

<b>Blood Type</b>	<b>Antigen</b>	<b>Antibody</b>	<b>Can donate blood to...</b>	<b>Can receive blood from...</b>
A				
B				
AB				
O				

## Five white blood cells & their functions:

1.

2.

3.

4.

5.

Differences between red blood cell & white blood cells:

# Hemostasis

Cardiovascular System - Part VII

# Hemostasis

- Prevents or stops blood loss due to damaged blood vessels
- Three Phases:
  1. Vascular Phase
  2. Platelet Phase
  3. Coagulation Phase

# Vascular Phase

- Vascular Spasm
  - contraction of blood vessel at the site of injury
  - lasts ~30 minutes
- Blood vessel contraction
- Chemical factors and hormones are released
- Endothelial cells will attach and create a “sticky” area on the damaged membrane

# Platelet Phase

- Platelets stick to the “sticky” surface of the membrane
  - platelet adhesion → platelet aggregation
- Platelet aggregation occurs within 15 seconds of injury
  - Growth is limited by hormones and enzymes

# Coagulation Phase

- Starts 30 seconds after blood vessel has been injured
- Coagulation = blood clotting
- Converts fibrinogen into fibrin
  - fibrin network covers the platelet plug, forming a blood clot
    - seals damaged vessel
- Clotting depends on the presence of the 13 clotting factors

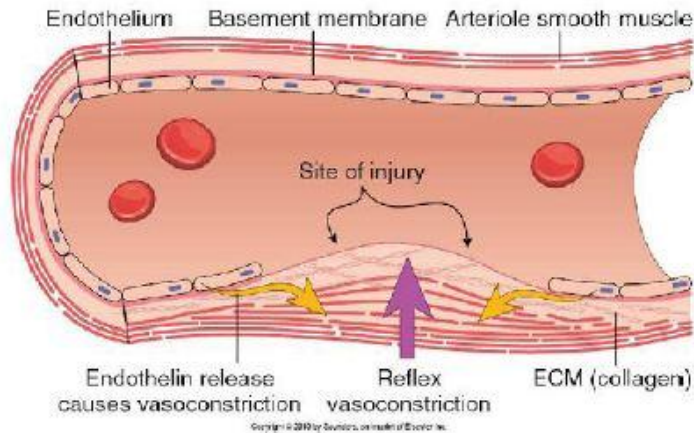


**Table 13.4 | The Plasma Clotting Factors**

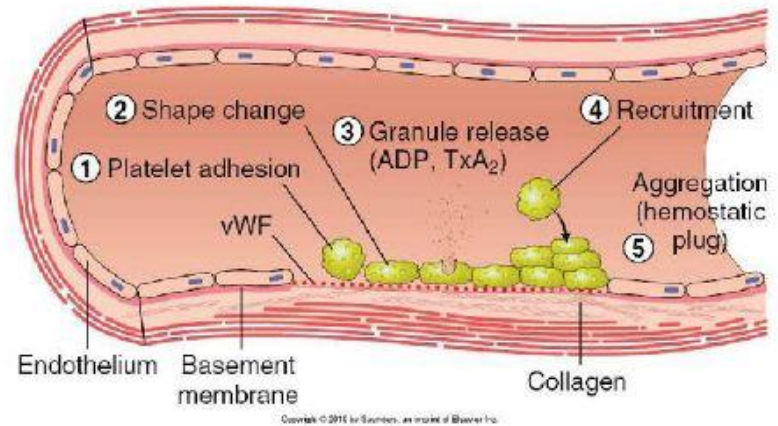
Factor	Name	Function	Pathway
I	Fibrinogen	Converted to fibrin	Common
II	Prothrombin	Converted to thrombin (enzyme)	Common
III	Tissue thromboplastin	Cofactor	Extrinsic
IV	Calcium ions ( $\text{Ca}^{2+}$ )	Cofactor	Intrinsic, extrinsic, and common
V	Proaccelerin	Cofactor	Common
VII*	Proconvertin	Enzyme	Extrinsic
VIII	Antihemophilic factor	Cofactor	Intrinsic
IX	Plasma thromboplastin component; Christmas factor	Enzyme	Intrinsic
X	Stuart-Prower factor	Enzyme	Common
XI	Plasma thromboplastin antecedent	Enzyme	Intrinsic
XII	Hageman factor	Enzyme	Intrinsic
XIII	Fibrin stabilizing factor	Enzyme	Common

\*Factor VI is no longer referenced; it is now believed to be the same substance as activated factor V.

