

SYNOPSIS OF BLOOD COAGULATION

Introduction → Blood is a liquid tissue which flows through out the body with the purpose of transport of respiratory gases and substances from external area of the liver and other body parts. Some times due to an damage or wound caused to the body parts there profuse blood flow out if there flow out is unchecked there shall be death of blood in the body. But the body has its own regulatory system and so the blood flow is checked. That mechanism is blood clotting or coagulation of blood.

COAGULATION OF BLOOD → Coagulation is process of blood clotting, in which plasma take an active part while cells are physically caught in meshes of insoluble fibrin threads, which are formed by action of thrombin on soluble fibrinogen; thrombin being formed from prothrombin by action of calcium and activated thromboplastin.

PHYSIOLOGY OF BLOOD COAGULATION →

According to recent conception, the coagulation mechanism involves three distinct phases —

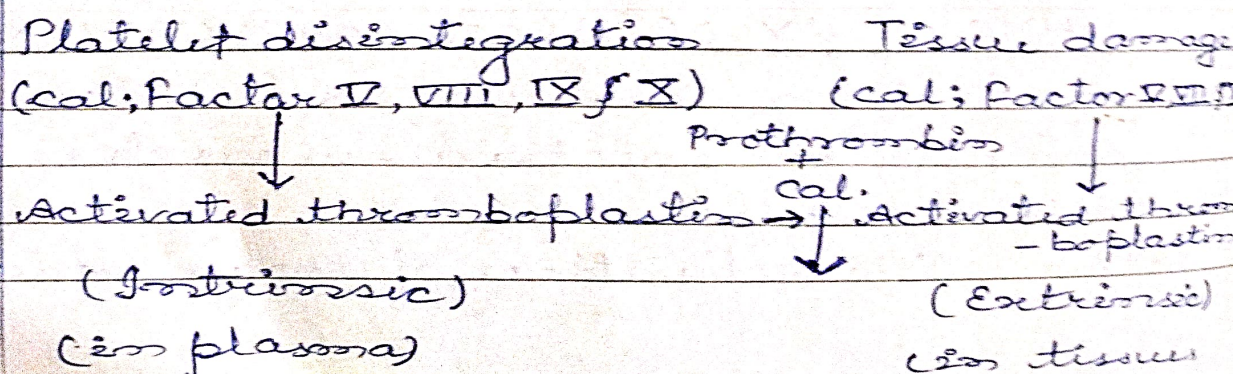
Phase I - Activation of thromboplastin

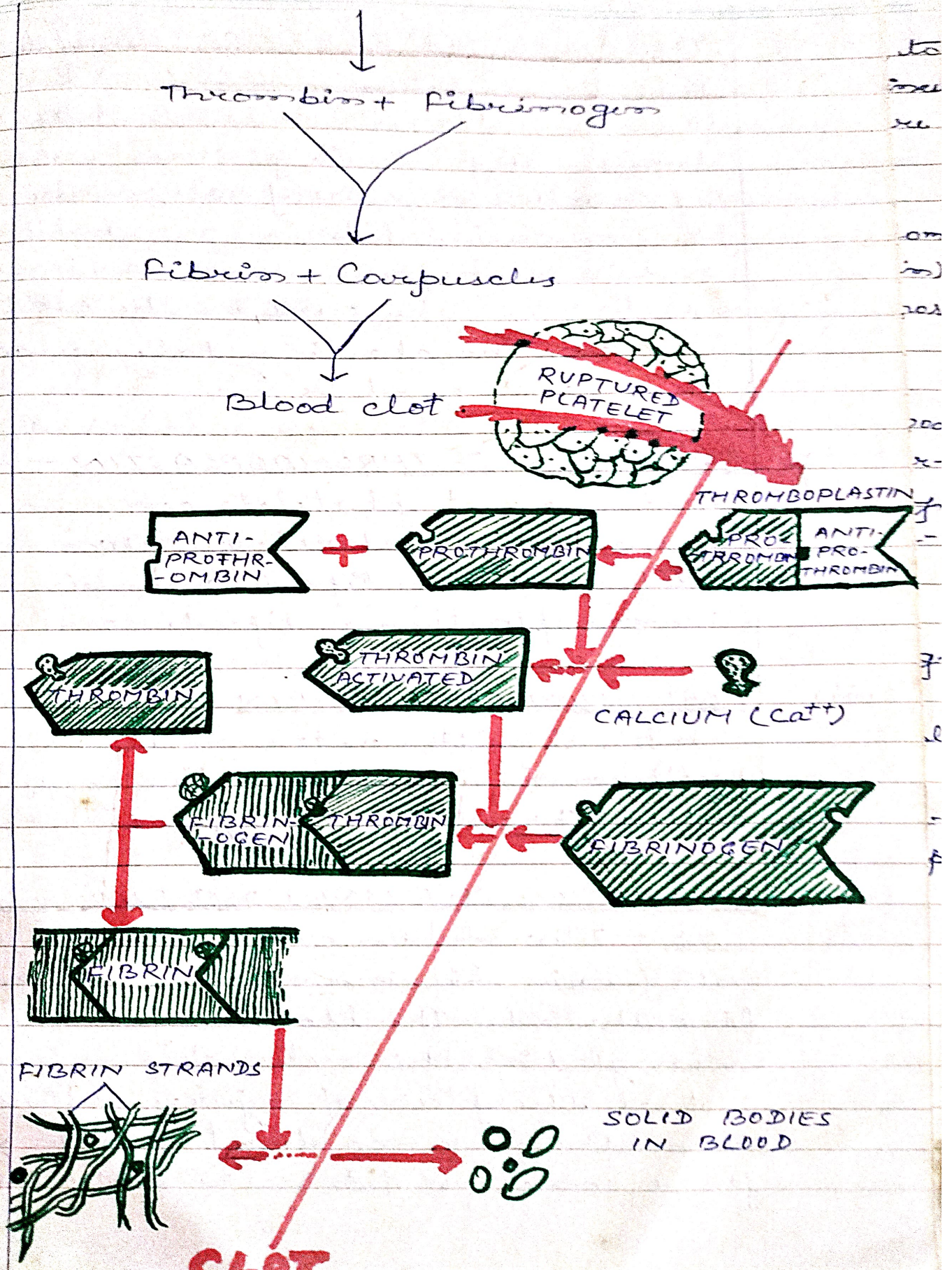
Phase II - Formation of thrombin
Phase III - Fibrin formation

Thromboplastin may be intrinsic (in plasma) or extrinsic (in tissue). Thromboplastin is intracellular and very rich in brain, lungs, placenta and testes. Intrinsic thromboplastin is activated by platelet disintegration along with factor IX, calcium ion, factor