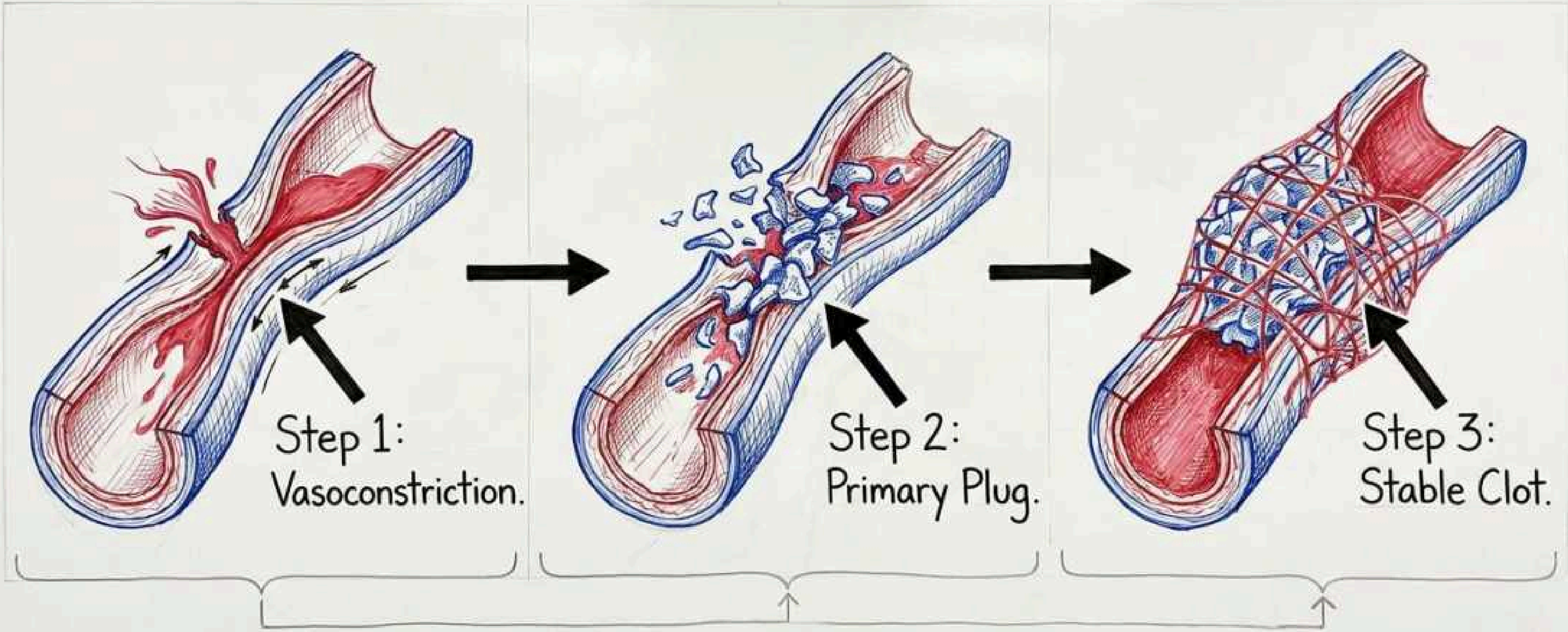
Haemostasis: Sealing the Breach

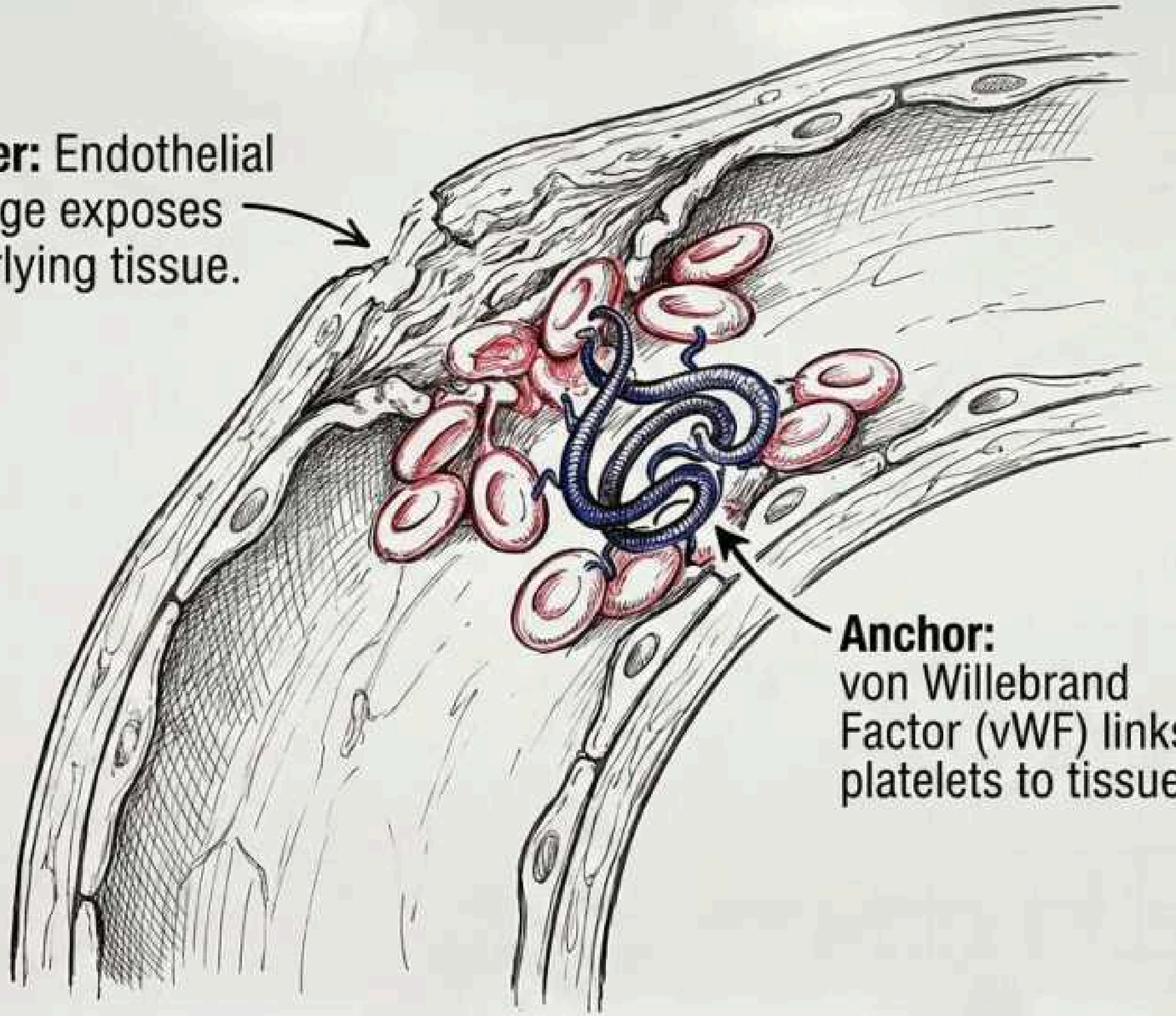
¶ 4.1



Gemini Notebook

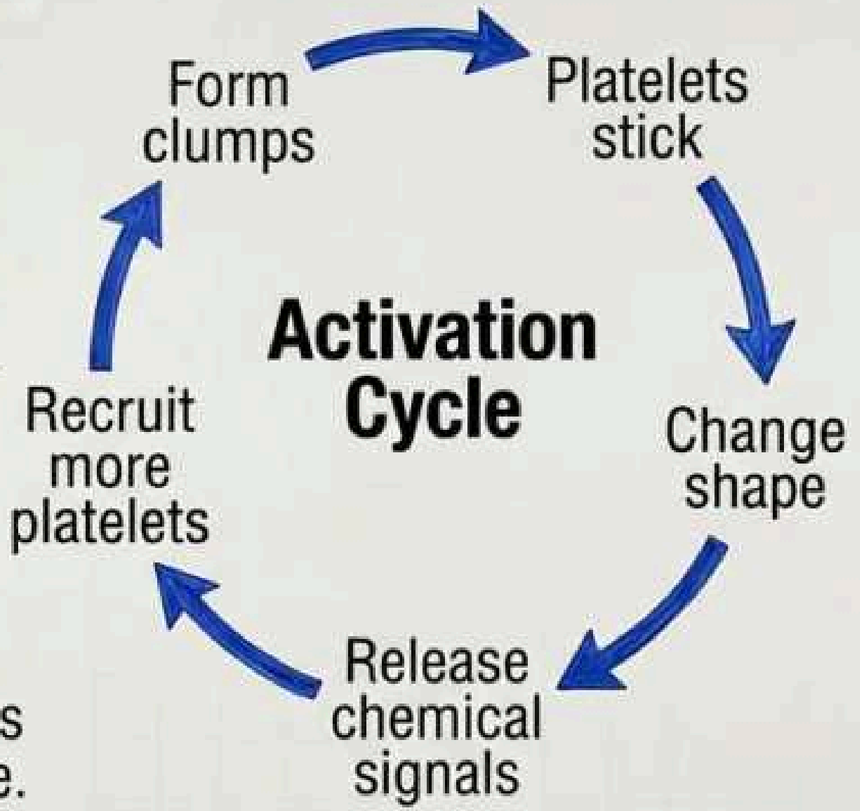
¶ 4.2