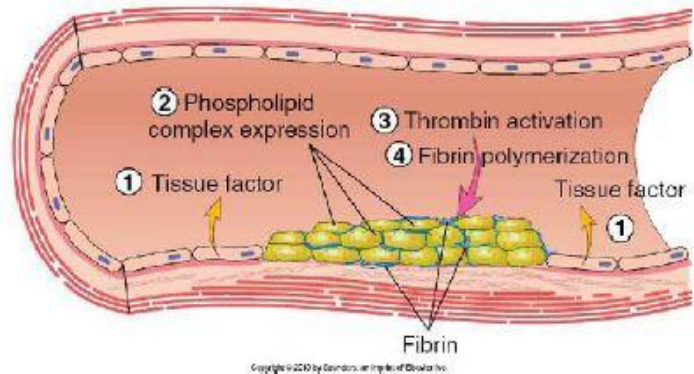
### A. VASOCONSTRICTION



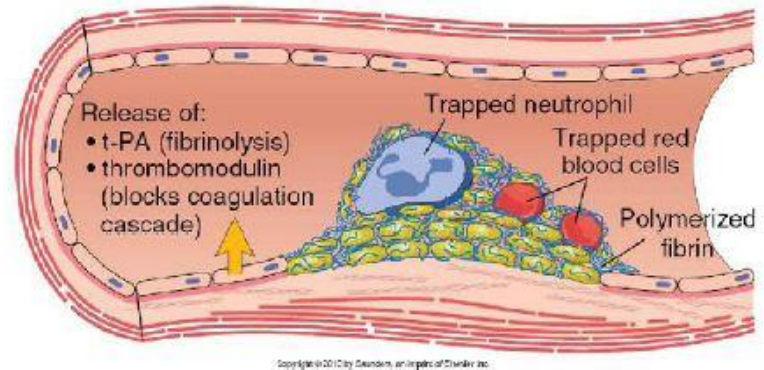
### B. PRIMARY HEMOSTASIS

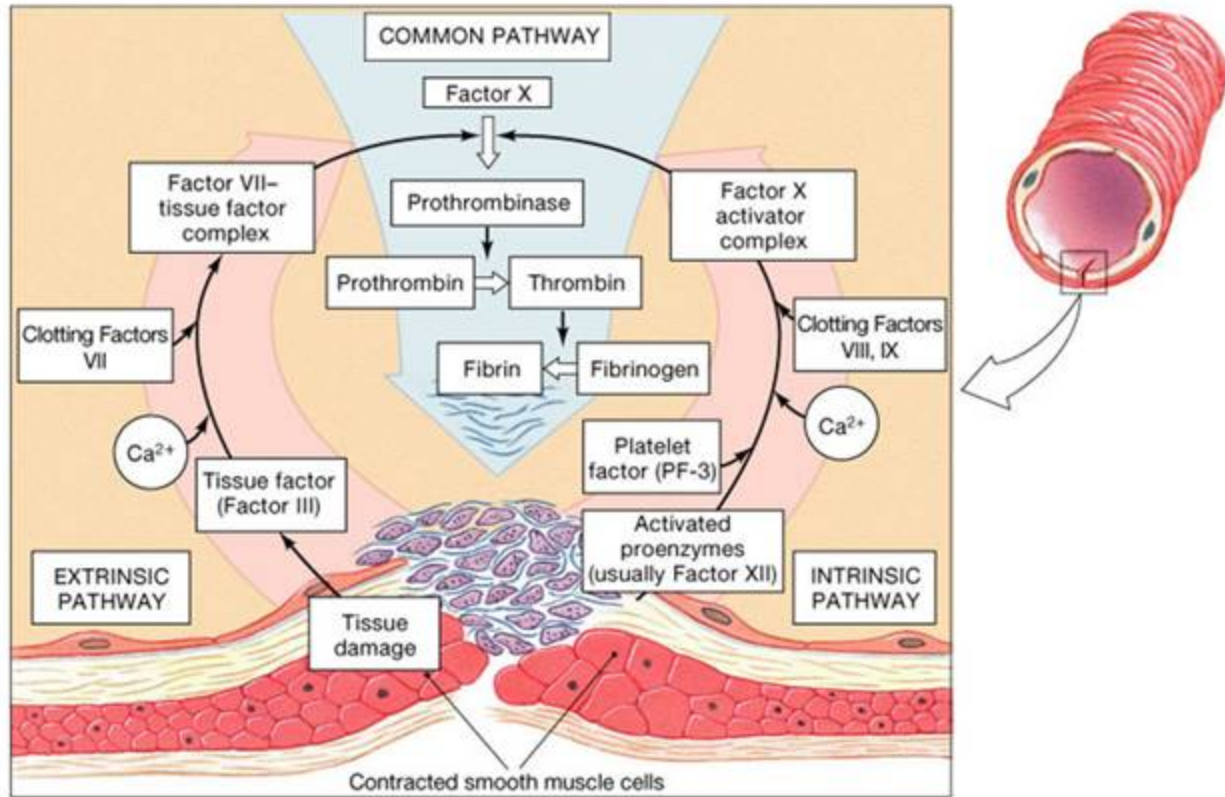


### C. SECONDARY HEMOSTASIS



### D. THROMBUS AND ANTITHROMBOTIC EVENTS





(a) The coagulation phase

# Extrinsic Pathway

- Begins in the vessel wall
- Shorter & faster
- Damaged endothelial cells release Factor III (tissue factor)
  - binds to  $\text{Ca}^{+2}$  & Factor VII → activates Factor X

# Intrinsic Pathway

- Begins in the bloodstream
- Takes longer
- Reinforces the extrinsic pathways work
- Clotting factors exposed to collagen at site of damage
  - Factors VIII & IX become activated → activate Factor X

# Common Pathway

- The activation of Factor X from either the extrinsic or intrinsic pathway
