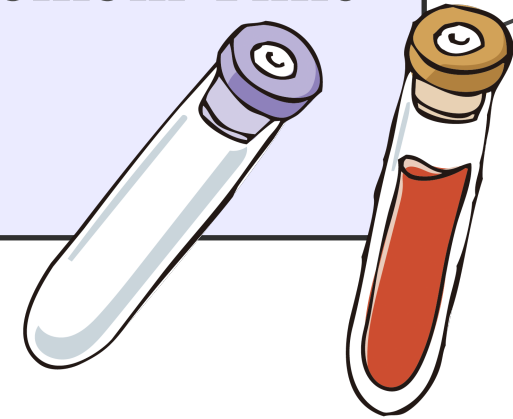
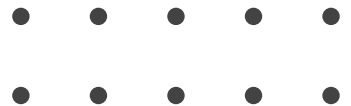
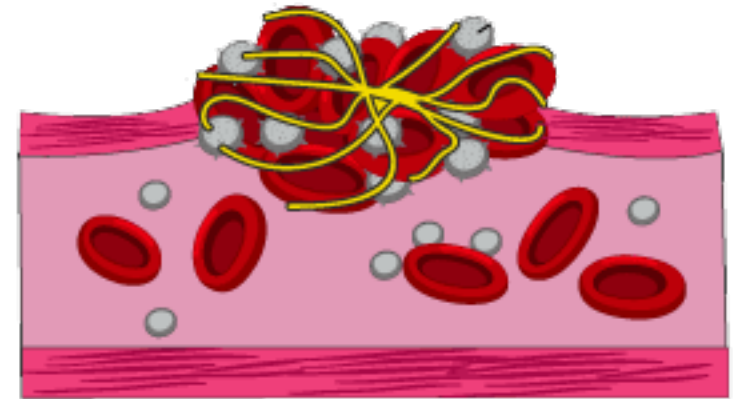
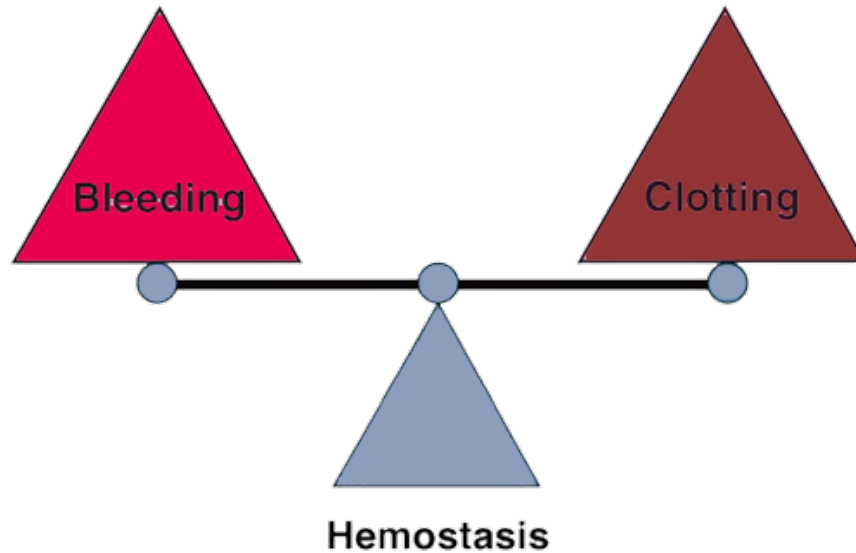


Blood Biochemistry BCH 471 [Practical]
Lab (8) Clotting Time, Bleeding Time and Prothrombin Time



Coagulation

- **Coagulation** is a complex process by which blood forms clots.
- It is an important part of **hemostasis** (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

- **Hemostasis** is a complex of homeostatic reactions, which result in arrest of bleeding from damaged blood vessels.