The Primary Platelet Plug



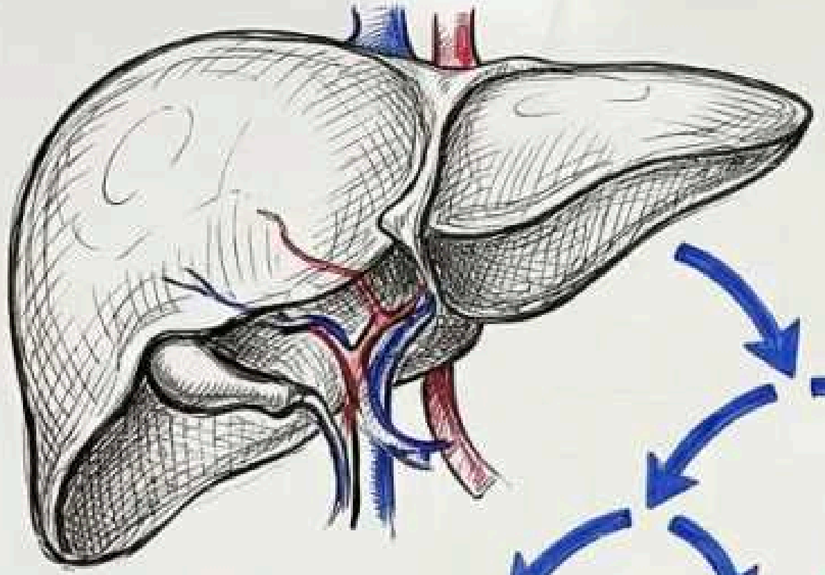
Trigger: Endothelial damage exposes underlying tissue.

Anchor: von Willebrand Factor (vWF) links platelets to tissue.



