

COGULATION PROFILE

Clotting time, Bleeding time, and Prothrombin time

OBJECTIVES

- To understand the different test of coagulation and the purpose of each one

Coagulation

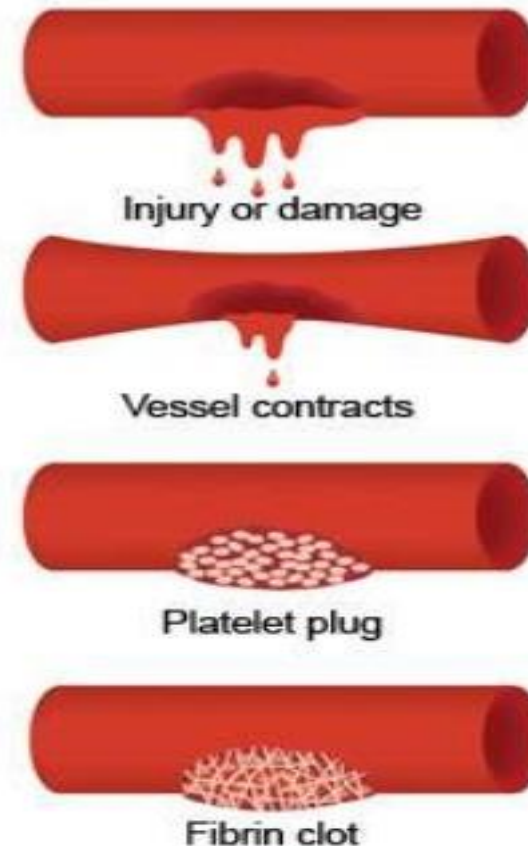
- **Coagulation** is a complex process by which blood forms clots.
- It is an important part of **haemostasis** (the cessation of blood loss from a damaged vessel).
- **Disorders** of coagulation can lead to an increased risk of bleeding (hemorrhage) or clotting (thrombosis).

HEMOSTASIS IS MAINTAINED IN THE BODY VIA THREE MECHANISMS :