- Maintained in the body **via three mechanisms:**

1. Vascular spasm

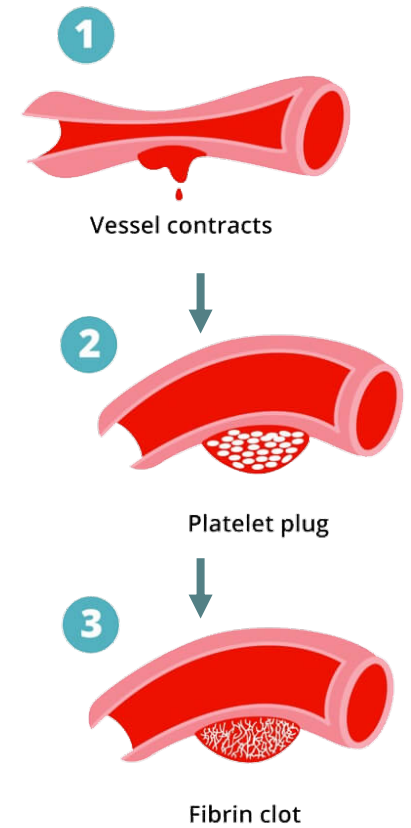
Damaged blood vessels constrict.

2. Platelet plug formation

Platelets adhere to damaged endothelium to form platelet plug (**primary hemostasis**).

3. Blood Coagulation

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

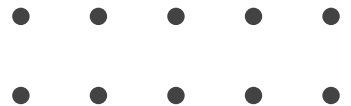


Clotting Cascade

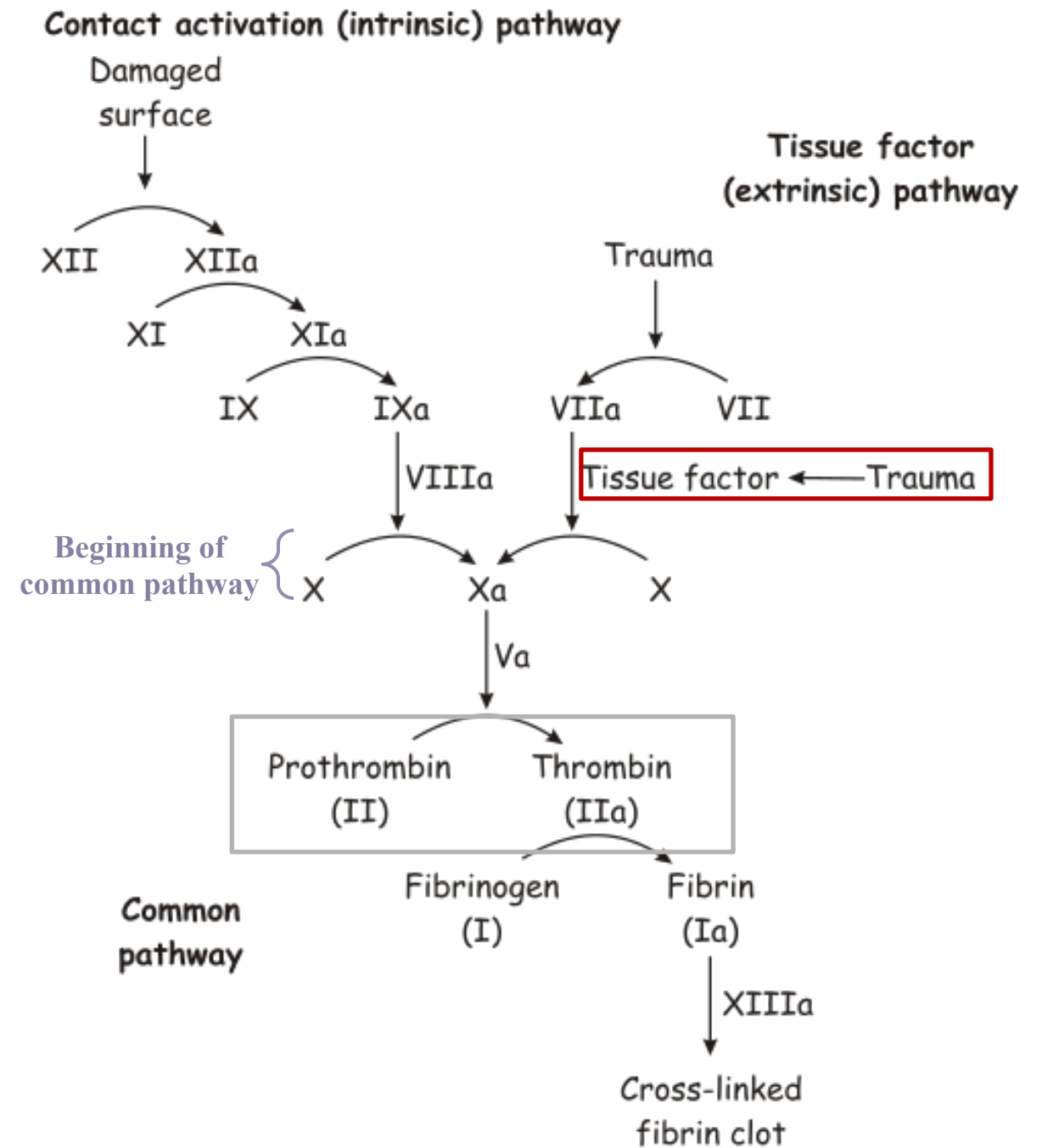
- A **cascade** is a mechanism in which enzymes activate other enzymes sequentially usually leading to an amplification of an initial signal.

