

# Haemostasis & thrombosis

Parts 1 & 2

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# Session Plan

## Part 1 –Overview of Haemostasis

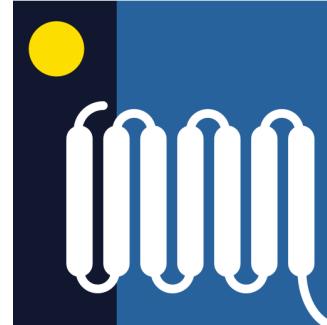
- Primary Haemostasis
- Secondary Haemostasis (Coagulation)
- Fibrinolysis

## Part 2 –Primary Haemostasis

- Platelets
  - Adhesion
  - Release reaction
  - Thromboxane A<sub>2</sub> synthesis
  - Platelet aggregation
- Antiplatelet drugs
- Von Willebrand factor

## Part 3 – Coagulation (Secondary Haemostasis)

- Clotting factor synthesis
- Cellular base model of coagulation
  - Initiation
  - Amplification
  - Propagation
- Coagulation inhibitory mechanisms
  - - Anticoagulant Pathway
  - Anticoagulant Drugs



## Part 4: Fibrinolytic system

- Fibrinolysis
- Antifibrinolytic drugs

## Part 5: Tests of Coagulation

- Prothrombin time (PT)
- Activated Partial Thromboplastin Time (APTT)

## Part 6 – Bleeding and Thrombosis: READING

- The Balance Model of Coagulation and its Application



# Session Plan

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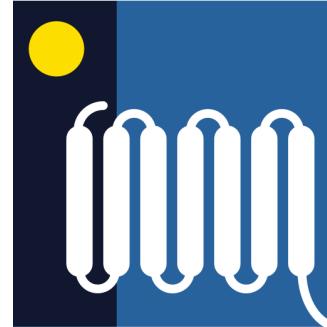
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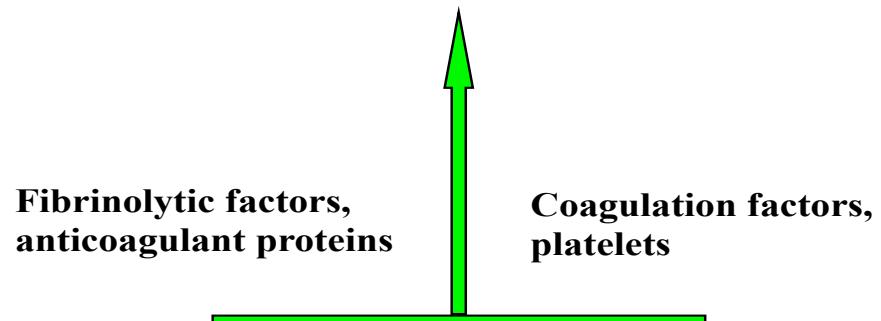
# What is Haemostasis?

- Haemostasis describes the ‘halting of blood’ following trauma to blood vessels

## Functions of Haemostasis

1. Prevention of blood loss from intact vessels
2. Arrest of bleeding from injured vessels

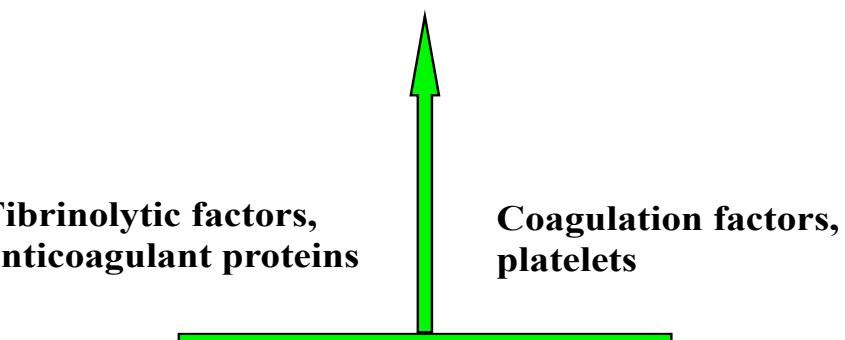
**Normal haemostasis: a state of equilibrium**