Gemini Notebook

The Clotting Cascade

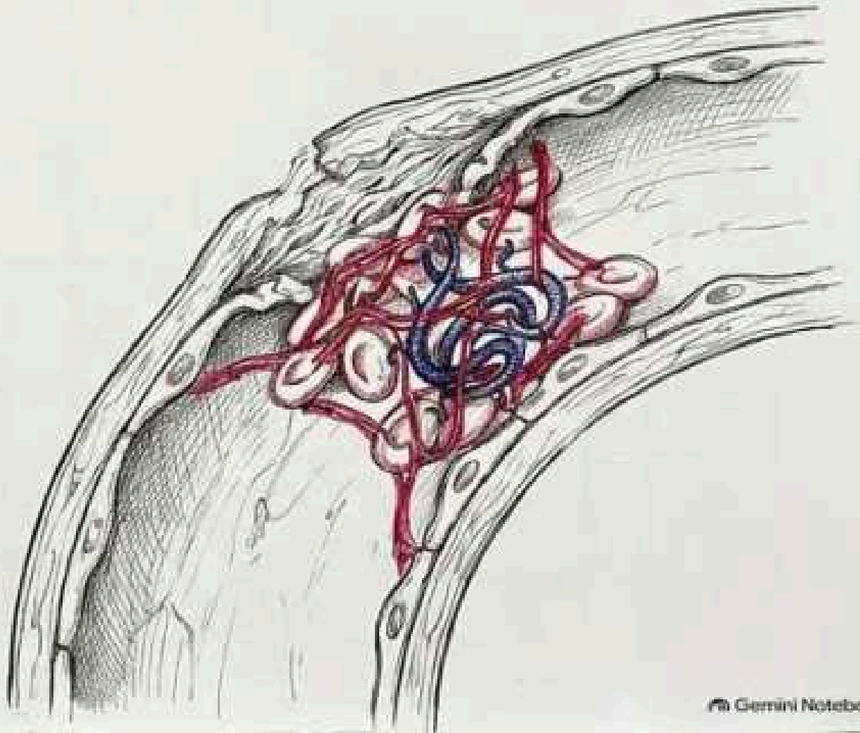


Source: Clotting factors (chain of proteins) primarily synthesized in the liver.

[**Small Trigger**] → [**Amplification**] → [**Large Response**]

Fibrinogen (soluble) → [**Thrombin** (Enzyme)] → **Fibrin** (strands)

Outcome: Fibrin binds the platelet plug together.



Gemini Notebook

Vitamin K and Clotting

The Dependency:

Several Clotting Factors + Vitamin K = Functional Clotting.

The Blockers:

Warfarin (drug) & Vitamin K deficiency → Inactive factors → Bleeding.

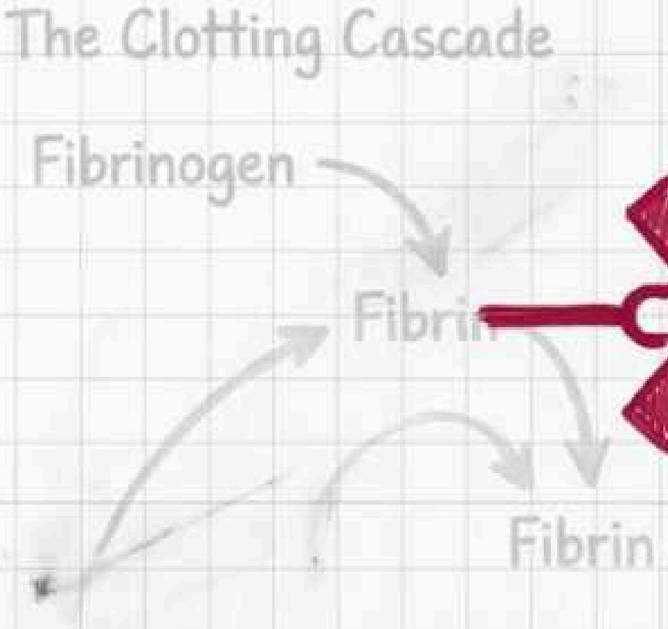
Clinical Application: Prophylactic Vitamin K given to newborns to prevent severe infantile bleeding disorders.



Gemini Notebook

The Brakes: Anticoagulants & Fibrinolysis

¶ 4.5



Healthy Endothelium: Actively repels clotting.



Natural Anticoagulants:
Antithrombin, Protein C, Protein S
[Switch OFF the cascade]



Risk Warning:
Inherited weaknesses in these brakes = Unwanted clots.

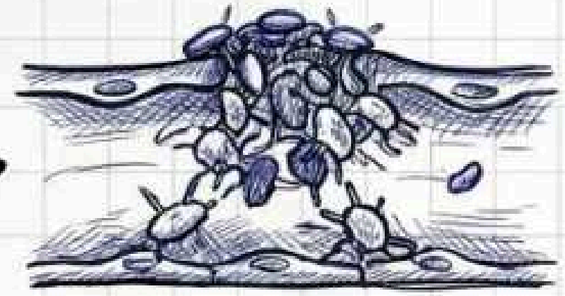
Fibrinolysis (Post-Healing timeline):

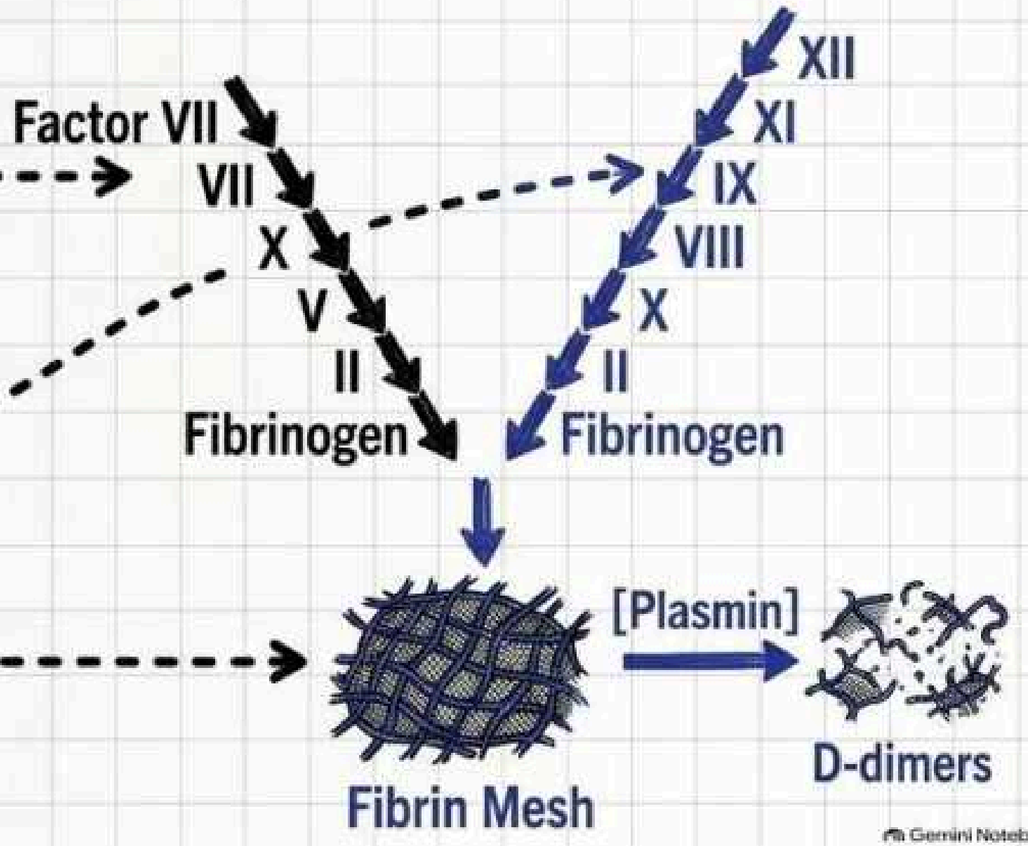
Clot ---> Plasmin ---> Dissolved Mesh.