Vascular spasm - Damaged blood vessels constrict

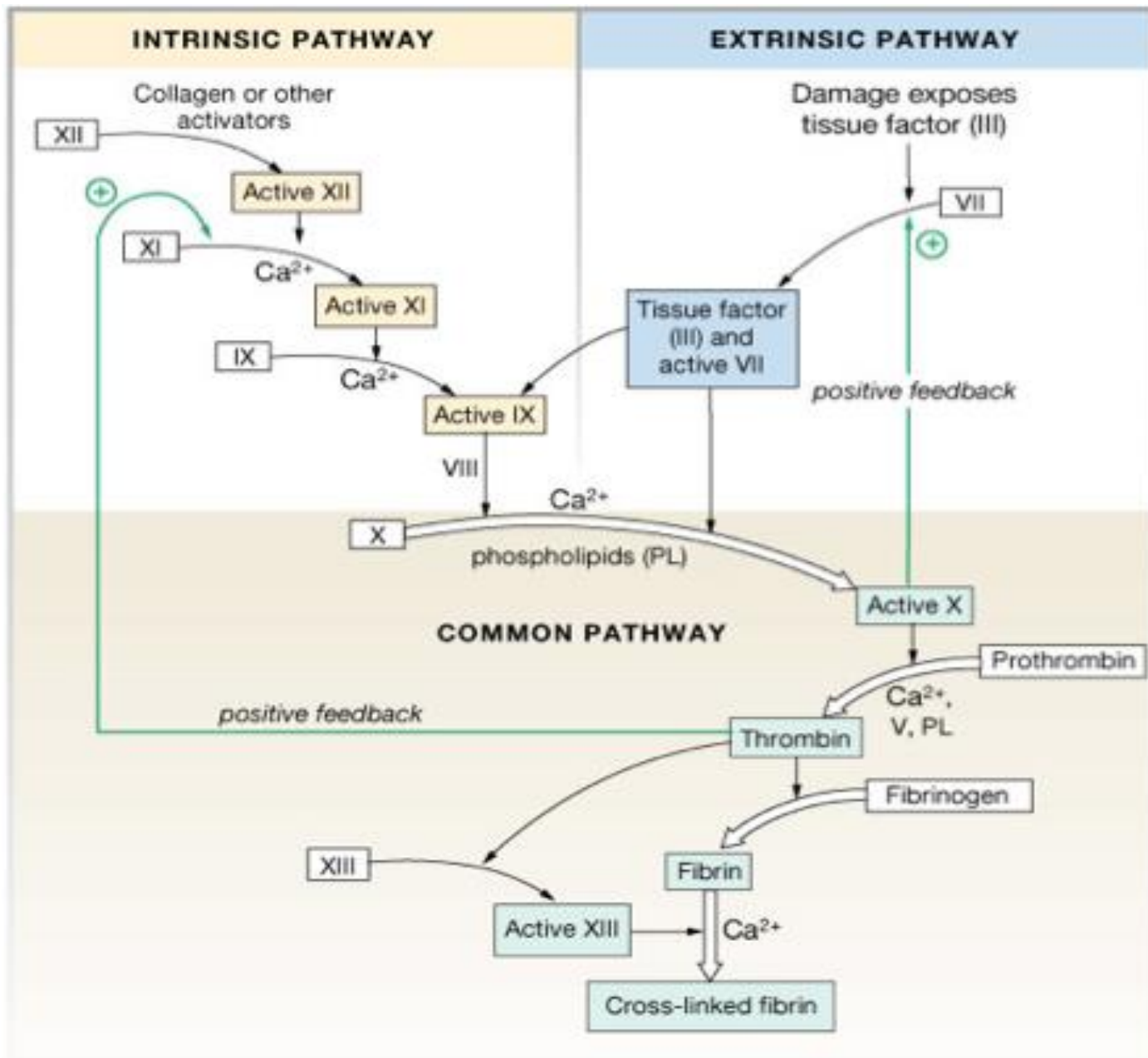
Platelet plug formation - Platelets adhere to damaged endothelium to form platelet plug (*primary hemostasis*)

Blood Coagulation - Clots form upon the conversion of fibrinogen to Fibrin (*secondary hemostasis*).



Clotting Cascade

- A **cascade** is a mechanism in which enzymes activate other enzymes sequentially usually leading to an amplification of an initial signal.
- **Pathways**
 - Extrinsic } Initially independent, then they converge
 - Intrinsic } on common pathway leading to the formation of a fibrin clot
- Each of these pathways leads to the conversion of factor X (inactive) to factor Xa (active)