# Why is this balance important?

1. Allows the stimulation of blood clotting processes following injury, in which blood changes from its liquid state (**coagulation**)
2. Limits the extent of the response to the area of injury to prevent excessive or generalised blood clotting (**thrombosis**)
3. Starts the process that eventually leads to the breakdown of the clot as part of the process of healing (**fibrinolysis**)

**Normal haemostasis: a state of equilibrium**



# Haemostatic Plug Formation: An Overview

*Response to injury*

Vessel constriction



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Formation of an unstable platelet plug

-platelet adhesion

-platelet aggregation



# Haemostatic Plug Formation: An Overview

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Vessel constriction



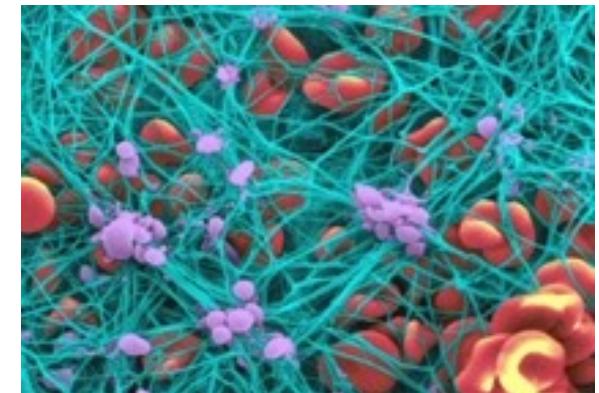
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Stabilisation of the plug with fibrin

- blood coagulation



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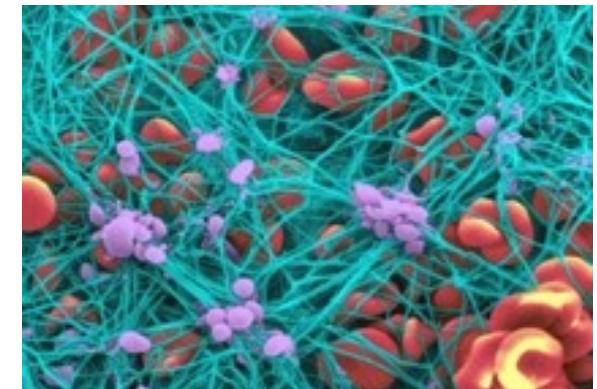
Stabilisation of the plug with fibrin

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Dissolution of clot and vessel repair