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Diagnostic Laboratory Tests

Platelet Count	Measures total number of platelets.
Prothrombin Time (PT/INR)	Measures Pathway A / Used to monitor Warfarin.
Activated Partial Thromboplastin Time (aPTT)	Measures Pathway B.
Fibrinogen & D-dimer	Measures clot formation and breakdown products.



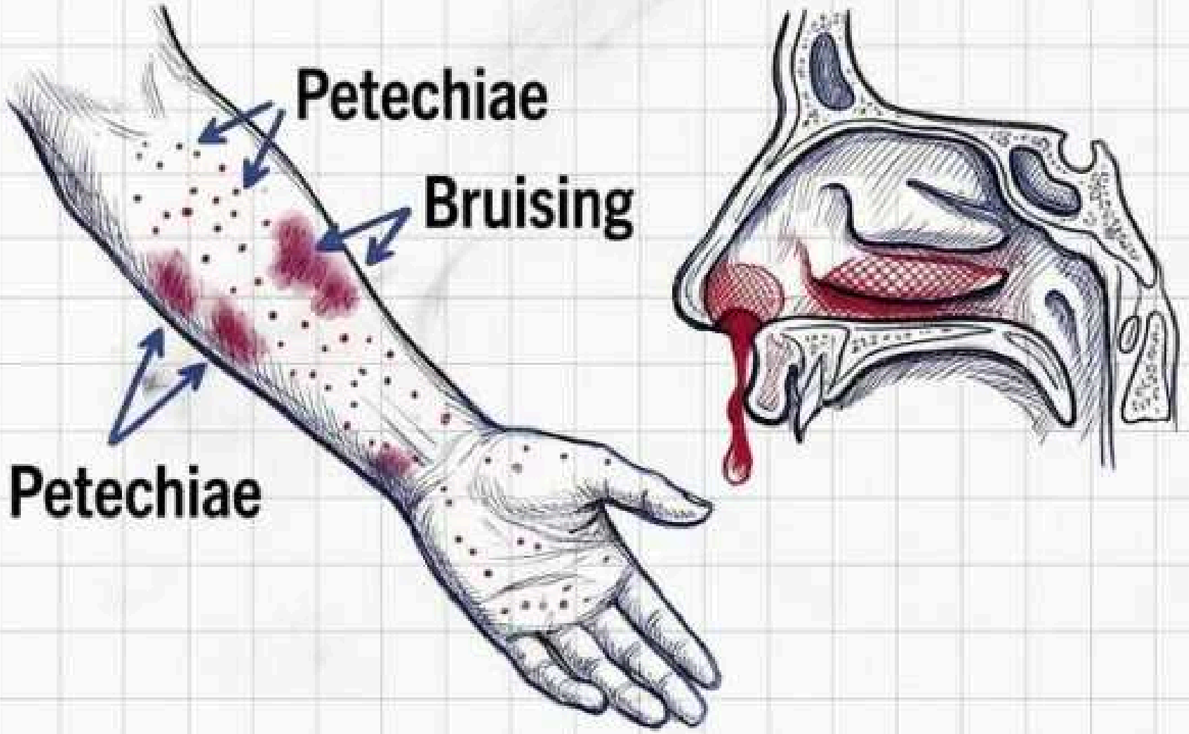


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Bleeding Patterns: A Diagnostic Split

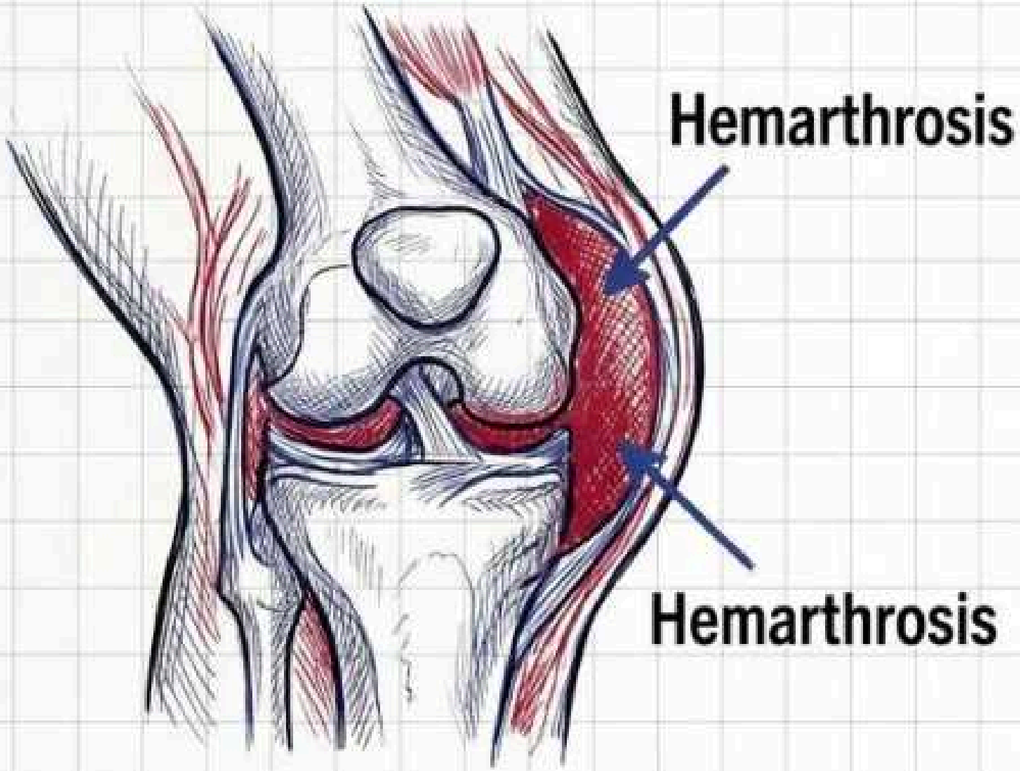
¶ 4.7

Platelet Problems



Signs: Skin/mucous membranes, easy bruising, nosebleeds, bleeding gums, heavy periods.

