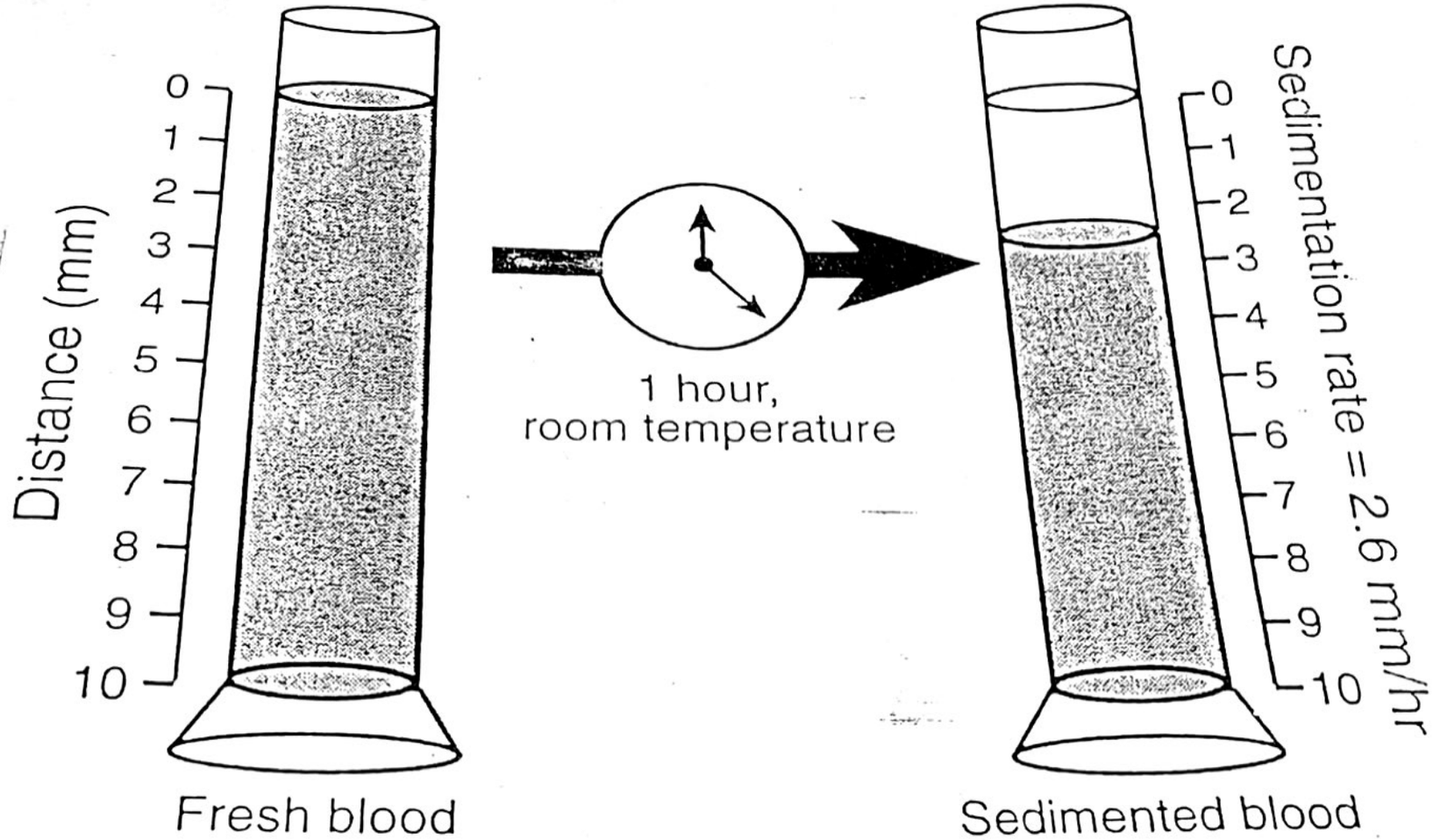
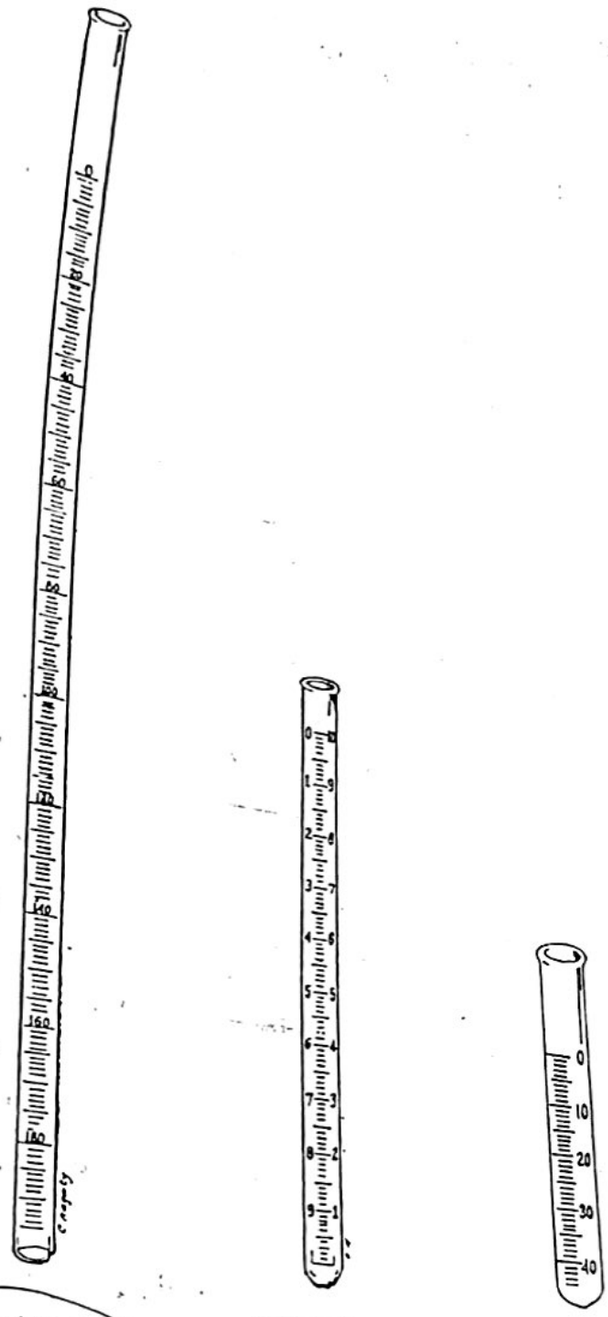