- fibrinolysis



# Mechanisms of Haemostasis

Response to injury to endothelial cell lining

**Vessel constriction**

Vascular smooth muscle cells contract locally

Limits blood flow to injured vessel



**Formation of an unstable platelet plug**

platelet adhesion

platelet aggregation

Limits blood loss + provides surface for coagulation



**Stabilisation of the plug with fibrin**

blood coagulation

Stops blood loss



**Vessel repair and dissolution of clot**

Cell migration/proliferation & fibrinolysis

Restores vessel integrity

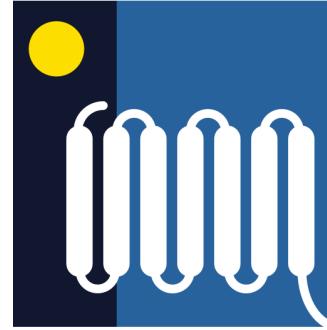
**PRIMARY HAEMOSTASIS**

**SECONDARY HAEMOSTASIS**

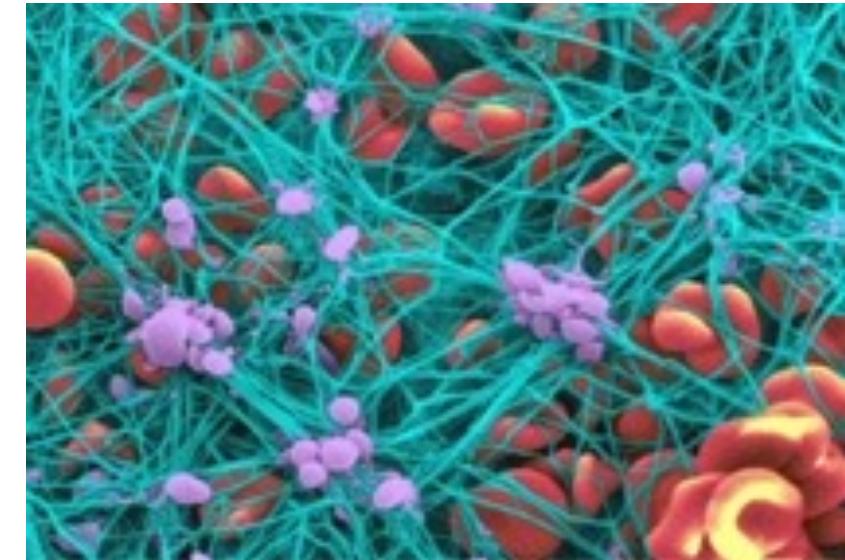
**FIBRINOLYSIS**



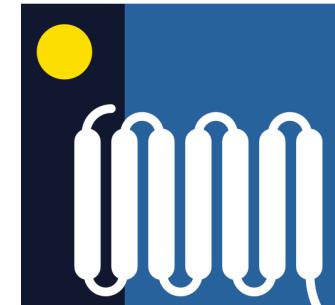
# Why do we need to understand haemostatic mechanisms?



- Diagnose and treat bleeding disorders
- Control bleeding in individuals who do not have an underlying bleeding disorder
- Identify risk factors for thrombosis
- Treat thrombotic disorders
- Monitor the drugs that are used to treat bleeding and thrombotic disorders



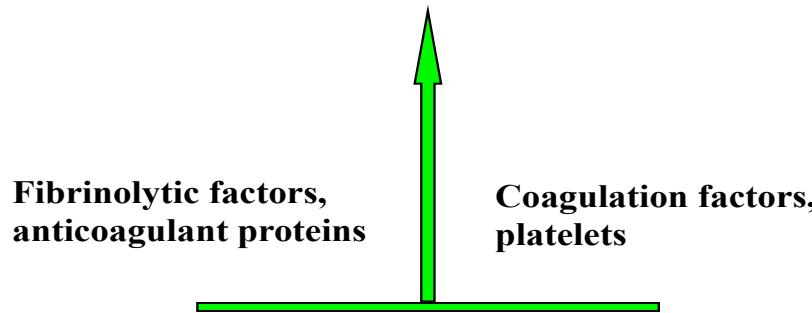
# Primary Haemostasis



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## Normal haemostasis: a state of equilibrium



## Vessel constriction

Formation of an unstable platelet plug

-platelet adhesion

-platelet aggregation

Stabilisation of the plug with fibrin

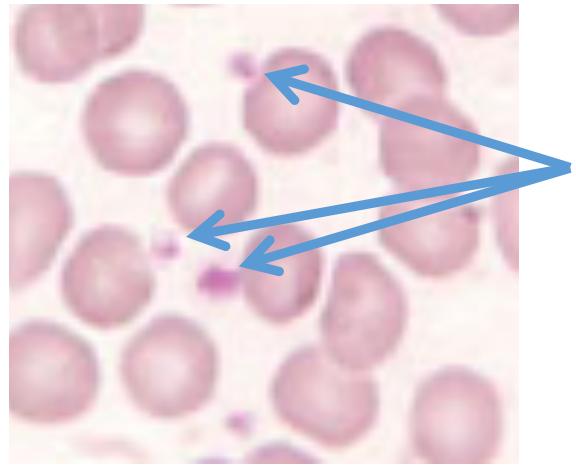
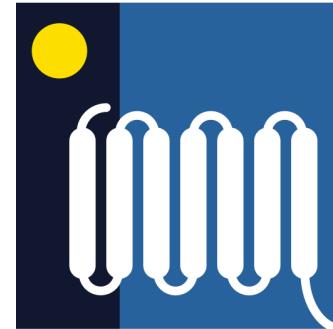
-blood coagulation