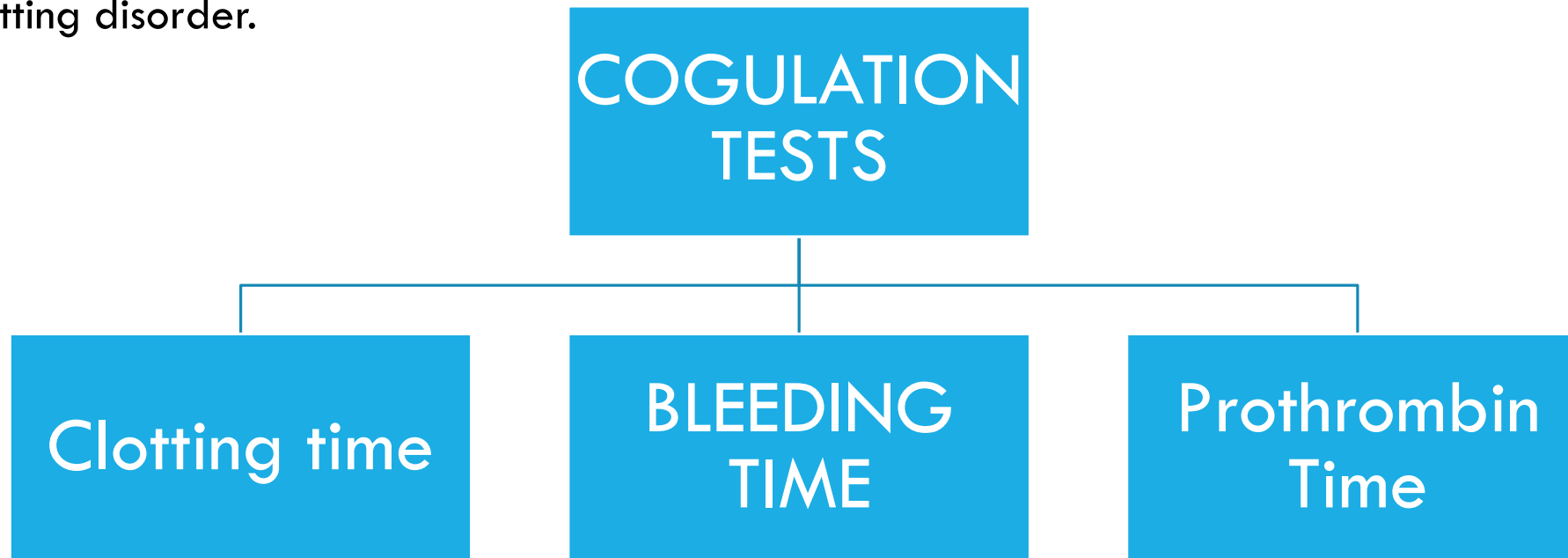
WHAT TRIGGERS EXTRINSIC AND INTRINSIC PATHWAYS

Extrinsic—Release of biochemicals from broken blood vessels/damaged tissue.

Intrinsic—No tissue damage, blood contacts damaged endothelial layer of blood vessel walls.

COAGULATION PROFILE

- Coagulation tests measure your blood's ability to clot and the amount of time it takes to do so
- You may be recommended to undergo a coagulation test if your doctor suspects you have a clotting disorder.



CLOTTING TIME

- Test for intrinsic system
- Simple test but takes time and rarely done now
- Method:
 - Venous blood is taken and placed on glass test tube at 37°C and it observed at time intervals until clotting occurs
- Normal blood takes 5-10min to clot
- Longer periods → Coagulation defects (e.g. Hemophilia)

