

Blood coagulation

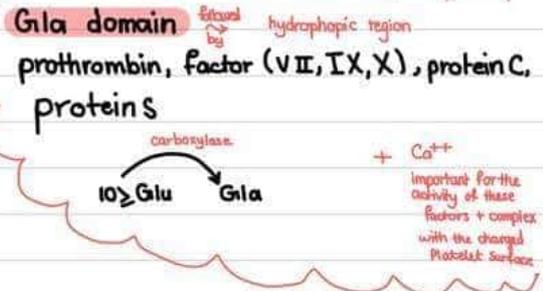
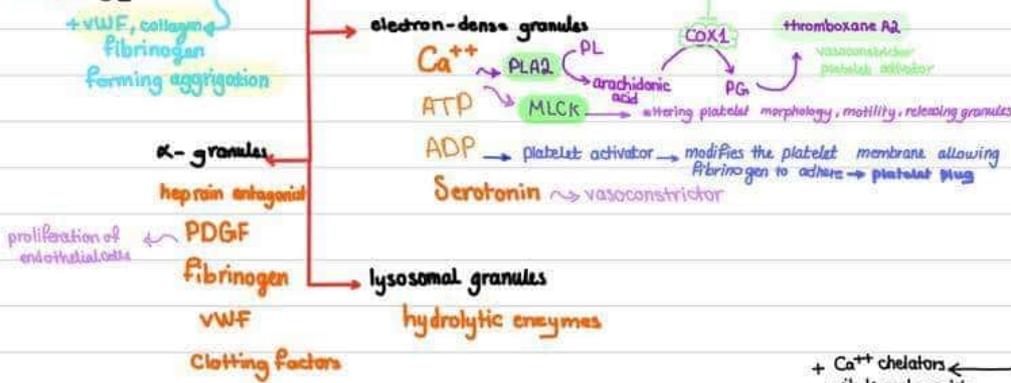
Steps of hemostasis

1. vascular constriction
2. activation + aggregation of platelets
3. formation of fibrin mesh
4. dissolution of the clot

Platelets are a major player

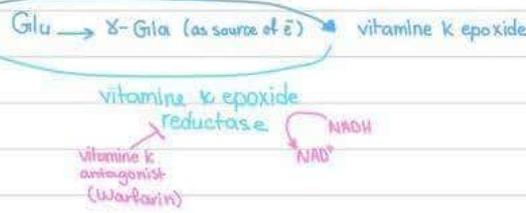
they contain

- numerous kinds of surface receptors
- actin filaments + myosin (change the shape of platelet)
- three types of granules
- glycoproteins

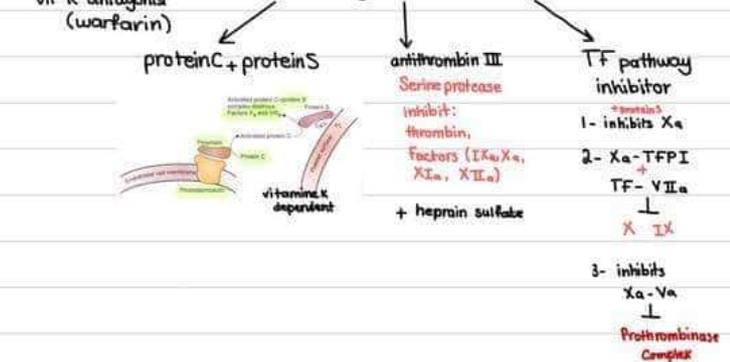


Components of coagulation

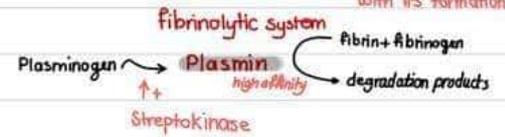
1. organizing surface (platelets)
2. proteolytic zymogens (prekallikrein, prothrombin, factors VII, IX, X, XI, XII, XIII)
3. anti-coagulants (protein C, protein S)
4. non-enzymatic protein cofactors (factor VIII, V, tissue factor)
5. Ca⁺⁺
6. vitamin K
7. fibrinogen



Anti-coagulant factors

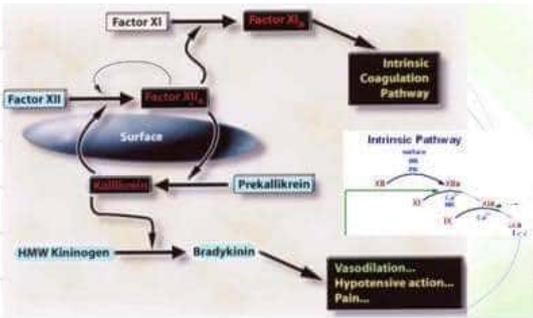


Clot dissolution (starts concomitant with its formation)