Dissolution of clot and vessel repair

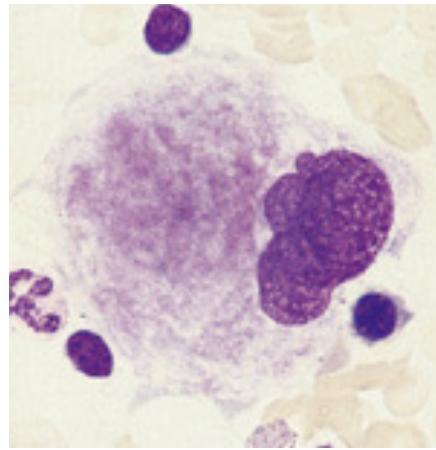
-fibrinolysis



# Platelets



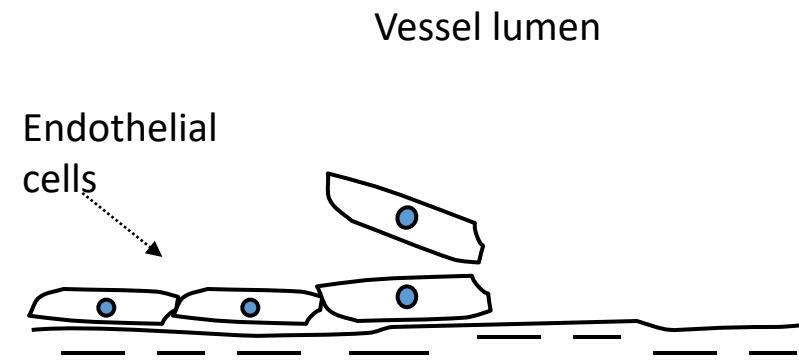
Platelets in circulating blood