METHOD

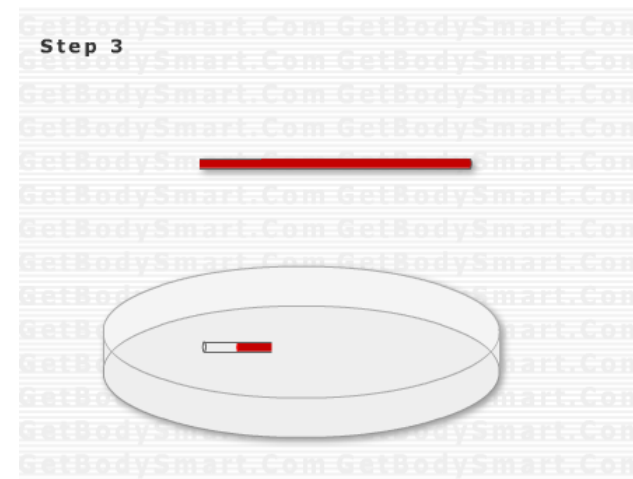
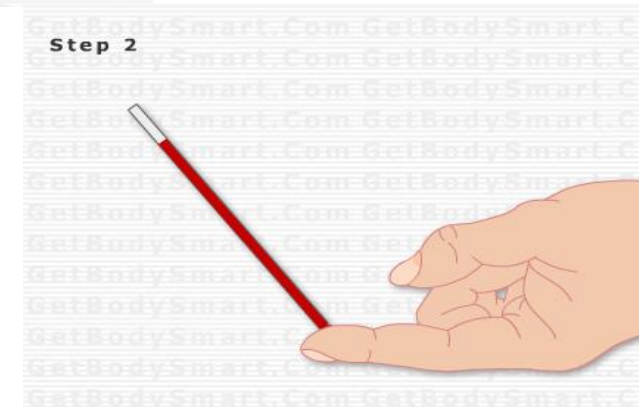
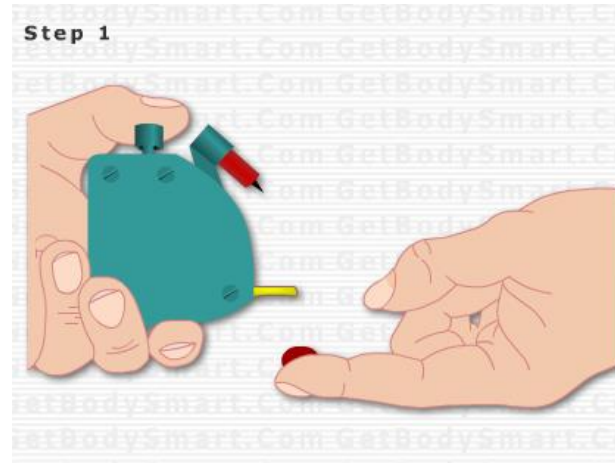
A finger is lanced and a small drop of blood is allowed to accumulate

The time is noted then the blood is drawn up into a nonheparinized glass tube.

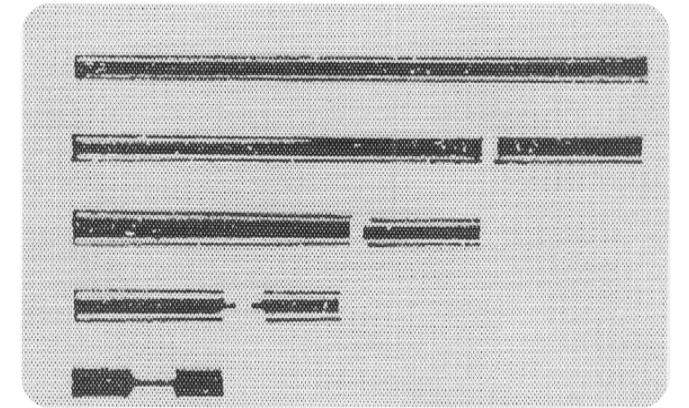
Negative charges associated with the glass will initiate the intrinsic coagulation pathway

After 2 min, a small portion of the glass tube is broken off. Other pieces are then broken off every 30 seconds

