Blood pathology 2

Hemostasis

LEC 7

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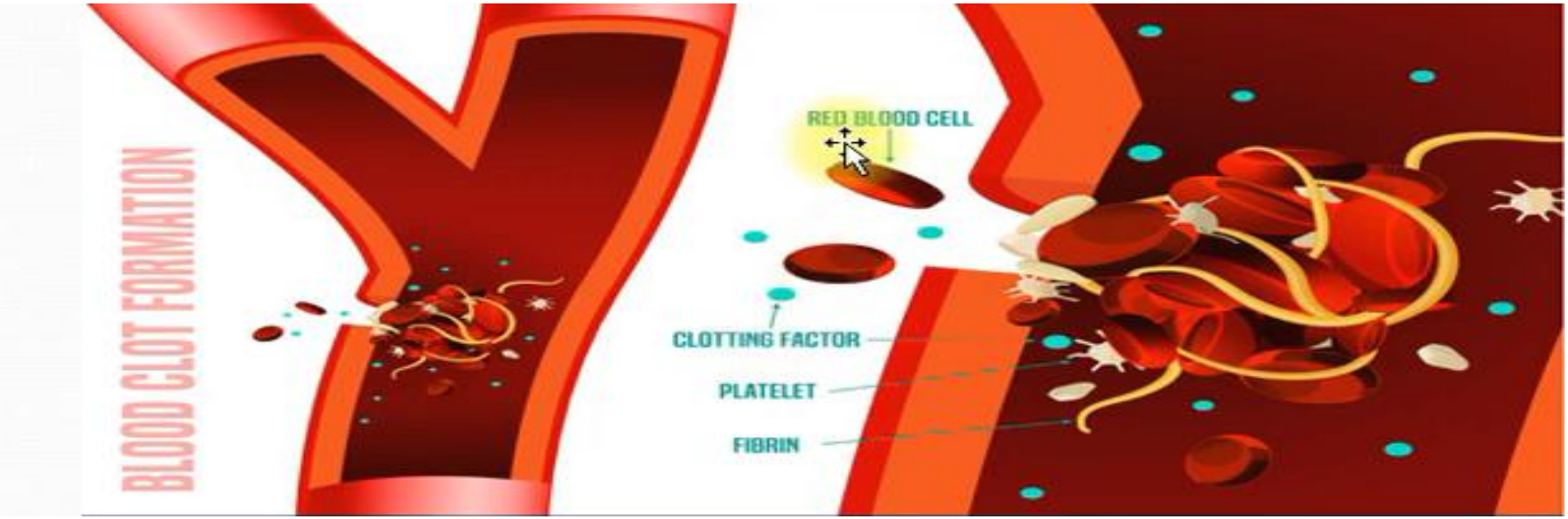
- **Hemostasis :** is the normal response of the body to stop bleeding and loss of blood, keeping the blood within a **damaged blood vessel**.

- The hemostatic response to vascular damage depend on the interaction between the **blood vessel wall**, circulating **platelets** and blood **coagulation factors**.



- **Significance of Hemostasis:**

- 1) Stimulate **healing process** of the ruptured Blood Vessel (BV).

- 2) Prevents blood loss and Anemia.

- 3) Prevents deposition of blood from ruptured Blood Vessel to internal organs.

- 4) Helps to maintain **homeostasis**= A state of balance among all the body systems

