Clinical pathology 4th class	Hemostate system and disorders	Dr Mohammed A.Y.Al-Amery 2025

Normal hemostasis(The Coagulation Pathways): is a complex interaction of plasma coagulation and fibrinolytic proteins, platelets, and the blood vasculature.

1- **blood vasculature :**

Slows blood flow will enhancing the adherence of platelets to exposed subendothelial surfaces and the activation of the coagulation process.

2- platelets

In the normal hemostatic mechanism platelets function to form a temporary plug at the site of vascular injury. The basic events involved are:

(1) shape change,

(2) adhesion,

(3) aggregation

(4) secretion.

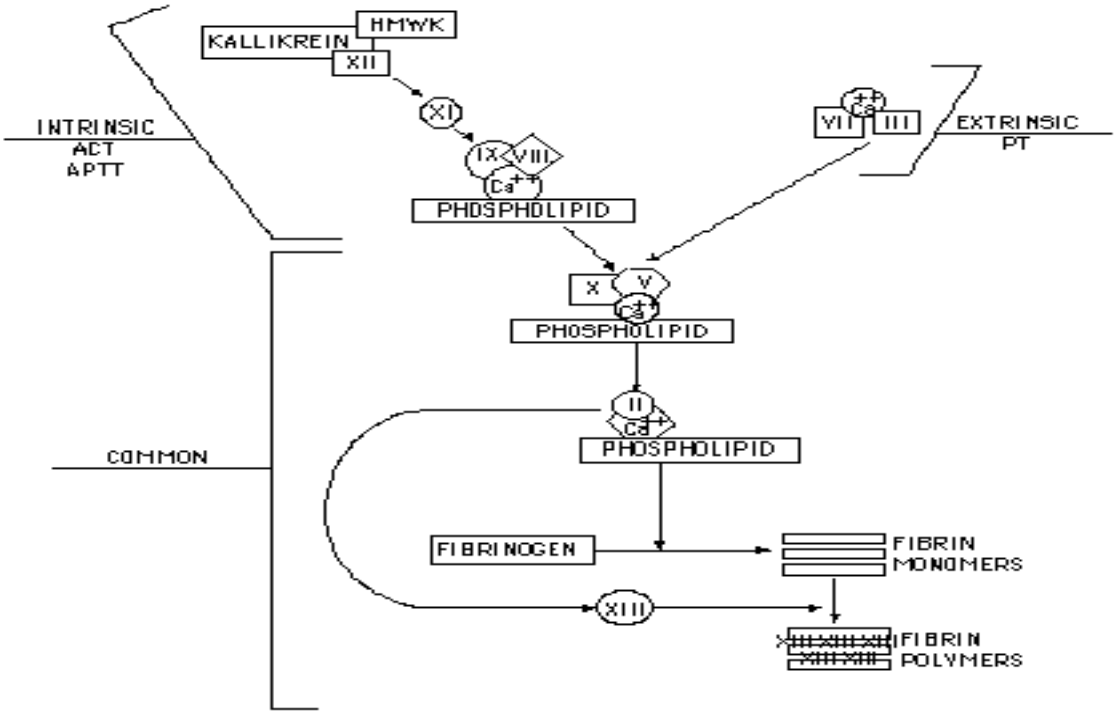
The **adherence** of platelets at sites of vascular injury is an important early event in hemostasis. Following adhesion additional platelets are recruited in response to **components released** from platelet granules including adenosine diphosphate **(ADP)** and serotonin. Platelets synthesize thromboxane **A2 (TXA2)** and platelet activating factor which are potent platelet **aggregating** agonists and, in the case of **TXA2,** enhance vasoconstriction. Exposure of subendothelial surfaces and/or the generation of tissue factors also leads to the sequential activation of a series of coagulation proteins.

3-Coagulation factors:

Intrinsic system: factor XII , factor XI , factor XI and factor VIII,

The extrinxic: tissue factor (factor III), in addition to calcium and factor VII

Common pathway: factor X and factor V, factor II **(prothrombin)** to factor IIa (thrombin). Thrombin in turn cleaves fibrinogen into fibrin monomers which are cross-linked and stabilized by factor XIIIa. Factor XIII is activated by thrombin in the presence of calcium.



Coagulation screening test:

1. **Activated coagulation time (ACT)** for evaluation of the intrinsic and common pathways.
2. **Activated partial thromboplastin time (APTT)** is an indicator of the function of coagulation factors in the intrinsic and common pathways.
3. **Prothrombine time (PT):** An indicator of factors in the extrinsic and common pathways.
4. **Thormbine time (TT):** is a direct measurement of functional fibrinogen and/or evaluation of individuals with disseminated intravascular coagulation (**DIC**).
5. **Antithrombin III** (ATIII): is a circulating protein inhibitor of several coagulation factors including XII, XI, X, IX, and thrombin (II).

Test	Patient	Normal Range
PT	8.0 sec	6.1 - 10.1 sec
TT	8.9 sec	7.6 - 22.0 sec
Fibrinogen	240 mg/dl	100 - 300 mg/dl
Platelet	Ct 310,000/ul	200,000 - 500,000/ul

Hemostate disorders

1-Deficiencies of Vitamin K; It is characterized by hematoma formation and hemorrhage into the conjunctiva, joints, and thoracic and abdominal cavities.

2-Coumarine - indanedione toxicity (Rodenticide)

3-Rickettsia rickettsii

4-Herpesvirus infection can result in the rapid death of puppies usually between ages of 7 and 21 days

5-LIVER DISEASE: liver is the major site of synthesis for most of the coagulation proteins.

6-Disseminated intravascular coagulation(DIC):

It is a pathologic process involving overwhelming activation and consumption of coagulation proteins and platelets often accompanied by enhanced fibrinolysis.

The syndrome may occur secondarily to a variety of events including viral, bacterial, protozoal or rickettsial infections, parasite migration, heat stroke, burns, shock or trauma. In horses with intestinal ischemia and endotoxemia.

7-Platelet disorders: congenital and acquired thrombocytopenias, and congenital and acquired functional platelet disorders.

Induce Fibrinolysis:

1.**Urokinase**: derived from human cell culture, this product is expensive and is not fibrin specific.

2.**Streptokinase**：This product is less expensive but it also is not fibrin specific. In addition, in humans, many people have antibodies to this product due to previous infections with beta-hemolytic streptococcus. In these individuals it is necessary to give the product in high enough concentrations to overcome the antibody response as well as natural inhibitors of plasmin.

Coagulation factores
I Fibrinogen
II Prothrombin
III Tissue factor, Thromboplastin
IV Calcium
V Proaccelerin, Labile factor
VII Proconvertin, Stable factor
VIII Antihemophiliac factor A
IX Antihemophiliac factor B
X Stuart factor
XI Plasma thromboplastin antecedent
XII Hageman factor
XIII Fibrin stabilizing factor
Prekallikrein Fletcher factor
High Molecular
Weight Kininogen Fitzgerald factor
Williams factor
Flaujeac factor