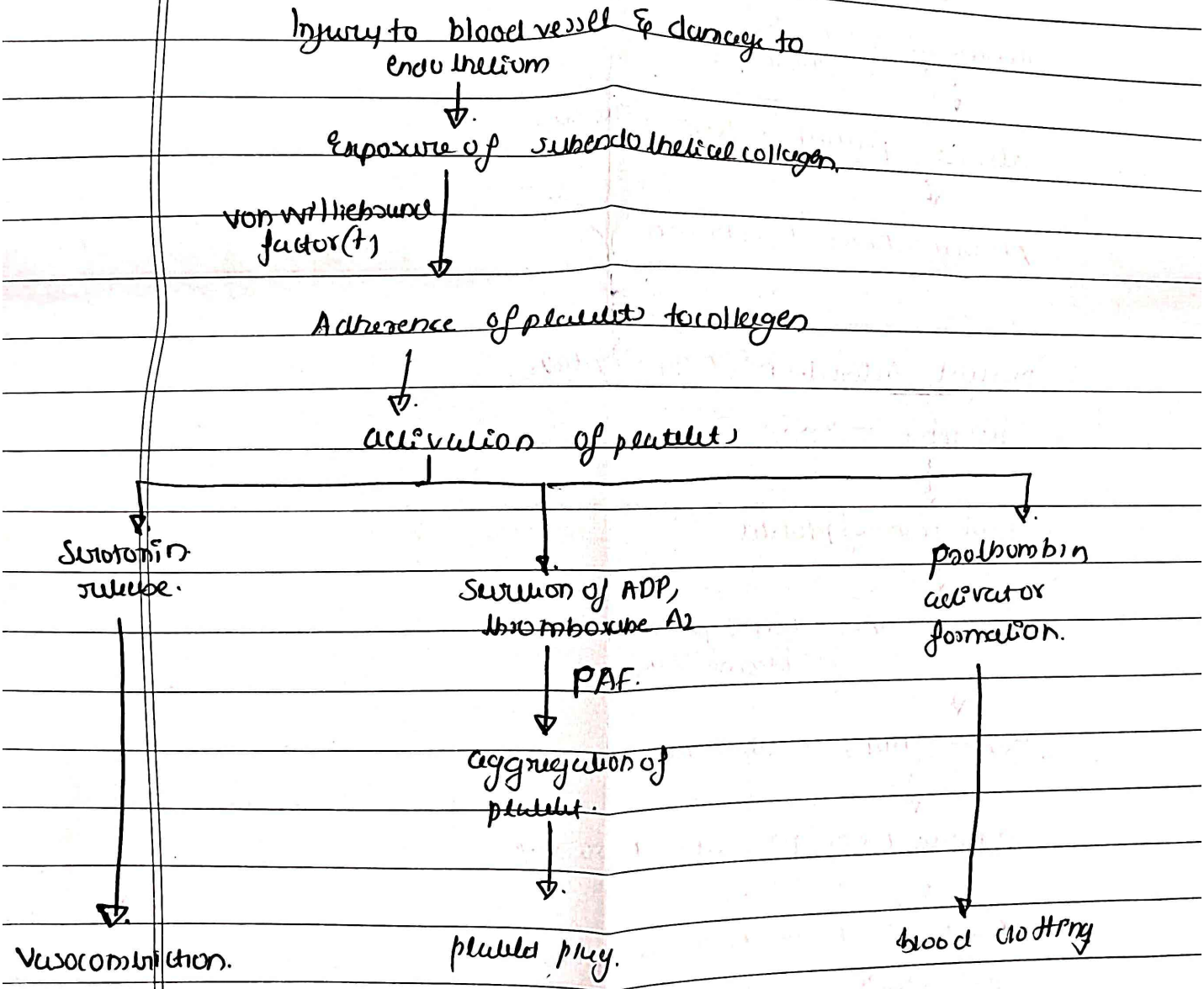
Hemostasis

defined as arrest / stoppage of bleeding

3 phases.

1. vasoconstriction
2. temporary platelet plug formation
3. Coagulation - definitive platelet plug.



Vasoconstriction

- due to release of serotonin from platelets.