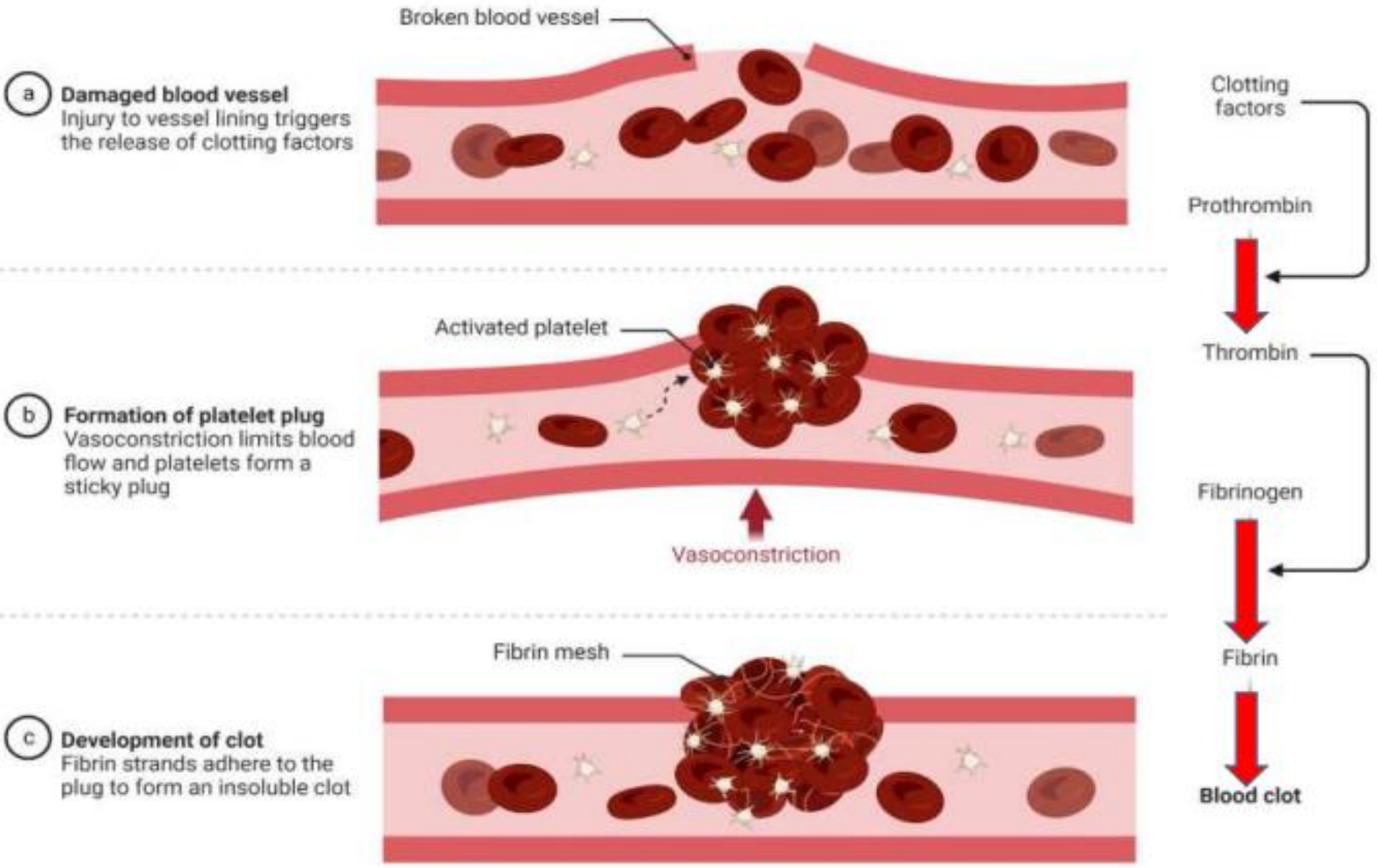
Hemostasis

Hemostasis is the process of forming **clots** in the wall of an **injured blood vessel** and preventing blood loss.

The Steps of Hemostasis

1. Vascular spasms (vasoconstriction at injured site).
2. Platelet plug formation (plugging the wound).
3. Formation of a blood clot (blood coagulation).
4. Fibrinolysis system.