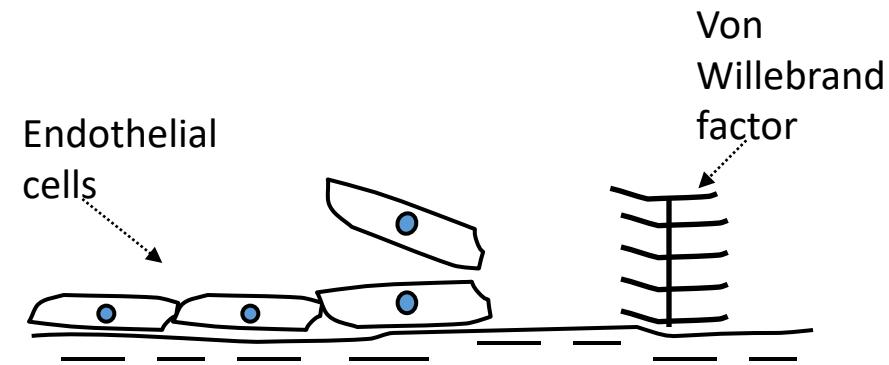
Megakaryocyte in the bone marrow



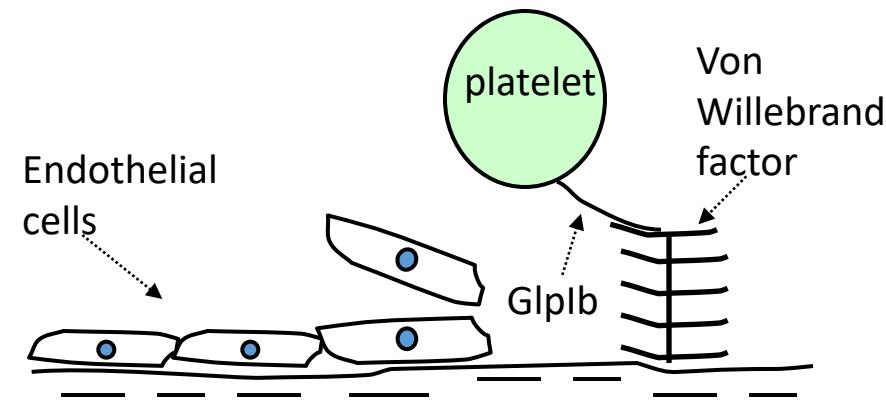
# Platelet adhesion



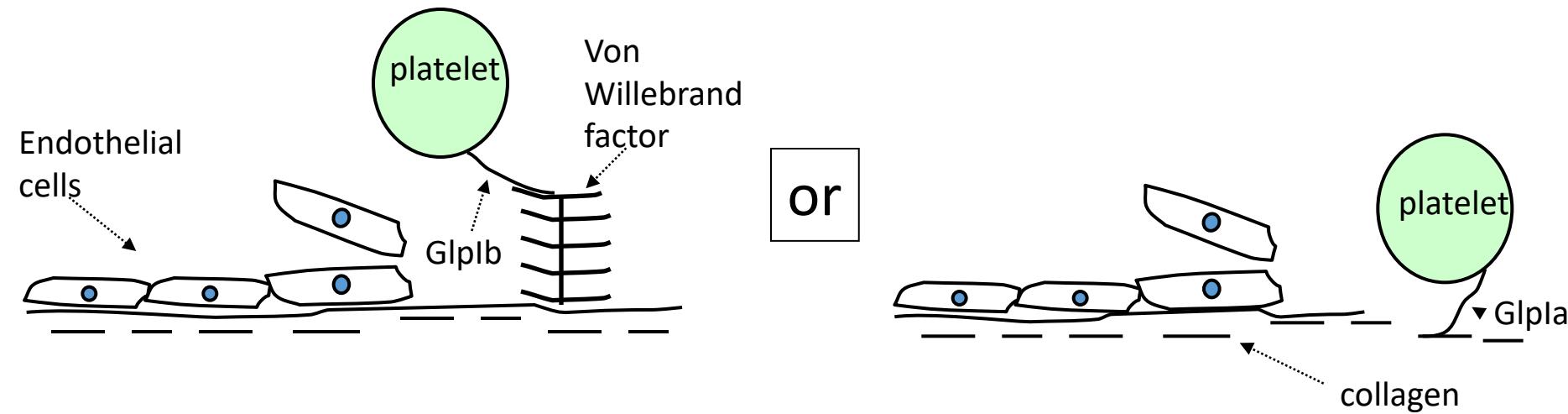