Clotting Factor Problems



Signs: Deep tissues, joints/muscles, delayed bleeding post-injury/surgery.

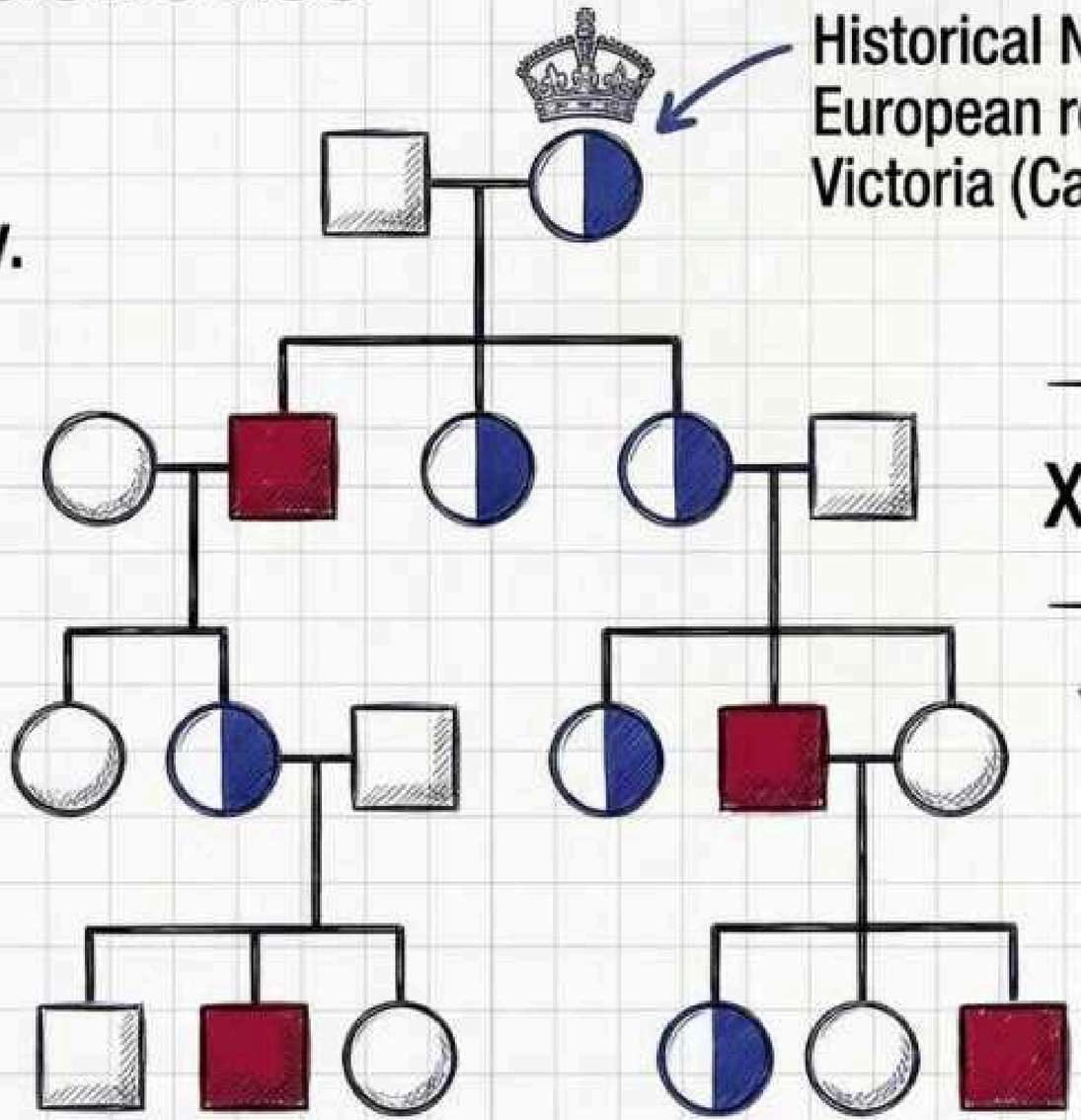
Gemini Notebook

Haemophilia Genetics

Haemophilia A:
Factor VIII (8) deficiency.

Haemophilia B:
Factor IX (9) deficiency.

Genetics:
X-chromosome linked.
Females (XX) = Carriers.
Males (XY) = Affected.



Historical Note: Spread through European royal families via Queen Victoria (Carrier).

