

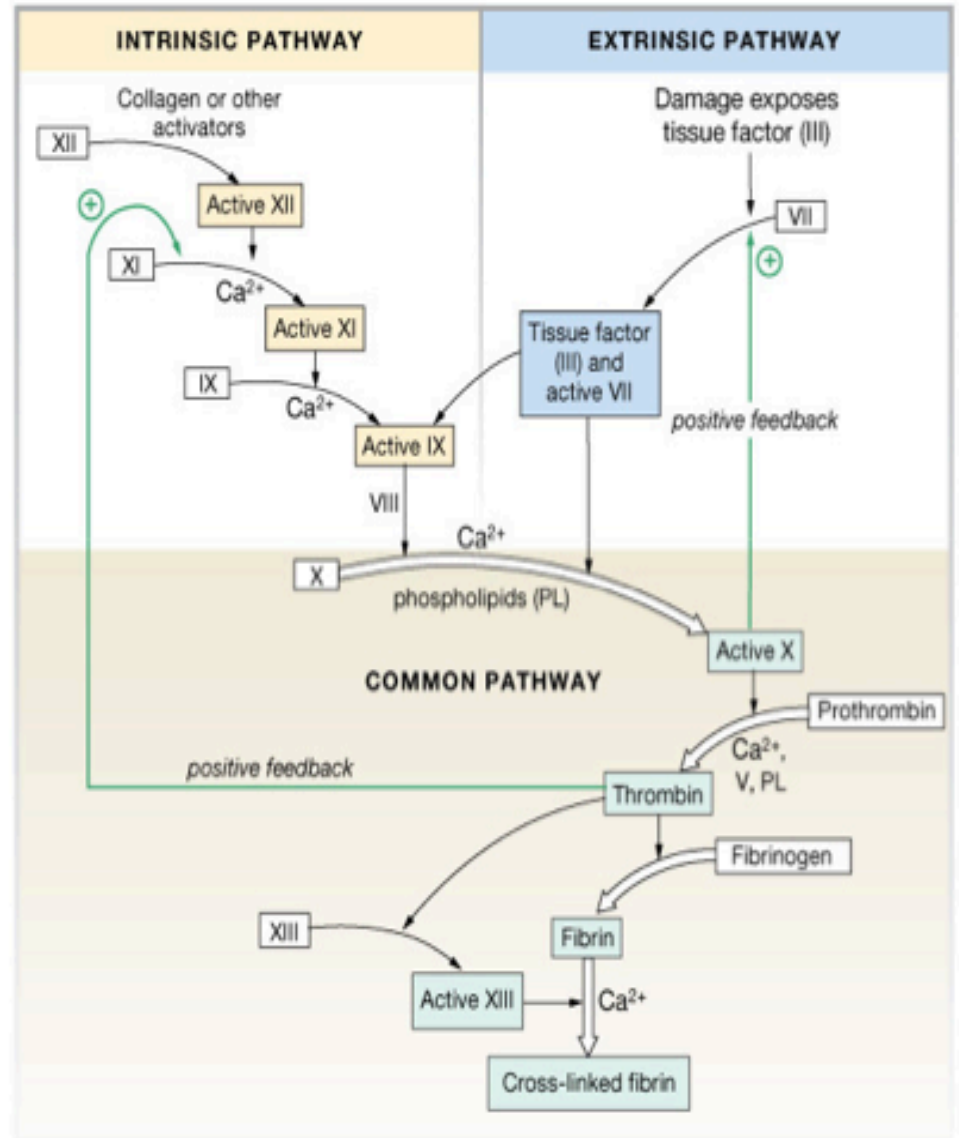
# **BCH 471**

## Experiment (6)

# **PROTHROMBIN TIME AND COAGULATION TIME**

# Clotting Cascade

- ▶ A **cascade** is a mechanism in which enzymes activate other enzymes sequentially usually leading to an amplification of an initial signal.
- ▶ Each of these pathways leads to the conversion of **factor X** (inactive) to **factor Xa** (active)



## ▶ Pathways

- Extrinsic
  - Intrinsic
- } Initially independent, then they converge on **common pathway** leading to the formation of a **fibrin clot !**

▶ The **intrinsic and extrinsic** coagulation pathways are a series of reactions involve coagulation factors

known as

1. Enzyme precursors (**zymogens**)
2. Non-enzymatic (**cofactors**)
3. Calcium (**Ca<sup>++</sup>**)
4. Phospholipids (**PL**).

# What Triggers Intrinsic/Extrinsic Clotting?

- ▶ **Extrinsic**—Release of biochemicals from broken blood vessels/damaged tissue.
- ▶ **Intrinsic**—No tissue damage, blood contacts damaged endothelial layer of blood vessel walls.

# Diagnosis of abnormal bleeding

- ▶ A number of parameters are used for diagnosis of clotting disorders including:
  1. Coagulation time (whole blood clotting time)
  2. Bleeding time
  3. Prothrombin time (PT)

# Diagnosis of abnormal bleeding (cont...)

## 1- Coagulation 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**

# Diagnosis of abnormal bleeding (cont...)

## 2- Bleeding time

- ▶ Test for a platelet function
- ▶ **Time taken for the blood to stop:**  
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**
- ▶ Bleeding time depends on the number and **functional activity of platelets**



# Diagnosis of abnormal bleeding (cont...)

## 3- Prothrombin time (PT)

▶ Test for extrinsic system

▶ **Method:**

An excess of tissue factor and  $\text{Ca}^{2+}$  ions are added to diluted plasma containing citrate (anticoagulant) and then the time taken for the mixture to clot is measured

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