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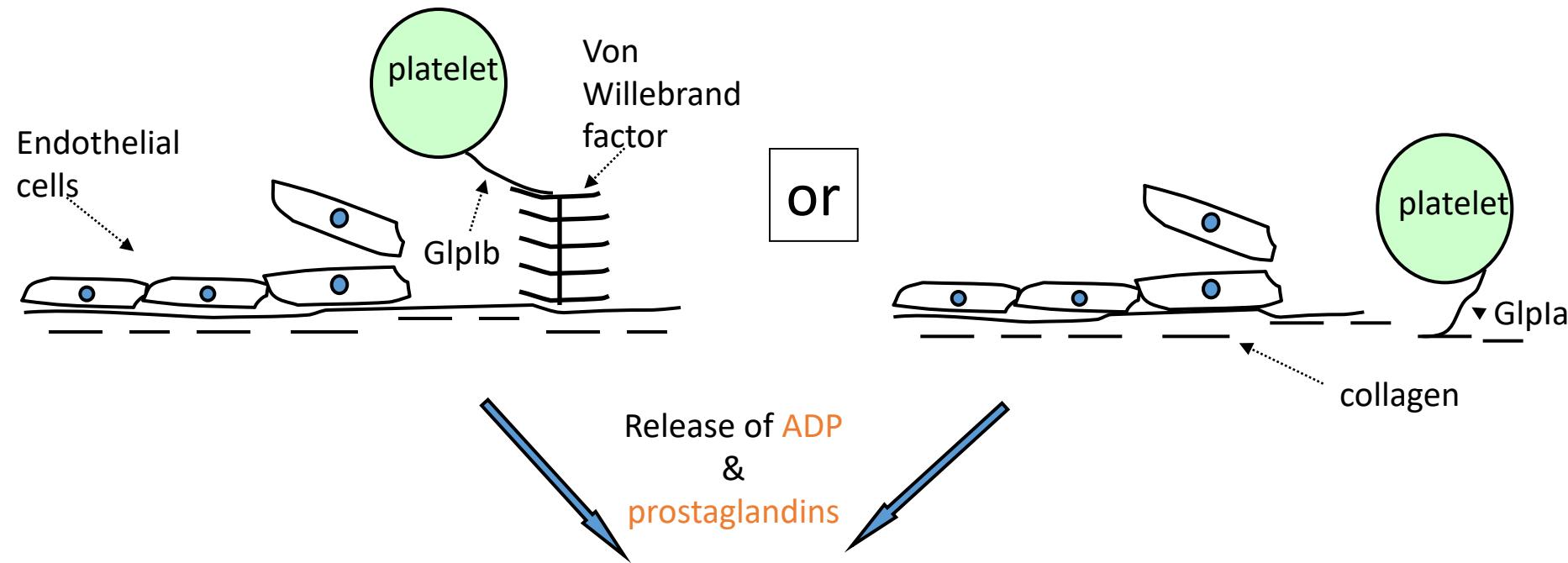
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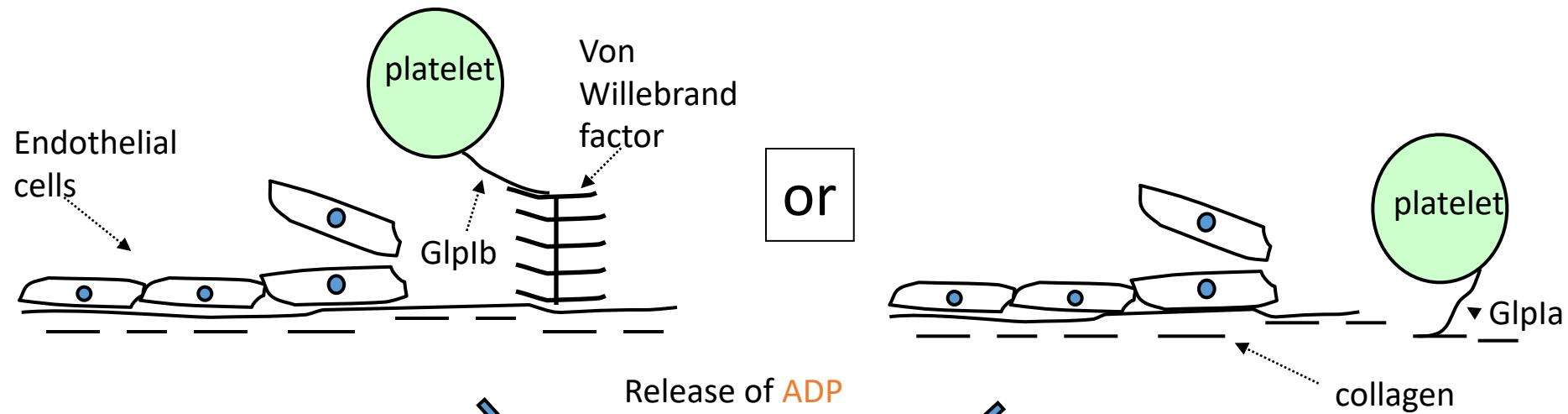