	$X^{(H)}$	$X^{(h)}$
$X^{(H)}$	$X^{(H)}X^{(H)}$ (Healthy Female)	$X^{(H)}X^{(h)}$ (Carrier Female)
Y	$X^{(H)}Y$ (Healthy Male)	$X^{(h)}Y$ (Affected Male)

Gemini Notebook

¶ 4.9

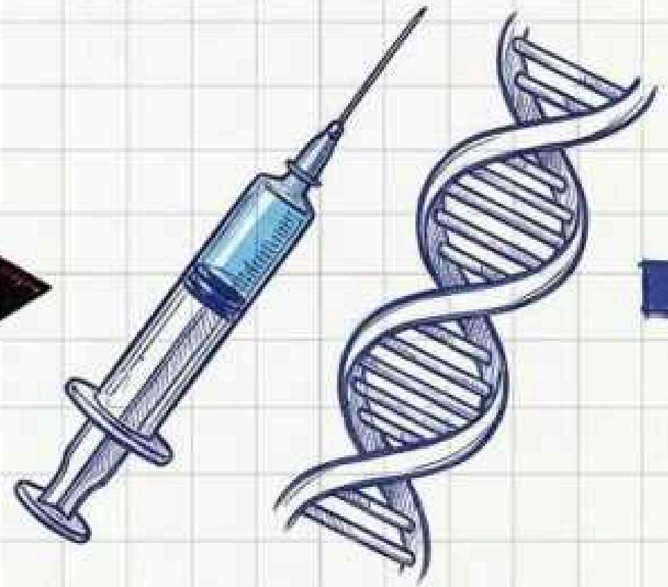
Haemophilia: Consequences & Treatments

Untreated



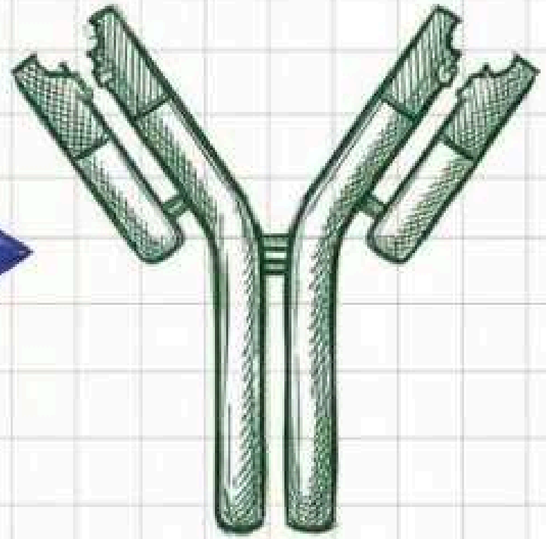
Untreated: Repeated bleeding ----> painful joint damage, danger from minor injuries.

Standard Treatment



Standard Treatment: Regular injections of missing factor (Recombinant DNA technology) = Near-normal life.

Innovations

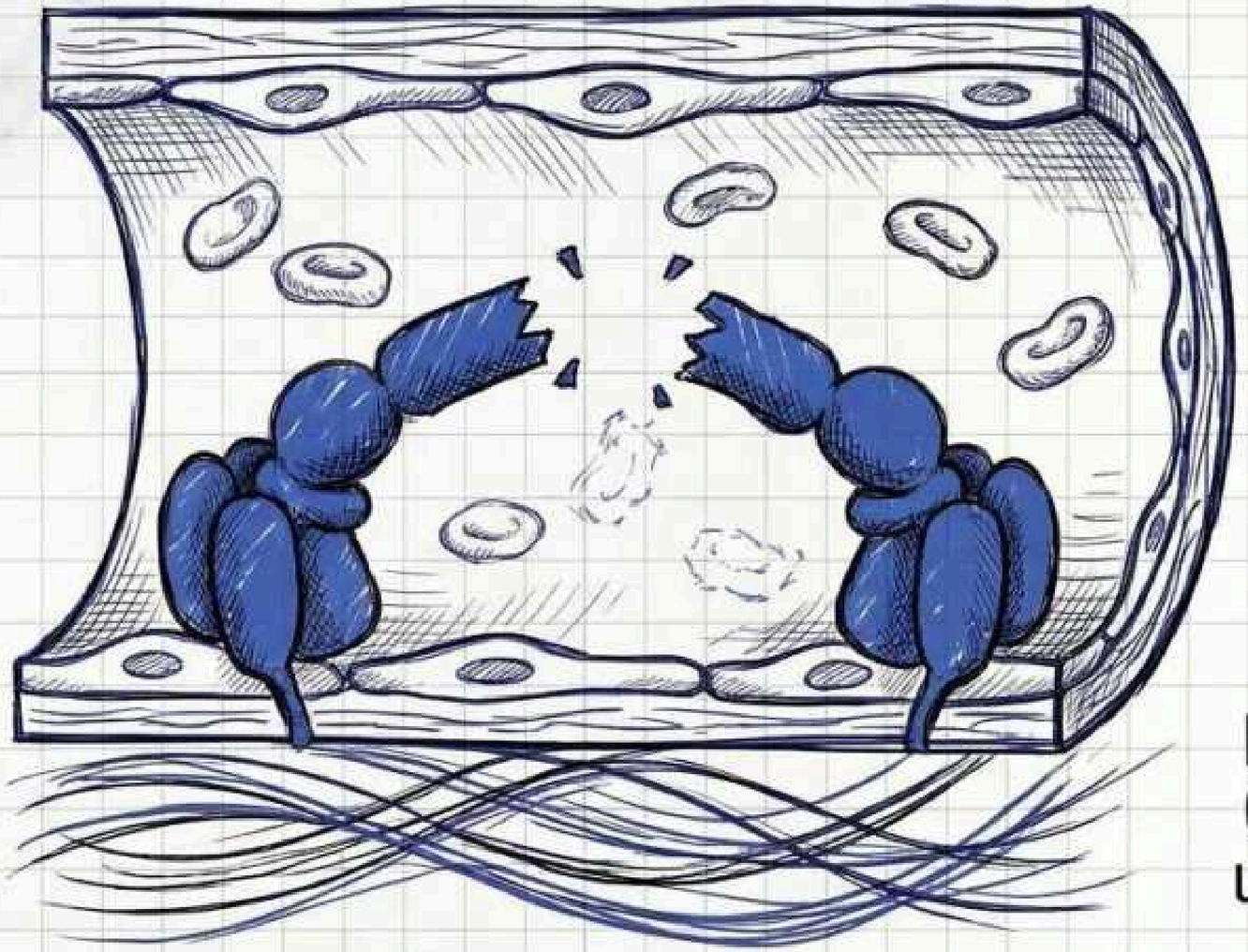


Newer Innovations: Long-acting mimicking antibodies & Gene therapy.

Gemini Notebook

Von Willebrand Disease

The Defect:
Deficiency or defect of von Willebrand factor.



Presentation:
Usually mild (Platelet-type bleeding: nosebleeds, heavy periods).