Pathways

1. **Extrinsic**, which normally is triggered by trauma.
 2. **Intrinsic**, which begins in the bloodstream and is triggered by internal damage to the wall of the vessel.
- Initially independent, then they converge 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**).



Clotting Cascade



💡 **Pause and Think** why extrinsic pathway is completed in seconds whereas intrinsic pathway takes few minutes?

What triggers extrinsic and intrinsic pathways?

Extrinsic

- Damage to tissue **outside** the blood vessel.
- This pathway acts to clot blood that has **escaped** from the vessel.

Intrinsic

- Damage to blood vessel wall.
- Coagulates the blood **within** the damaged vessel.
- Triggered by elements that **lie within** the blood itself.

Practical Part



Clotting Time

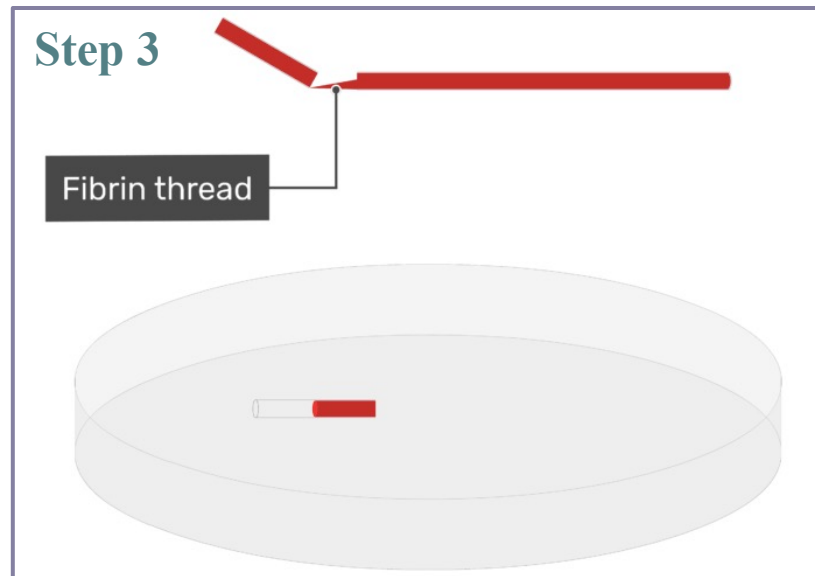
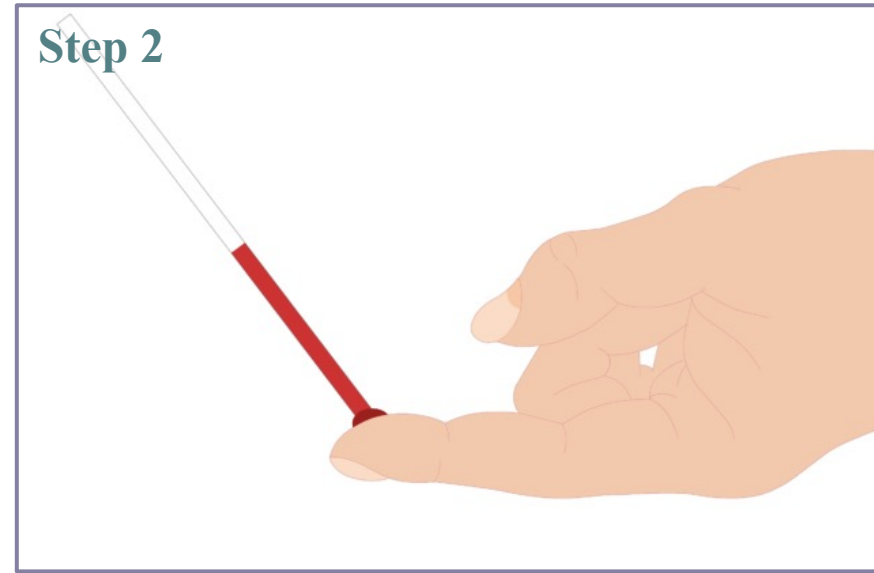
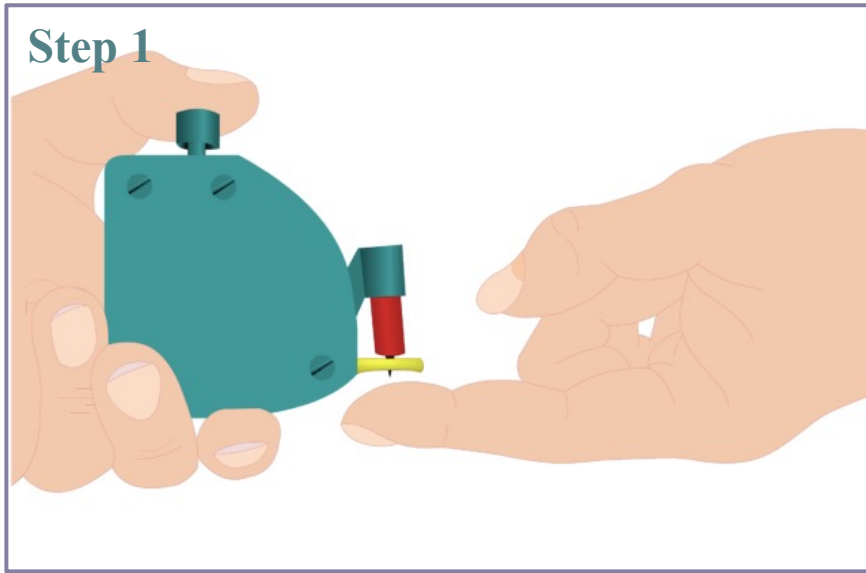
- Test for intrinsic system.
- Simple test but takes time and rarely done now.



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 - 10 min** to clot.
- Longer periods → Coagulation defects (e.g. Hemophilia).

Clotting Time - Capillary Method



Bleeding Time (BT)

- Provides assessment of platelet count and function.

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.
- The normal range from **2-4 min.**



Prothrombin Time (PT)

- Measures effectiveness of the extrinsic pathway

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

Prothrombin Time [PT]