  - forms prothrombinase
    - converts prothrombin into thrombin
      - thrombin converts fibrinogen into fibrin

# Clot Retraction

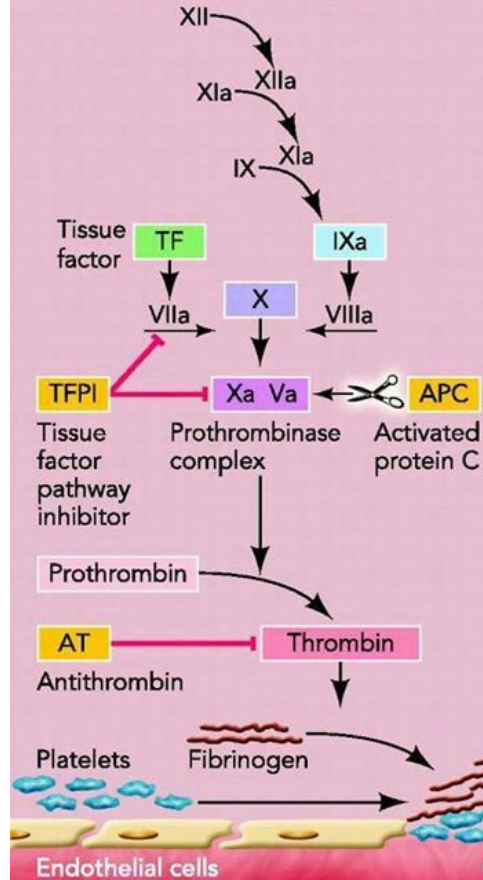
- Once fibrin lays over the platelet plug, platelets and RBCs will stick to the fibrin instead of the blood vessel membrane
  - Platelets will contract, pulling the damaged vessel walls closer together
    - reduces the site of injury
- Occurs 30-60 minutes after injury

# Fibrinolysis

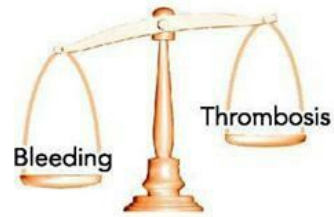
- The process of dissolving blood clots
- Plasminogen is activated by thrombin & tissue plasminogen activator (t-PA)
  - produces plasmin
    - digests fibrin



## COAGULATION CASCADE



## FIBRINOLYSIS



Together, coagulation, anti-coagulation, and fibrinolysis maintain a delicate physiological balance.