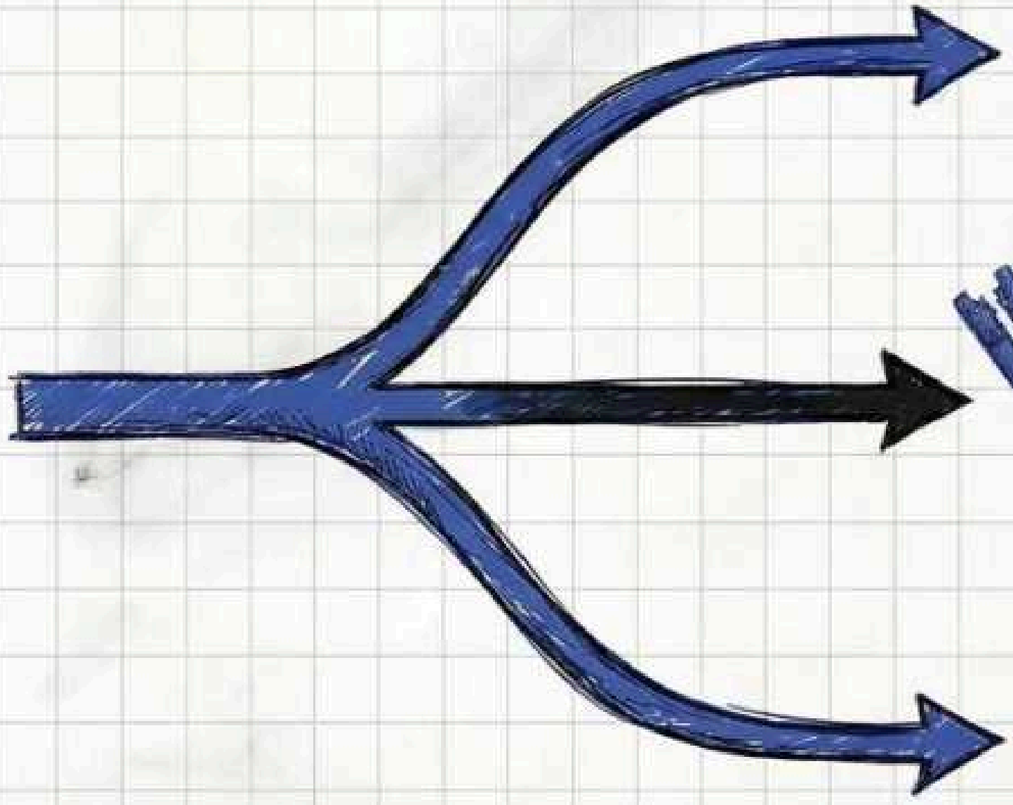
Prevalence:
The most common inherited bleeding disorder.

Hidden Risk:
Often undiscovered until surgical trauma or childbirth.

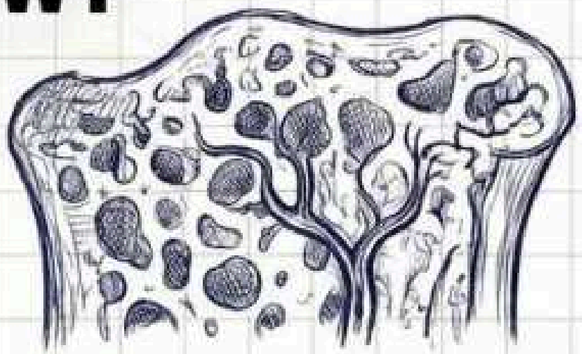
Gemini Notebook

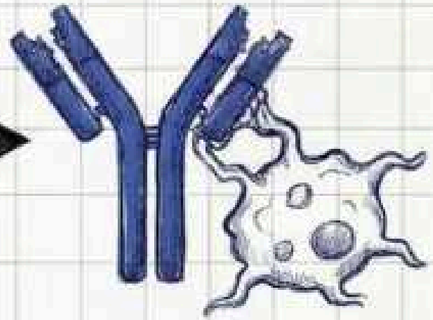
¶ 4.11

Thrombocytopenia: Why are platelets low?



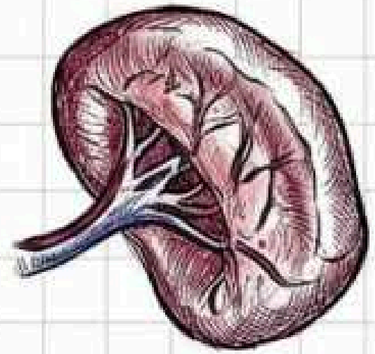
Reduced Production
(Bone Marrow).





Increased Destruction
(Immune antibodies; Drug triggers like Heparin).

Trapping (Enlarged Spleen).



Danger: Very low counts risk serious spontaneous bleeding (e.g., into the brain).