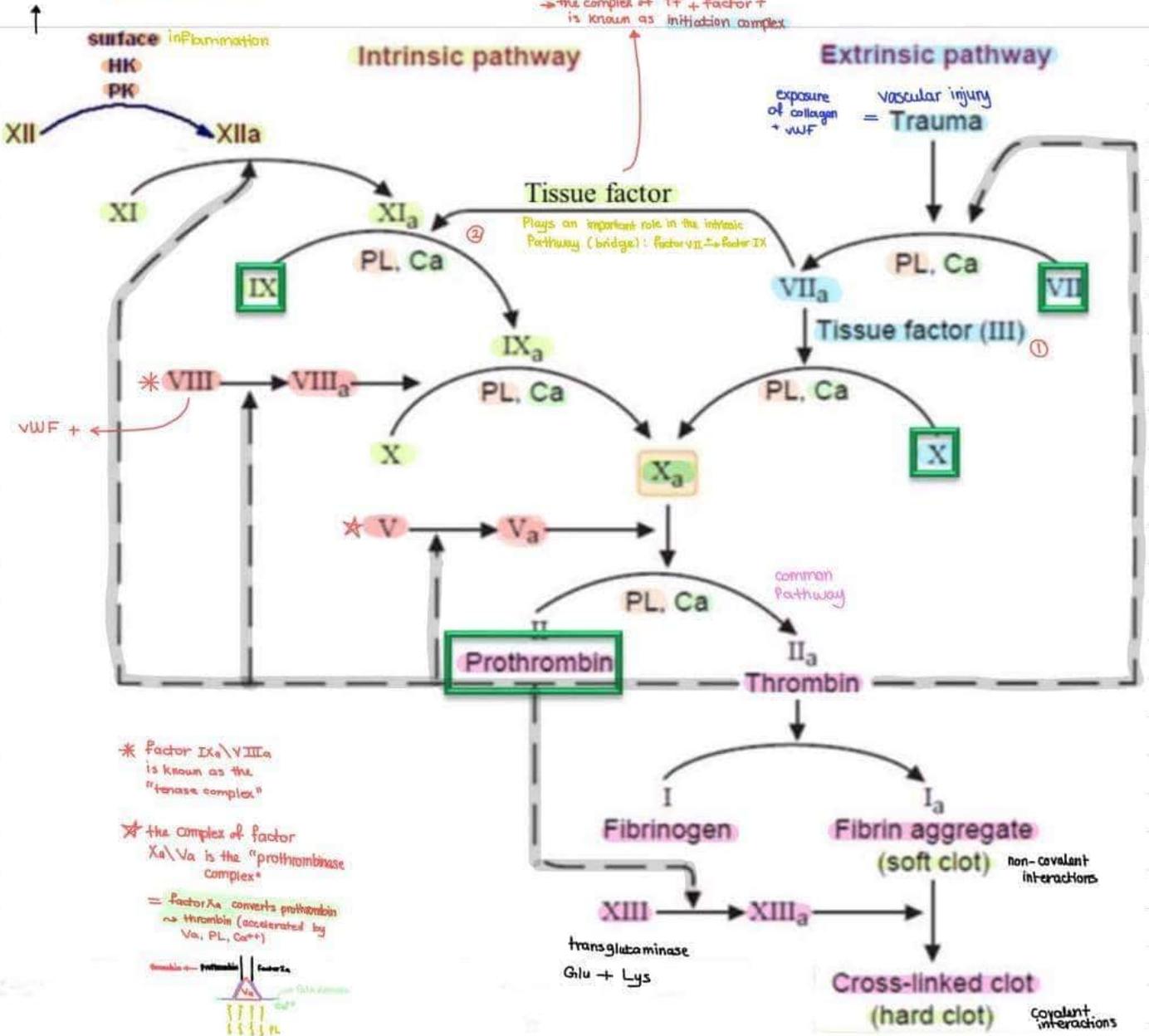


Clotting factor number	Clotting factor name	Function	Plasma half-life (h)
I	Fibrinogen	Clot formation	90
II	Prothrombin	Activation of I, V, VII, VIII, XI, XIII, protein C, platelets	65
III	TF	Co factor of VIIa	-
IV	Calcium	Facilitates coagulation factor binding to phospholipids	-
V	Proaccelerin, labile factor	Co-factor of X-prothrombinase complex	15
VI	Unassigned		
VII	Stable factor, proconvertin	Activates factors IX, X	5
VIII	Antithaemophilic factor A	Co-factor of IX-tenase complex	10
IX	Antithaemophilic factor B or Christmas factor	Activates X; Forms tenase complex with factor VIII	25
X	Stuart-Prower factor	Prothrombinase complex with factor V; Activates factor II	40
XI	Plasma thromboplastin antecedent	Activates factor IX	45
XII	Hageman factor	Activates factor XI, VII and prekallikrein	
XIII	Fibrin-stabilising factor	Crosslinks fibrin	200
XIV	Prekallikrein (F Fletcher)	Serine protease zymogen	35
XV	HMWK- (F Fitzgerald)	Co factor	150
XVI	vWF	Binds to VIII, mediates platelet adhesion	12
XVII	Antithrombin III	Inhibits IIa, Xa, and other proteases	72
XVIII	Heparin cofactor II	Inhibits IIa	60
XIX	Protein C	Inactivates Va and VIIIa	0.4
XX	Protein S	Cofactor for activated protein C	

HMWK - High molecular weight kinogen; vWF - Von Willebrand factor; TF - Tissue factor



activation of kallikrein-kinin system



Roles of thrombin

1. platelets recruitment.
2. amplification
3. formation of soft clot
4. formation of hard clot
5. attenuation of its own activity
6. vascular remodeling and inflammation