Normally after 2 to 6 min a fibrin strands will form



CLOTTING TIME - CAPILLARY METHOD



BLEEDING TIME

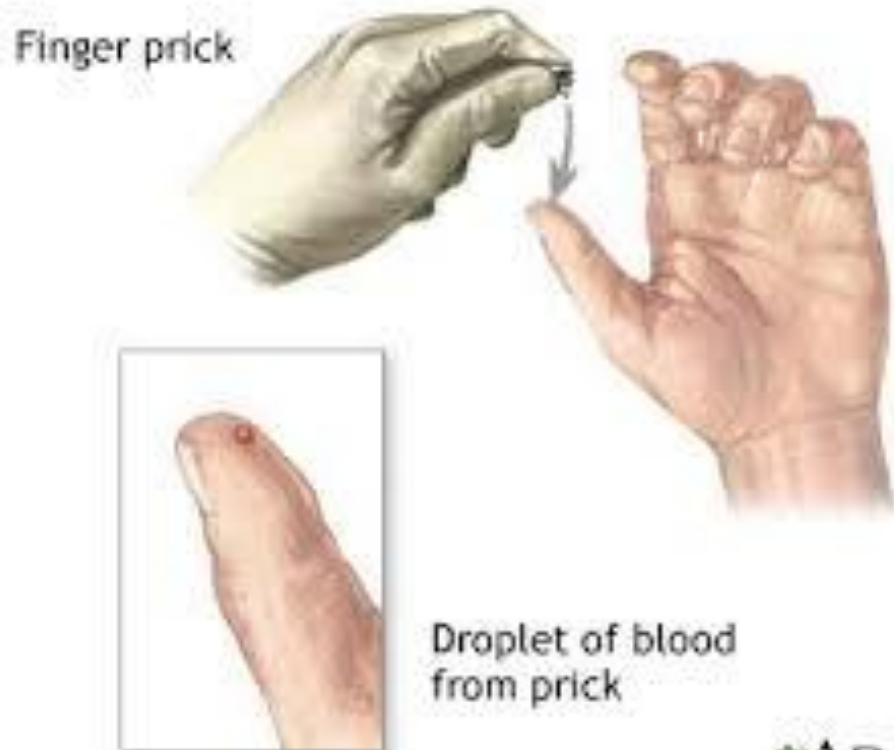
- This test analyzes how quickly small blood vessels in your skin close up and stop bleeding thus it assess platelet function and the body's ability to form a clot.

Method:

It is determined by noting time at which blood coming out a small cut, no longer forms a spot on a piece of filter paper placed in contact with cut surface every 30 seconds until bleeding stops

The normal range from 2-4 min

BLEEDING TIME



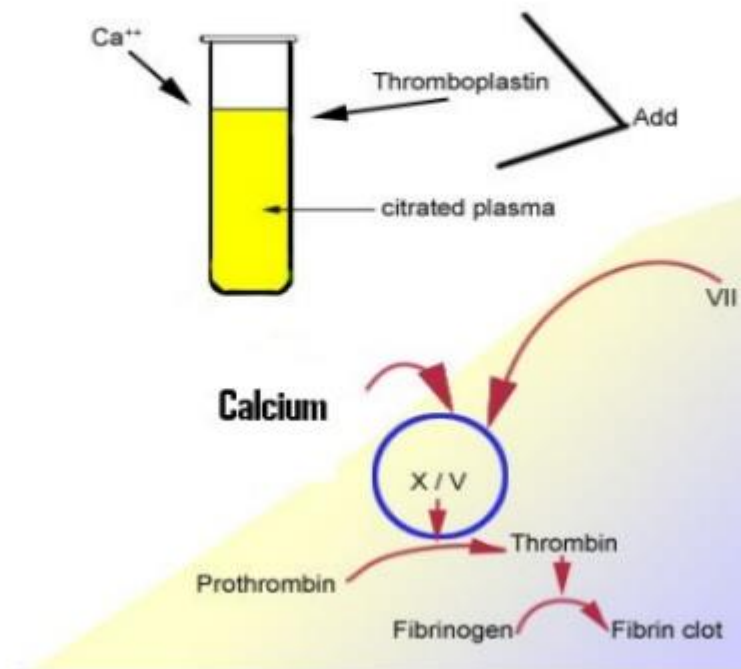
- **Longer-than-normal bleeding time may be due to:**
- Blood vessel defect
- Platelet aggregation defect
- Thrombocytopenia (low platelet count)

PROTHROMBIN TIME (PT)

- Measures effectiveness of the extrinsic pathway
measures the activity of the so-called **extrinsic** and common pathways of **coagulation**.
- Method:
 - An excess of tissue factor and Ca^{2+} ions are added to **diluted plasma** containing citrate (**anticoagulant**) and then the time taken for the mixture to clot is measured
- Normal value → 10-15 secs

PROTHROMBIN TIME (PT)

Prothrombin Time



- High PT low levels of thrombin
- Results from liver disease due to deficiency of prothrombin, fibrinogen, V, VII and X factors