2. *Type of test tube:* The coagulation time will be lengthened to 20 to 40 minutes if plastic or silicone coated test tubes are used.
3. *Drugs:* Increased coagulation time may be seen with:
   - Mithramycin
   - Tetracyclines
   - Anticoagulants
   - Azathioprine
   - Carbenicillin.

   Decreased coagulation time may be seen with:
   - Corticosteroids
   - Epinephrine.

## Clot Retraction

### *Principle*

When whole blood is allowed to clot spontaneously, the initial coagulum is composed of all elements of the blood. With time the coagulum reduces in mass and fluid serum is expressed from the clot. This is due to an action of platelets on the fibrin network.

### *Requirements*

- Equipment for collecting blood
- Clean, dry plain glass graduated centrifuge tube
- Timer
- Water bath 37°C.

### *Method*

1. 5 mL blood is obtained with a standard two-syringe technique and transferred to the centrifuge tube.
2. Incubate it at 37°C in vertical position.
3. Record degree of retraction after 1, 2, and 4 hours. It may be necessary to loosen the clot gently from the wall of the test tube if contraction is not apparent at the end of 1 hour. The degree and rate of retraction should be noted. Note also any digestion of clot or discoloration of serum.

Clot retraction is directly related to platelet count, hence, it is impaired in thrombocytopenia, but is normal in hemophilia. In the method just described, one can remove the clot by using a hooked long needle and the volume of serum left behind can be measured. The percentage of clot can be calculated from the initial 5 mL of blood taken. In normal individuals, the clot percentage is about 50% at the end of one hour of the original blood volume taken.

### *Interpretation*

1. Patients with qualitative or quantitative platelet disorders have samples with scant serum and a soft, plump, poorly demarcated clot.
2. The clot is small and serum voluminous if the patient has a low hematocrit.
3. Patients with polycythemia have poor clot retraction because the large numbers of captured red cells separate fibrin stands and interfere with platelet contraction.
4. If fibrinogen levels are low, the initial clot is so fragile that the delicate strands rupture and red cells spill out into the serum when retraction begins.
5. Serum contamination by red cells is especially striking if fibrinolysis is abnormally brisk, as often happens with reduced fibrinogen levels. Sometimes in these cases, the incubated tube contains only cells and plasma with no fibrin clot at all.

### *Errors*

1. When fibrinogen is reduced in amount, the clot may be very small and retraction may be interpreted as normal even though it is inadequate.
2. In the presence of active fibrinolytic activity, the clot may dissolve.
3. In normal blood the exuded serum will be clear and free of RBC's. The presence of significant number of RBC's in the serum suggests fibrinolytic activity.
4. With a low hematocrit value, the mass of the clot will be proportionately small and may give enormously high values.

## Heparin Therapy

### *Protocols and Blood Coagulation Tests*

1. Heparin combines in the blood with an alpha globulin (heparin cofactor) for a potent antithrombin.
2. The intravenous injection of heparin will give an immediate anticoagulant effect, so it is used when rapid effects are desired.
3. Because of heparin not remaining in the blood very long, the clotting time is measured before each injection.
4. The coagulation time is ordinarily maintained at two to two and one half times the normal limit.
5. To evaluate the effect of heparin, the blood is tested for coagulation time:
   - Before therapy is started for baseline
   - One hour before the next dose is administered
   - Dependent upon the status of patient during heparin therapy (signs of bleeding).
6. Protamine sulfate is the antidote for heparin overdose and hemorrhage.