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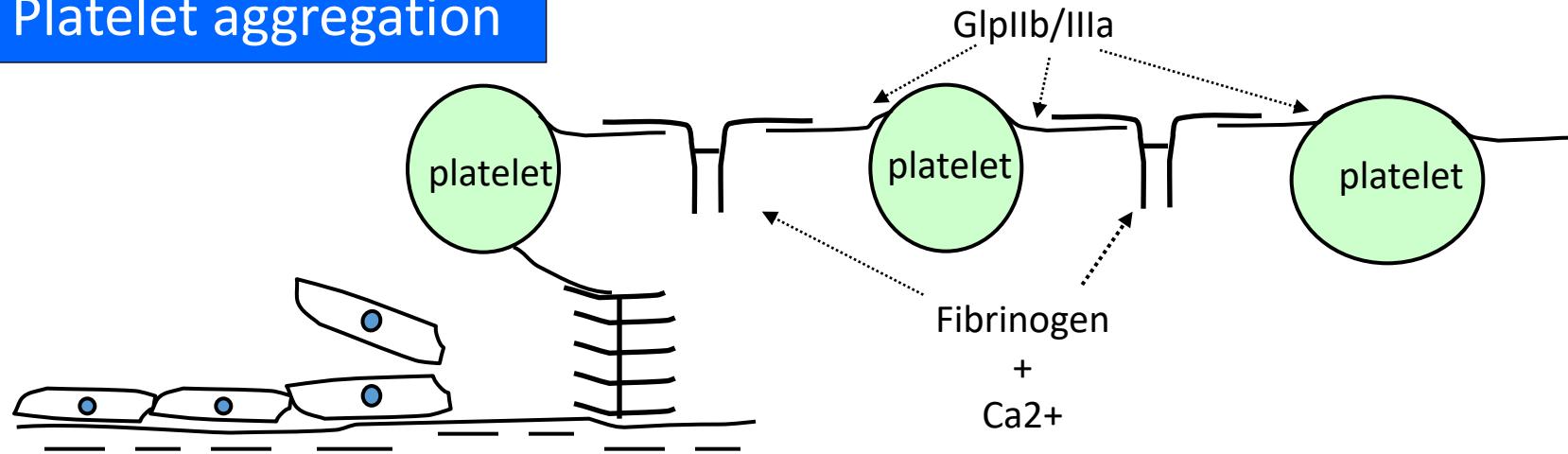
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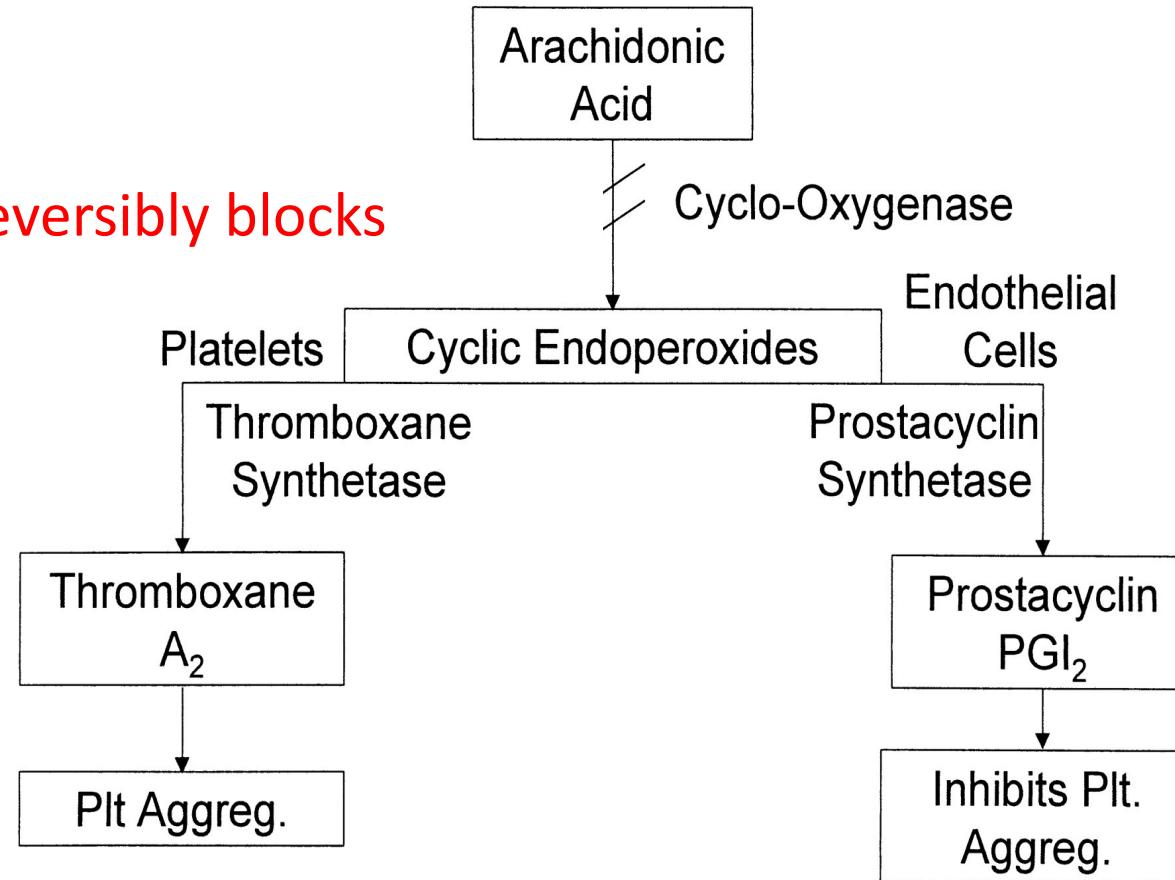
## Platelet aggregation