FIGURE 11.1 Determination of the erythrocyte sedimentation rate (ESR). Fresh, anticoagulated blood is allowed to settle at room temperature in a graduated cylinder. After a fixed time interval (1 hour), the distance (in millimeters) that the erythrocytes' sediment is measured.

esophageal varices, hiatus hernia, peptic ulcer, ial gastrectomy, carcinoma of stomach or

Portal hypertension



	Westergren	Wintrobe	Cutler
range of graduation	0 to 200 mm	0 to 100 mm (10 cm)	0 to 40 mm
height of blood column	200 mm	100 mm	50 mm
length of tube	300 mm	120 mm	70 mm
internal diameter of tube	2.5 mm	2.5 mm	5.0 mm
amount of blood	2 ml	1 ml	1 ml

Fig. 122. Sedimentation rate tubes.

Table 19. Methods and Normal Values for the Sedimentation Rate

Methods	Normal Values	
	Men (mm per hr)	*Women (mm per hr)*
Westergren	0 to 15	0 to 20
Wintrobe	0 to 10	0 to 20
Cutler	0 to 8	0 to 10
Landau	0 to 5	0 to 8

CESR in women more than

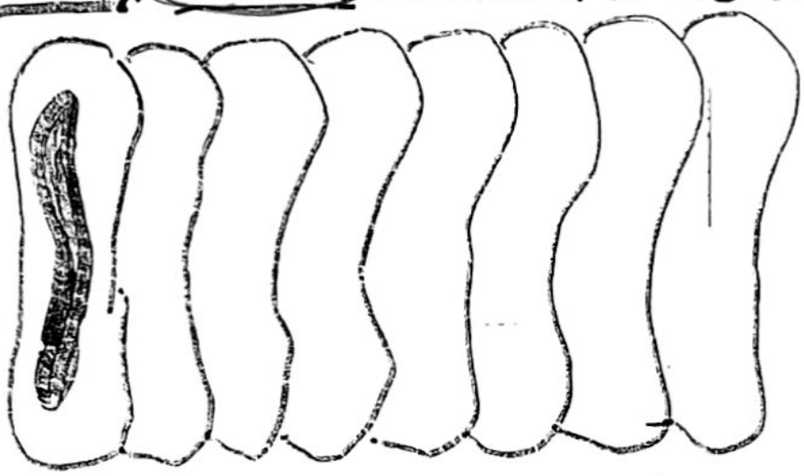
Fibrongen

⊛ESR increase in → acut & chronic infection
↳ old ages

* RA, TB, Hepatitis → ↑ESR.

ERYTHROCYTE SEDIMENTATION RATE

When anticoagulated whole blood is allowed to stand for a period of time, the red blood cells settle out from the plasma.
* The rate at which the red blood cells fall is known as the erythrocyte sedimentation rate (ESR). Rouleaux formation of the red blood cells.



* The ESR is affected mainly by three factors:-

I. ERYTHROCYTES (size, shape, cell count)

A factor of chief importance in determining the rate of fall of the red blood cells is the size or mass of the falling particle.

⊛ The larger the particle, the faster its rate of fall. Macrocytes tend to settle more rapidly than microcytes.

⊛ Red blood cells that show an alteration in their shape, such as sickle cells and spherocytes, are unable to form rouleaux and their ESR rate is decreased. * In severe anemia ESR is elevated. In polycythemia the ESR is normal.

II. PLASMA COMPOSITION

The plasma composition is the single most important factor determining the ESR. Rouleaux of the red blood cells are affected mainly by the levels plasma protein. levels of fibrinogen and globulins increases the ESR.

III. MECHANICAL AND TECHNICAL FACTORS.

It is important that the ESR tube be exactly perpendicular. A tilt of 3° can cause errors up to 30%. Also, the rack holding the tubes should not be subject to any movement or vibration. With large changes in temperature the ESR increases. The length and diameter of the ESR tube also affect the final test results.

OSMOTIC FRAGILITY TEST ?? (6)

The osmotic fragility test is employed to help diagnose different types of anemias, in which the physical properties of the red blood cell are altered. The main factor affecting the osmotic fragility test is the shape of the red blood cell, which, in turn, is dependent on the (1) volume, (2) surface area, and (3) functional state of the red blood cell membrane. An increased osmotic fragility is found in (1) hemolytic anemias, hereditary (2) spherocytosis, and whenever spherocytes are found. Decreased osmotic fragility occurs following splenectomy, in liver disease, sickle cell anemia, iron-deficiency anemia, thalassemia,