Blood Clot Formation in Broken Vessel

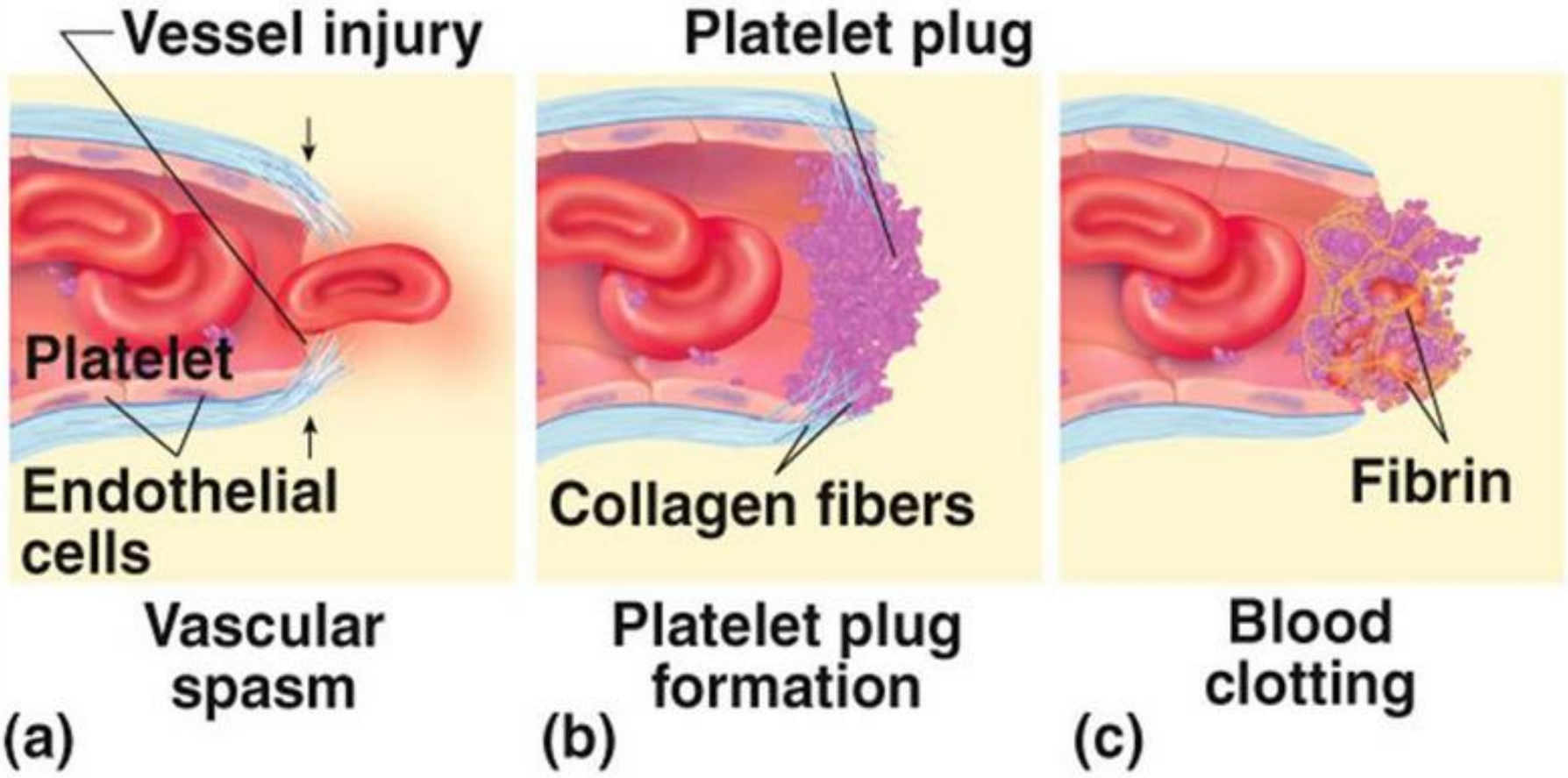


1- Vascular Spasms= Blood Vessel Constriction:

- Vasoconstriction is the first reaction to vascular damage, reduces blood flow from the site of injury and it is mediated by:

- a) Direct injury to vascular smooth muscle.
- b) Released chemicals substance (serotonin and thromboxane A2) by injured tissues and blood platelets.
- The spasm can last for many minutes to hours.