VII, X and XII. Christmas factor (Factor IX) is activated by factors formed due to contact with water-wettable surface i.e., Hageman factor (XII), and ^{plasma} thromboplastin antecedent (factor XI or PTE). The extrinsic thromboplastin liberated by tissue damage is activated by factors V, VII, X and calcium ion.

The activated thromboplastin along with calcium ions convert prothrombin into thrombin which in turn reacts with fibrinogen to form fibrin clot.

Table → Showing mechanism of blood coagulation:





(i) Thrombosis of blood vessels $\rightarrow$ Capillary thrombosis
Capillary thrombosis $\rightarrow$ Thrombosis of small blood vessels

(ii) Prothrombin + Ca^{++} $\rightarrow$ Thrombin
Thrombin + Fibrinogen $\rightarrow$ Fibrin (clot)
(soluble) (insoluble)

3. FLUID AND SPIRO'S THEORY $\rightarrow$ According

to this theory, blood clotting takes place in the following three steps $\rightarrow$

(i) Blood cells, specially the blood platelets produce a kind of enzyme called thrombokinase.

(ii) In the presence of Ca^{++} , thrombokinase acts on prothrombin and changes it to thrombin.

(iii) Thrombin converts fibrinogen to fibrin; the fibres of which blood cells entangle and a clot is formed.

The entire process can be shown as follows

Blood
(Blood cells + Platelets)



Thrombokinase
(enzyme)

+ $\downarrow Ca^{++}$

Prothrombin



Thrombin



Fibrinogen (In plasma)



Fibrin (clot)
(insoluble)