

## COAGULATION AND MECHANISM OF COAGULATION

Coagulation or clotting is defined as the process in which blood loses its fluidity and becomes a jelly-like mass few minutes after it is shed out or collected in a container.

### **„ FACTORS INVOLVED IN BLOOD CLOTTING**

Coagulation of blood occurs through a series of reactions due to the activation of a group of substances.

Substances necessary for clotting are called clotting factors.

Thirteen clotting factors are identified:

Factor I -Fibrinogen

Factor II -Prothrombin

Factor III -Thromboplastin (Tissue factor)

Factor IV- Calcium

Factor V- Labile factor or Proaccelerin

**Factor VI- absent**

Factor VII -Stable factor

Factor VIII- Antihemophilic factor A

Factor IX -Christmas factor or Antihemophilic factor b

Factor X- Stuart factor

Factor XI- Antihemophilic factor C

Factor XII -Hageman factor

Factor XIII- Fibrin-stabilizing factor

### Mechanism of coagulation:

Clot formation is initiated by

- Trauma to the vascular wall and adjacent tissues
- Trauma to blood
- Contact of blood with damaged endothelium cells .

## Stages of Blood Clotting

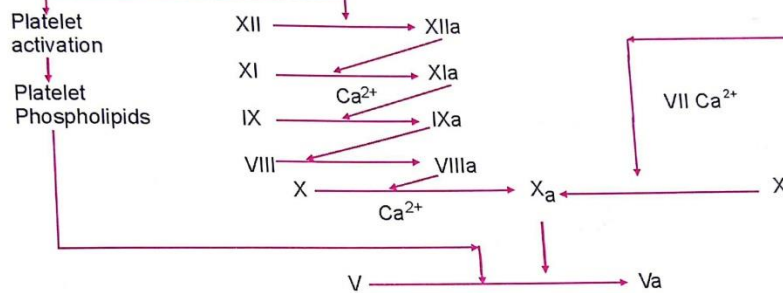
In general, blood clotting occurs in three stages:

1. Formation of prothrombin activator
2. Conversion of prothrombin into thrombin
3. Conversion of fibrinogen into fibrin.

### A. Formation of prothrombin activator

#### *Intrinsic pathway*

- Blood trauma, or
- Exposure of blood to collagen underlying damaged endothelium, or
- Exposure of blood to electronegatively charged wettable surface such as glass



#### *Extrinsic pathway*

Trauma to blood vessels or extravascular tissue

Tissue thromboplastins (Factor III)

VII Ca<sup>2+</sup>

X

V

Phospholipids, Va and Ca<sup>2+</sup>  
(Prothrombin activator)

### B. Conversion of prothrombin to thrombin

(Prothrombin)  $\xrightarrow{\text{Ca}^{2+}}$  (Thrombin)

### C. Conversion of fibrinogen to fibrin

Fibrinogen  $\xrightarrow{\text{Thrombin}}$  Fibrin  
 Fibrin  $\xrightarrow{\text{XIIIa, Ca}^{2+}}$  Fibrin threads

Fig. 2.4-5. Mechanism of blood coagulation.