Steps of Hemostasis



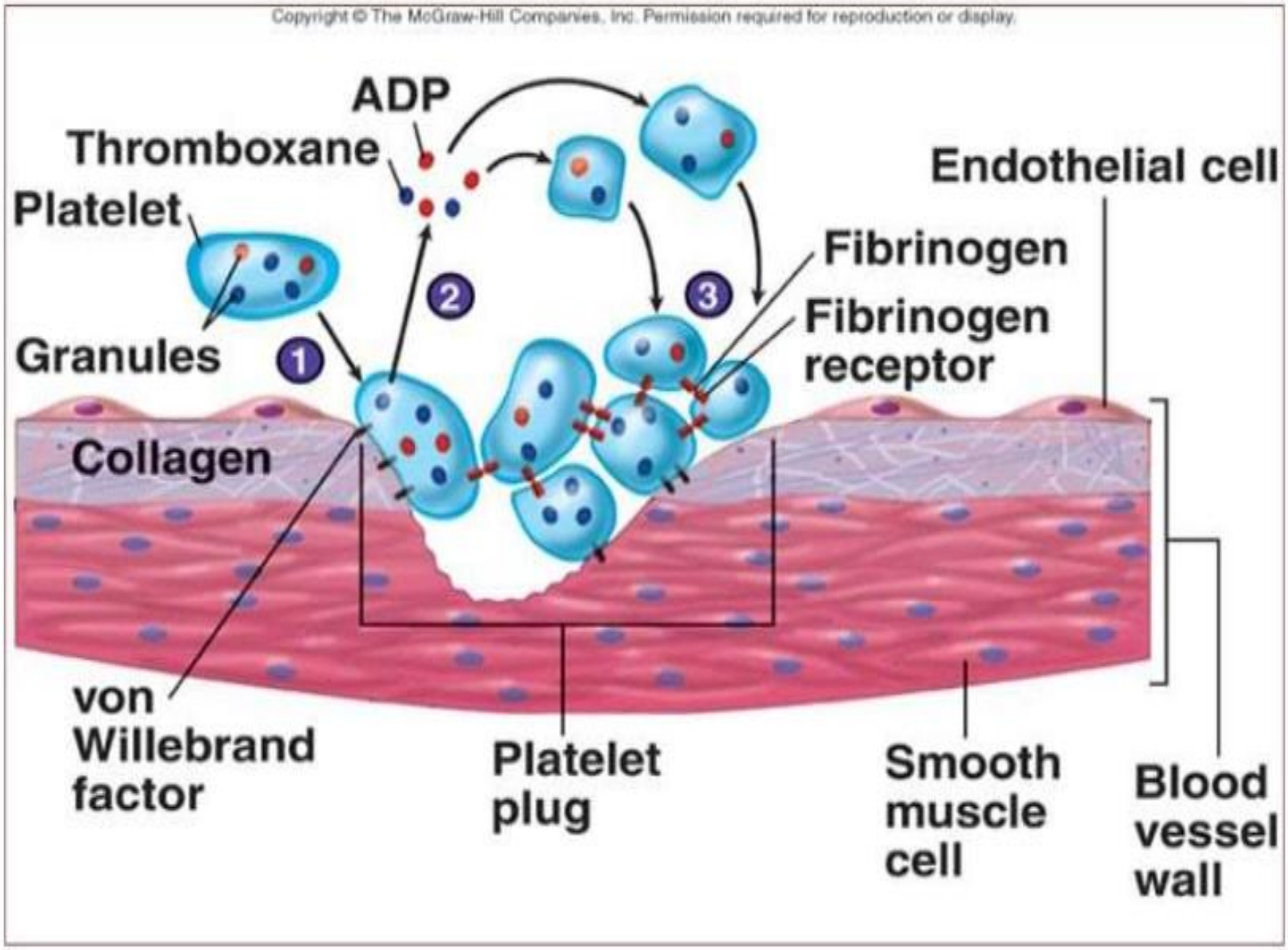
2- Formation of the Platelet Plug (Primary Hemostasis)

- After damage to endothelium of vessel:

1- Platelets adhere to the collagen of the injured vessel (enhanced by Von Willebrand factor) and become activated.

2- Activated platelets release ADP and thromboxane A2, that activate the surrounding platelets and causing platelet plug formation.