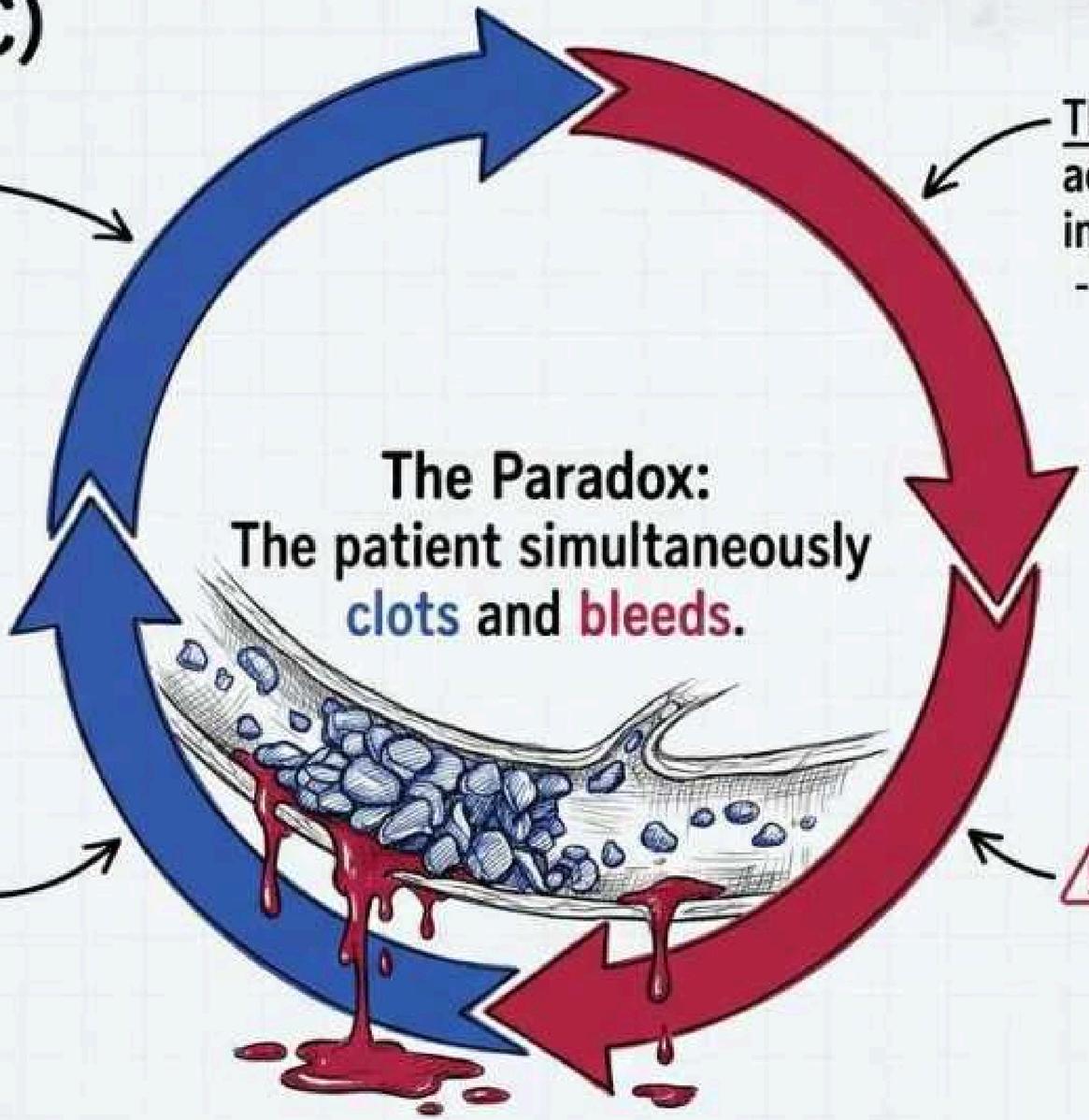
Gemini Notebook

Disseminated Intravascular Coagulation (DIC)

¶ 4.12

Triggers: Severe infection, trauma, trauma, pregnancy complications.

The Cycle: Widespread systemic activation ---> Micro-clots form in small vessels ---> Clotting factors & platelets are rapidly consumed ---> Severe bleeding results.



The Paradox:
The patient simultaneously clots and bleeds.

Treatment: Must resolve the underlying cause.

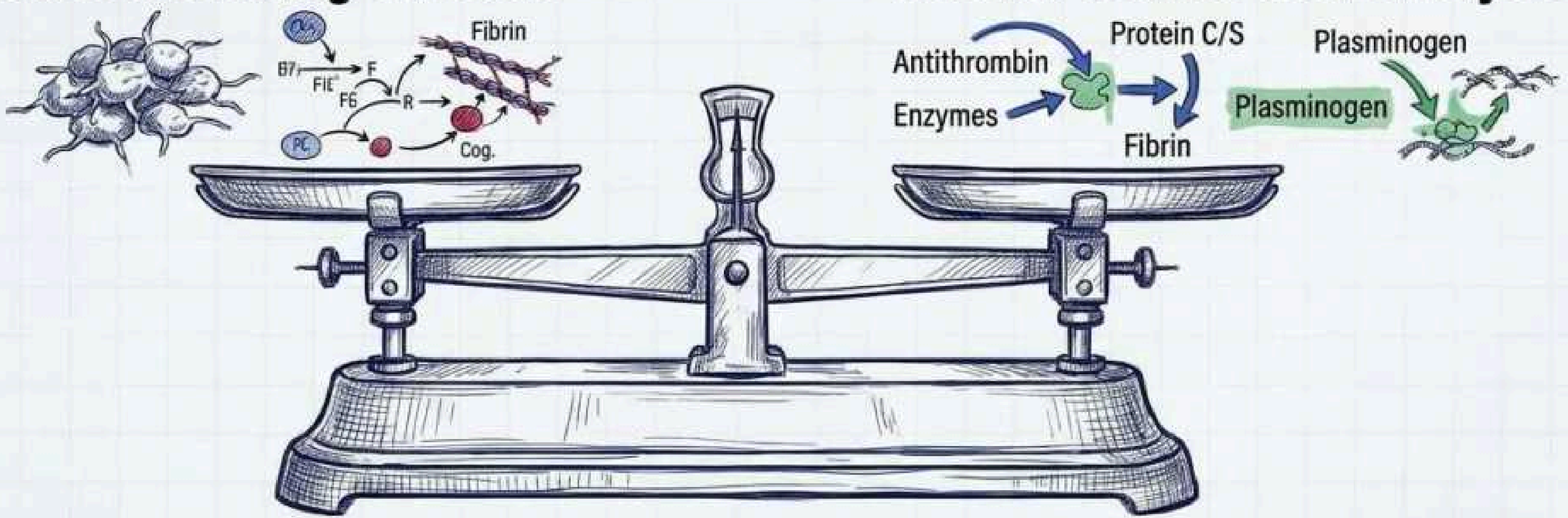
⚠ Danger: Very low counts risk serious spontaneous bleeding (e.g., into the brain).

Gemini Notebook

Summary: The Haemostasis Balance

Platelets & Clotting Cascade

Natural Brakes & Fibrinolysis



The Balance: Haemostasis is a tightrope between forming clots and stopping/dissolving clots.

Diagnostics: Bleeding patterns + Simple labs = Identifying the failure point.

Next: Unwanted Clots

Gemini Notebook