② Platelet adhesion

damage to vessel wall.
↓
Exposure of collagen.
↓
release of VWF. from endothelial cells
↓
attracts platelets - receptor using.
↓
platelet adhere to collagen.

platelet activation & aggregation.

receptor — VWF.
↓
activation of platelets.
↓
change shape - pseudopodia.
become sticky
↓
release, ADP, Thromboxane A2.
↓
activate more platelets - more sticky
↓
more platelet binds to collagen.
these platelet will aggregate.
to form platelet plug.

212

Coagulation → definitive hemostatic plug formation.

Coagulation is defined as the process by which blood loses its fluidity to become a jelly like mass few minutes after it is shed or taken in container.

⇒ Occurs by Cascade of enzymatic reactions

↓

upon activation one clotting factor act as enzyme for sequential activation of subsequent factors

↓

In a series steps. → finally fibrinogen → fibrin.

↓

Enzyme cascade hypothesis

in a series steps. → [illegible]

↓

Enzyme cascade hypothesis

Factor I - Fibrinogen.

II - prothrombin

III

IV

V

VI

VII

VIII

IX

X

XI

XII

XIII.

Steps

① activation of prothrombin activator.

- Extrinsic pathway
- Intrinsic pathway.

② Conversion of prothrombin → thrombin
fibrinogen → fibrin. } Common pathway

Extrinsic	Intrinsic.
• Invivo.	Invivo, Invitro
• fast	Slow
CF → VII, X	✗ 12, 11, 9, 10.
• factors are outside tissue.	• Triggered within tissue
• tissue injury & thromboplastin release	• Endothelial collagen exposure.

(Q) Why doesn't blood clot invivo? Antihaemostatic mechanism in physiological conditions → Intravascular clotting does not occur.

The reasons → physiochemic factors in the body.

Physical reason.

(1) Continuous circulation

(2). Smooth endothelial lining of blood vessel.

Chemical factor

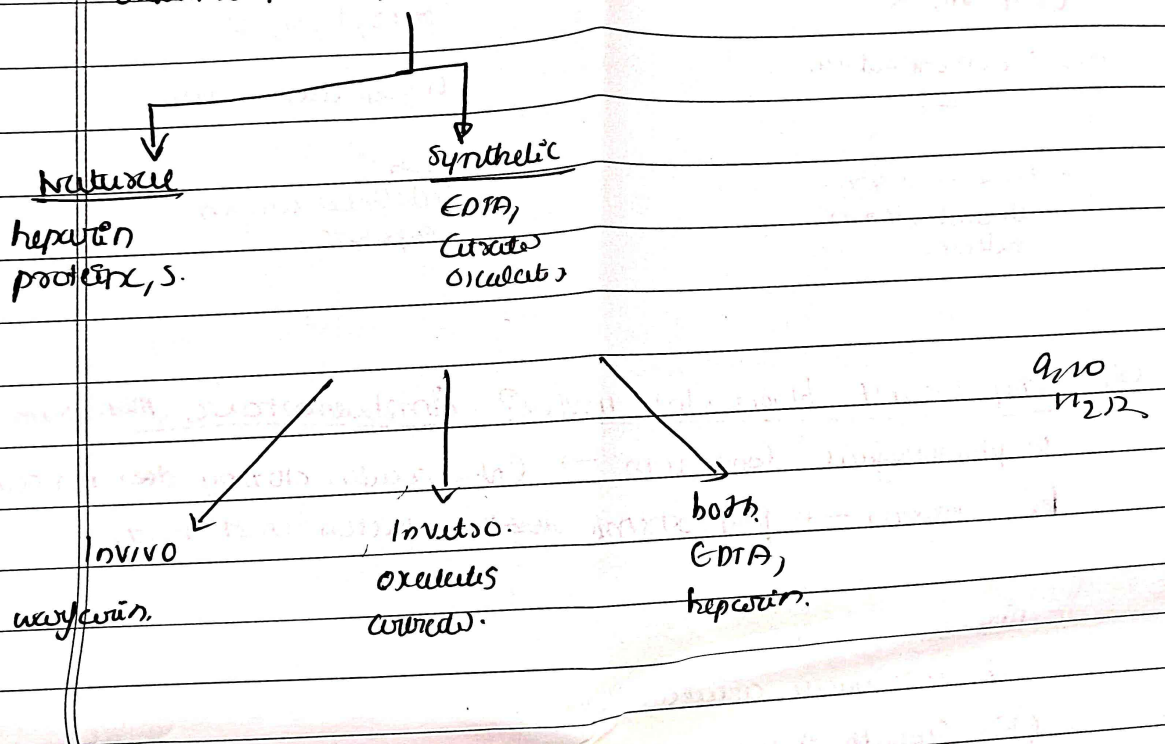
(1). natural anticoagulant → heparin.

