

Blood coagulation

Mean the process by which a [blood](#) clot is formed. The formation of a clot is often referred to as secondary hemostasis, because it forms the second stage in the process of arresting the loss of blood from a ruptured vesse

Blood Coagulation

The clotting mechanism involves a cascade of reactions in which clotting factors are activated.

Most of them are plasma proteins synthesized by the liver (vitamin K is needed for the synthesis of factor II, VII, IX and X).

They are always present in the plasma in an inactive form.

When activated they act as proteolytic enzymes which activate other inactive enzymes.

Several of these steps require Ca^{++} and platelet phospholipid.

II- Platelet plug formation

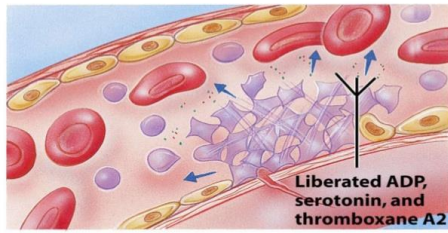
Mechanism:

Platelet adherence

Platelet activation

Platelet aggregation

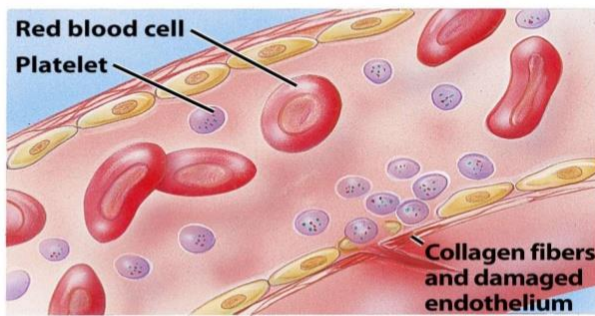
Platelet activation :
platelet release action



2 Platelet release reaction

Figure 15-9 part 2 Principles of Anatomy and Physiology, 11/e
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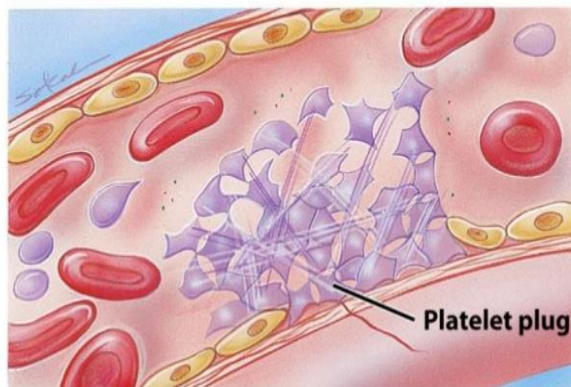
platelet adhesion



1 Platelet adhesion

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Platelet aggregation



3 Platelet aggregation

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WHY BLOOD DOES NOT CLOT IN CIRCULATION ?

- Endothelial surface factor
 - smoothness
 - layer of glycocalyx
 - Negatively charged
- Velocity of circulation
- Natural anticoagulants
- Activation of Fibrinolytic system
- Liver removes activated clotting factors

Intrinsic pathway

The initial reaction is the conversion of inactive factor XII to active factor XIIa.

Factor XII is activated in vitro by exposing blood to foreign surface (glass test tube).

Activation in vivo occurs when blood is exposed to collagen fibers underlying the endothelium in the blood vessels.

Extrinsic pathway

Requires contact with tissue factors external to blood.

This occurs when there is trauma to the vascular wall and surrounding tissues.

The extrinsic system is triggered by the release of tissue factor (thromboplastin from damaged tissue), that activates factor VII.

The tissue thromboplastin and factor VII activate factor X.

Platelets

- Produced in the bone marrow by fragmentation of the cytoplasm of megakaryocytes (1000-5000/cell).
- 1/3 of marrow output of platelets is trapped in spleen (splenectomy?)
- Normal count: 150,000-400,000/ μL (250,000)
- Life span 7-10 days.
- Removed from circulation by tissue macrophage system mainly in spleen.
- Thrombopoietin: major regulator of platelet production (produced by liver and kidney).
- It increases no. & rate of maturation of megakaryocytes.

