

PHYSIOLOGY

Q7 – Intrinsic Mechanism of Blood Coagulation

Ans : 7 – Answer

Introduction

Blood coagulation is a vital protective mechanism that prevents excessive blood loss following vascular injury. The intrinsic mechanism of blood coagulation is initiated within the blood itself and involves clotting factors present in plasma. It plays an important role in normal physiological hemostasis.

Definition

The intrinsic mechanism of blood coagulation is defined as the coagulation pathway initiated by contact of blood with a damaged vascular surface, involving clotting factors present within the blood and leading to formation of a stable fibrin clot.

Basis of Intrinsic Pathway

The intrinsic pathway is activated when blood comes in contact with collagen or other negatively charged surfaces. It does not require tissue thromboplastin and hence is called the intrinsic pathway.

Clotting Factors Involved

The intrinsic pathway involves clotting factors XII, XI, IX, and VIII, along with factor X, factor V, prothrombin (factor II), fibrinogen (factor I), factor XIII, calcium ions, and platelet phospholipids.

Steps of Intrinsic Mechanism

Contact with damaged endothelium activates factor XII to XIIa, which activates factor XI to XIa. Factor XIa activates factor IX to IXa. Factor IXa, along with factor VIIIa, calcium ions, and platelet phospholipids, forms the tenase complex that activates factor X to Xa. This marks the beginning of the common pathway.

Common Pathway

Activated factor Xa combines with factor Va, calcium ions, and platelet phospholipids to form prothrombin activator. Prothrombin is converted to thrombin, which then converts fibrinogen into fibrin. Factor XIII stabilizes the fibrin clot.

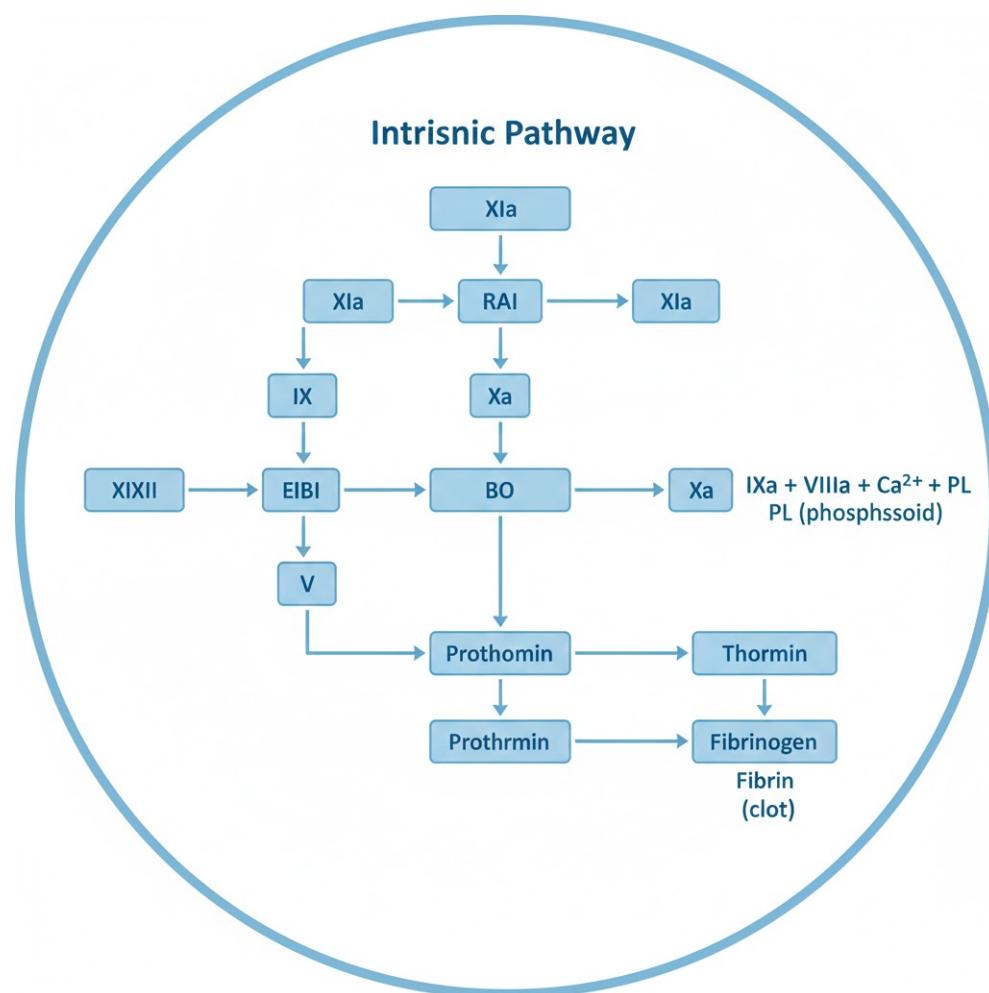
Laboratory Test

The intrinsic pathway is assessed by the activated partial thromboplastin time (aPTT). Prolongation of aPTT indicates abnormalities in intrinsic coagulation factors.

Clinical Importance

Defects in the intrinsic pathway result in bleeding disorders such as hemophilia A (factor VIII deficiency) and hemophilia B (factor IX deficiency). The intrinsic pathway is also important in monitoring anticoagulant therapy.

Diagram – Intrinsic Mechanism of Blood Coagulation



Conclusion

The intrinsic mechanism of blood coagulation is a complex but well-organized cascade involving multiple clotting factors present in blood. Although slower than the extrinsic pathway, it plays a crucial role in maintaining effective hemostasis and formation of a stable fibrin clot.