# The prostaglandin Thromboxane A<sub>2</sub> is produced by platelets from Arachidonic acid

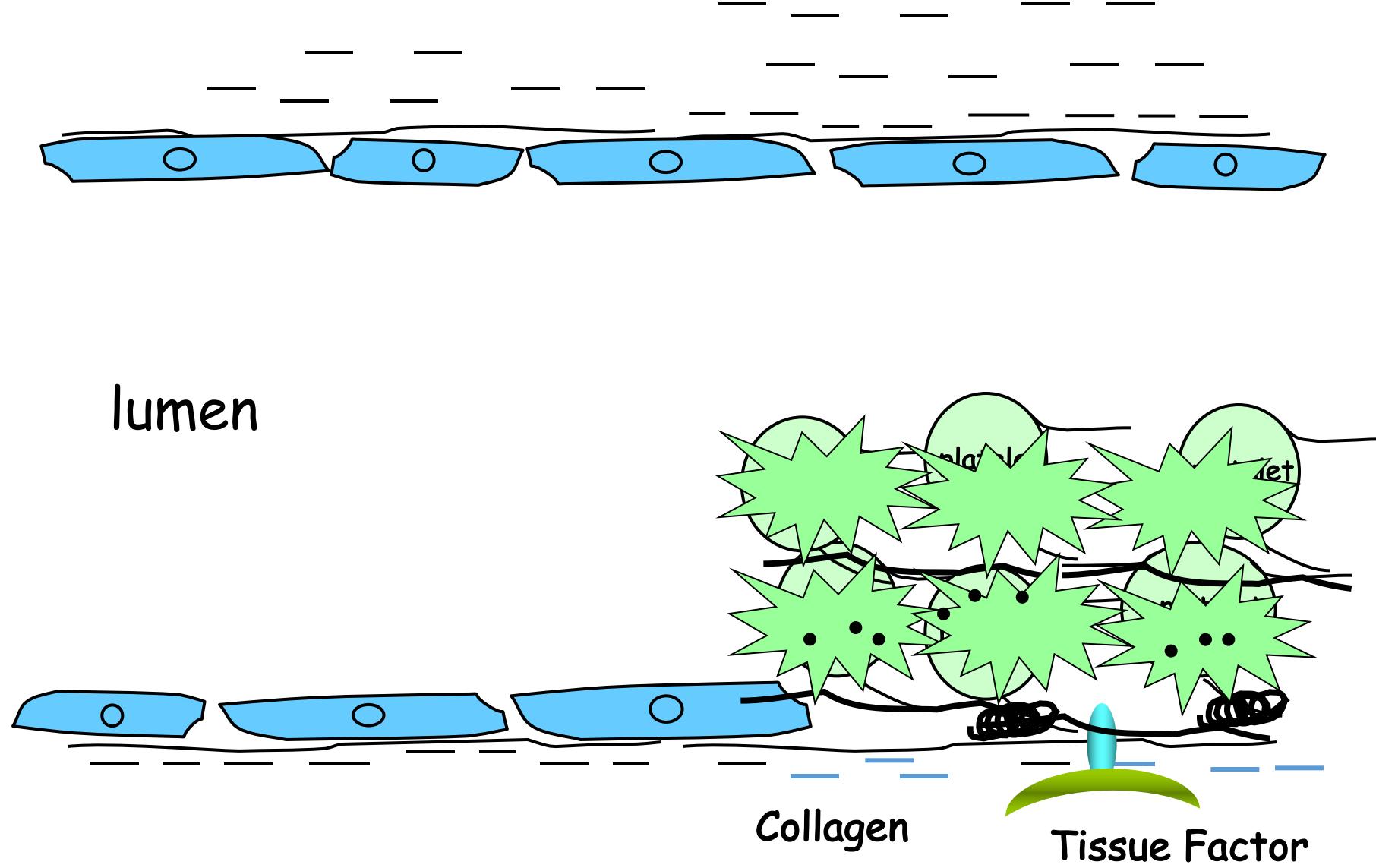
Aspirin and Clopidogrel are Antiplatelet drugs

Aspirin irreversibly blocks COX



Clopidogrel irreversibly blocks the ADP receptor P2Y12 on platelets





Primary Haemostasis: platelet plug

