4. fill the westergren pipette to exactly the 0 mark making.
5. place the pipette on the rack and leave it undistributed for one hour.
6. at the end of 60 minutes read the no. of millimeters the RBC have fallen (i.e: the height of clear plasma above the upper limit of column of sedimentary cells) the result is the ESR in mm/in 1 hr).

Wintrobe,s

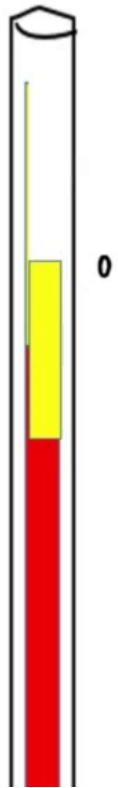
- Tube is closed at lower end & open at upper end.
- It contains less vol. blood sample
- EDTA as anticoagulant
- Normal range:
 - Male— 0-9mm/ 1st hr
 - Female— 0-20mm/ 1st hr
- Values are less sensitive
- Tube is 11 cm.
- Dia- 2.5mm



vs.

Westergren

- The tube is opened at both end.
- It contains large vol. of blood sample
- Sodium citrate as anticoagulant
- Normal range:
 - Male--0-5mm/ 1st hr.
 - Female—0-7mm/ 1st hr
- Values are more sensitive
- Tube is 30 cm long.
- Diamerter internal- 2.5mm



Medical application:

The increase in ESR could be physiological (as in pregnancy) or pathological (as in tuberculosis, leukemia, anemia, rheumatoid, increase plasma protein and other connective tissue disease).

The decrease in ESR is seen
in heart failure,
polycythemia and
spherocytosis.