- **Von Willebrand Factor:** is a glycoprotein made by bone marrow and endothelial cells, it functions as a bridge between platelet and collagen fibrils of damaged tissue



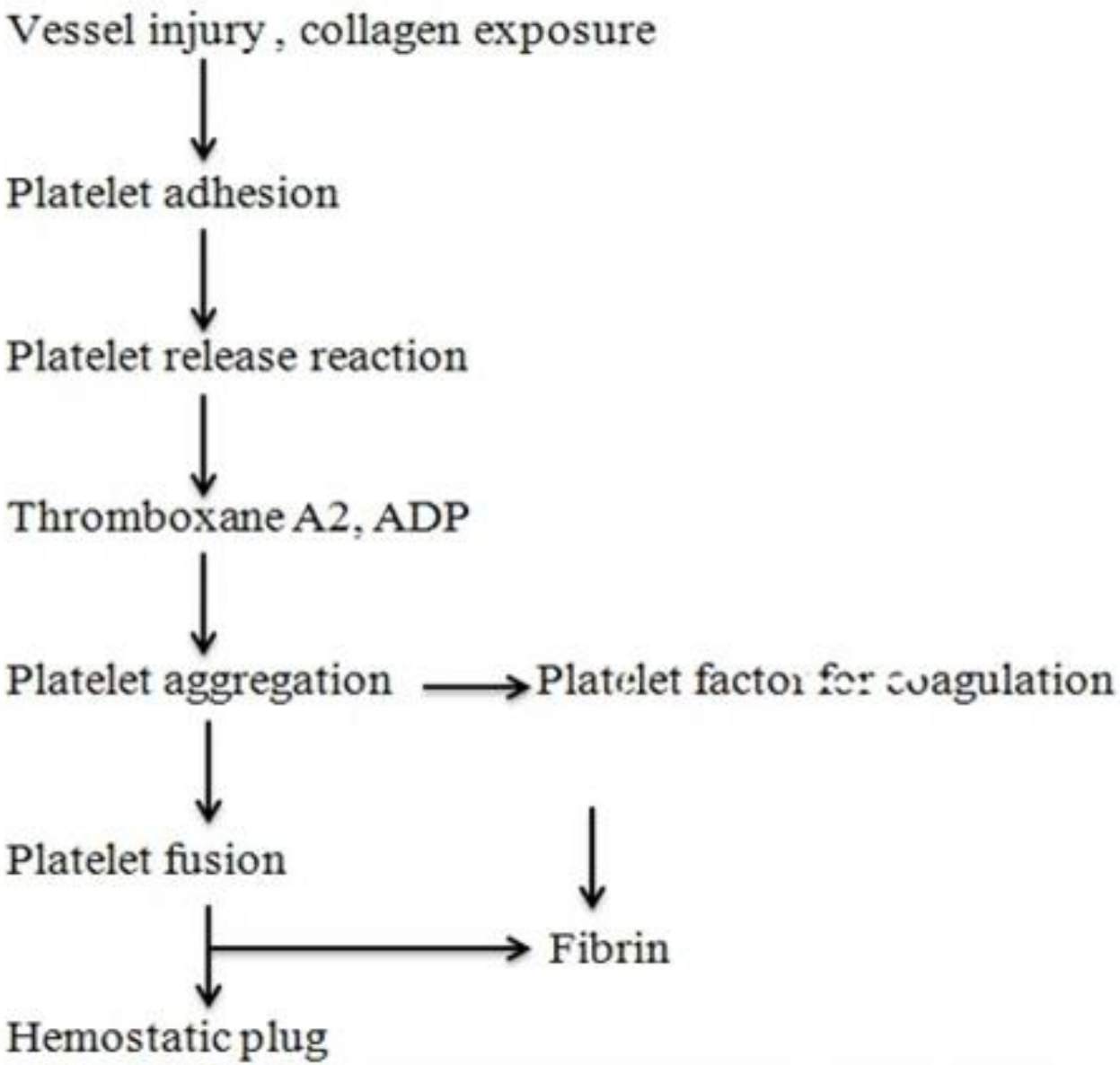
- **3. Formation of a blood clot (blood coagulation)**
- **(Secondary Hemostasis)**
- Coagulation of blood occur through a series of reaction due to activation of a group of substance called **clotting factors**
- Done by = Thrombin.
- <<< coagulation factors >>> ==> Insoluble Fibrin Clot
- □ Support **platelet plug** by adding RBC + WBC in the fibrin mesh ==> clot stronger

4- Fibrinolysis

- It is the physiological process of removing **unwanted fibrin deposits**, by a proteolytic enzyme in the plasma known as **plasmin** or **fibrinolysin**, which acts on fibrin to lysis of the clot.