(2) Fibrinolytic system → production of thrombomodulin by all. Endothelial cells except small vessels of brain.

(3) all CF-1 are inactive.

Anticoagulants

- substance which prevent / portpone coagulation of blood



Heparin

Naturally produced anticoagulant by mast cells (liver, lungs).
basophils.

Heparin

- directly suppress thrombin action
- activate antithrombin III → removed thrombin from circulation
- inactivate 9, 10, 11, 12.

→ NO blood clotting

uses:

- prevent intravascular blood clotting during surgery.
- cardiac, kidney.
- blood-transfusion → store.

Coumarin derivatives
warfarin, dicumarol.
Inhibit VitK (- VitK → 2, 7, 9, 10)
Oral anticoagulant.

EDTA → full form.
↳ remove Ca++ from blood.
↳ used poisoning.

(when ovuled)
• ppt calcium.
• reduce calcium in blood

Other ways
• cold - ↓ 5°C → postpone blood clotting
• collect blood in containers with smooth surface

Liver → synthesis → 5, 7, 9, 10.
protein C, antithrombin III, heparin.

VitK → 2, 7, 9, 10.
protein C.

Tests for Bleeding time & clotting time

(1) Bleeding time - (N - 1-4 minutes.)
> 8 → prolonged.
↑ purpura, VW brand disease.

(2) Clotting time - (3-8 minutes)
↑ in haemophilia.
Normal in purpura.

(3) prothrombin time.
Extrinsic + common - 12-
def of factors 7, 10.
VitK.
Normal in hemophilia.

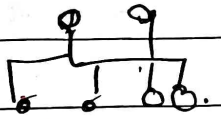
(4) Activated partial thromboplastin time.
Intrinsic + common pathway.
30-40 seconds.

* purpura → thrombocytopenic (less count)
  → thrombasthenic (abnormal structure)

* VW-disease → defect in platelet adhesion + factor VIII → both type of bleeding (hemophilic + platelet defect)

- Hemophilia - X linked recessive.
  Ble - N
  CT - Prolon

Inheritance



- Types A, B,
  VII, 9, 11.

Symptoms → spontaneous bleeding
prolonged blood loss even by small cut, tooth Extraction surg
- haemorrhage in GI & urinary tract.
- bleeding in joint → swelling.
- easy bruising.

Clot retraction → contraction of clot + oozing out of plasma

→ proteins → actin
myosin
thrombosthenin

Fibrinolysis → lysis of blood clot within the blood vessel

req → plasmin (plasminogen).

plasminogen ⟶ plasmin

↓

t-plasmin activator, lysosomal enzyme.
thrombin
endothelial plasmin activator.

t-PA → inhibited by → tpa inhibitor
→ V, VII

Damaged tissue & endothelium. release.

↓ thrombomodulin (Thrombin binding protein).

↓ Lysozomal enzymes.

Thrombin +

↓

Thrombomodulin - Thrombin Complex.

↓

protein C ⟶ activated protein C.

proteins. Inhibits.

↓ tPA inhibitor. ↓ V, VII

↓

activation of t-PA

Thrombin
tPa

plasminogen ⟶ plasmin

Function:

① Clearing minute clots.

② Liquefaction of menstrual clot

③ Sperm in epididymis

④ healing process

Coagulation

① activation of prothrombin activator.

② prothrombin → Thrombin.

③ fibrinogen → fibrin.

Extrinsic method
Intrinsic method