- These fragments are then **removed** from the circulation by the macrophages of the reticulo-endothelial system.

Plug formation:-

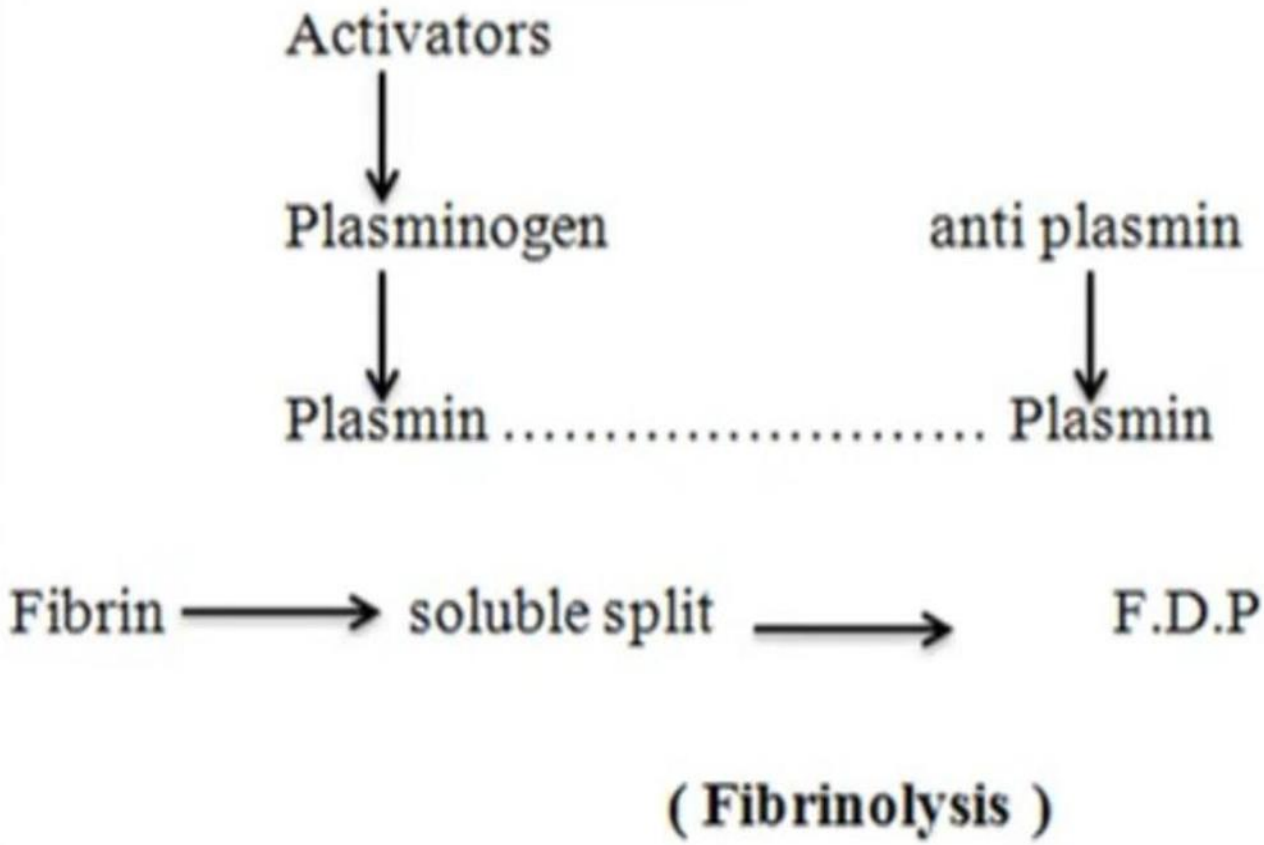


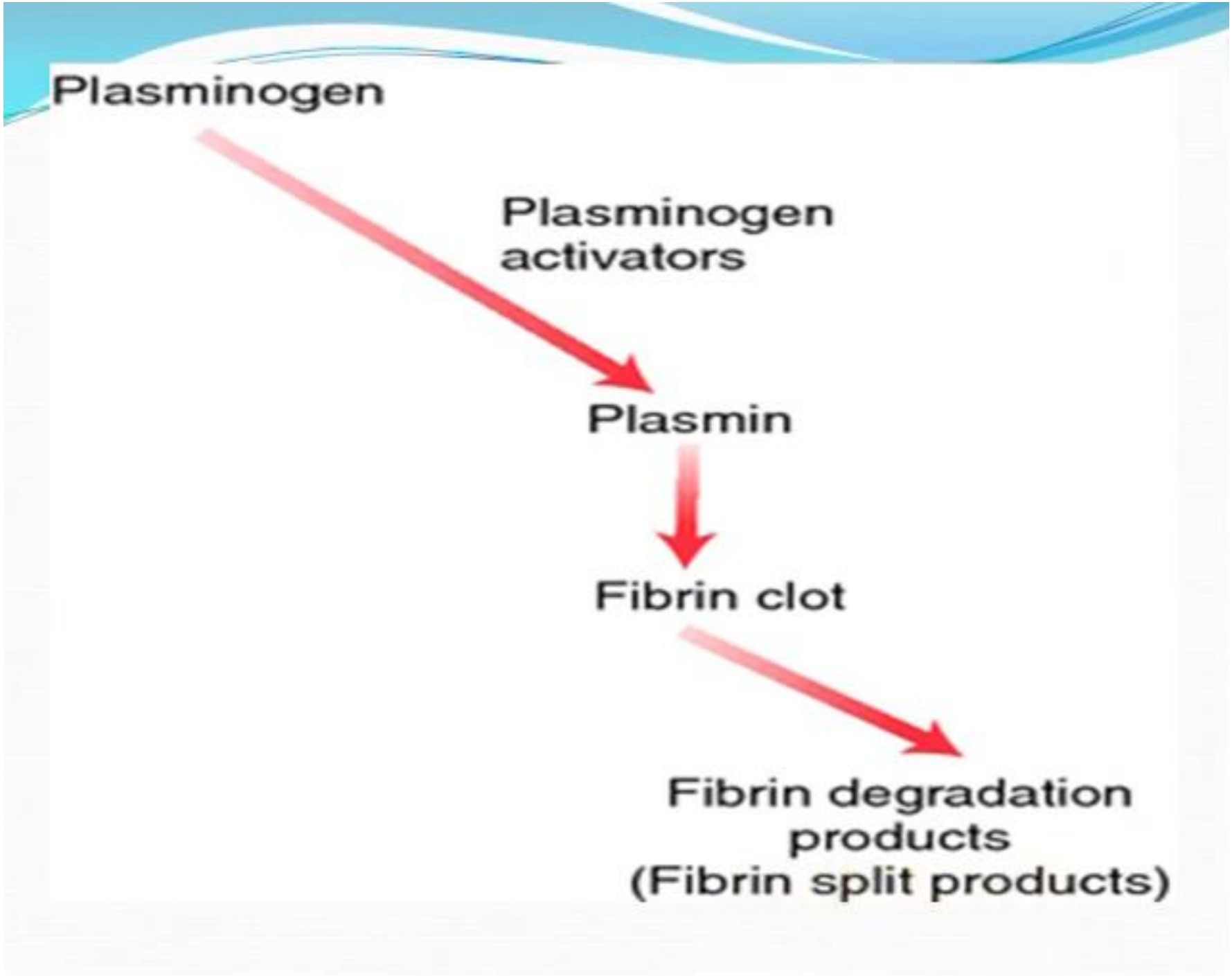
- **Plasminogen:-** it is a globulin proenzyme present in blood and tissue fluid, it is converted to the enzyme **plasmin** by process of fibrinolysis.

- **Plasmin :** it is a serine protease enzyme which is responsible for digestion of fibrin bond, fibrinogen bond and other proteins by hydrolysis of peptide leading to formation of soluble split (fibrin degradation product FDP).

- Then FDP are competitive inhibitors of thrombin.

- **Fibrin degradation products:-** Are the end results of the action of plasmin enzyme on the fibrin plug in the process of **fibrinolysis.**




Plasminogen
Plasminogen activators
Plasmin
Fibrin clot
Fibrin degradation products
(Fibrin split products)

Thank You For Listening