

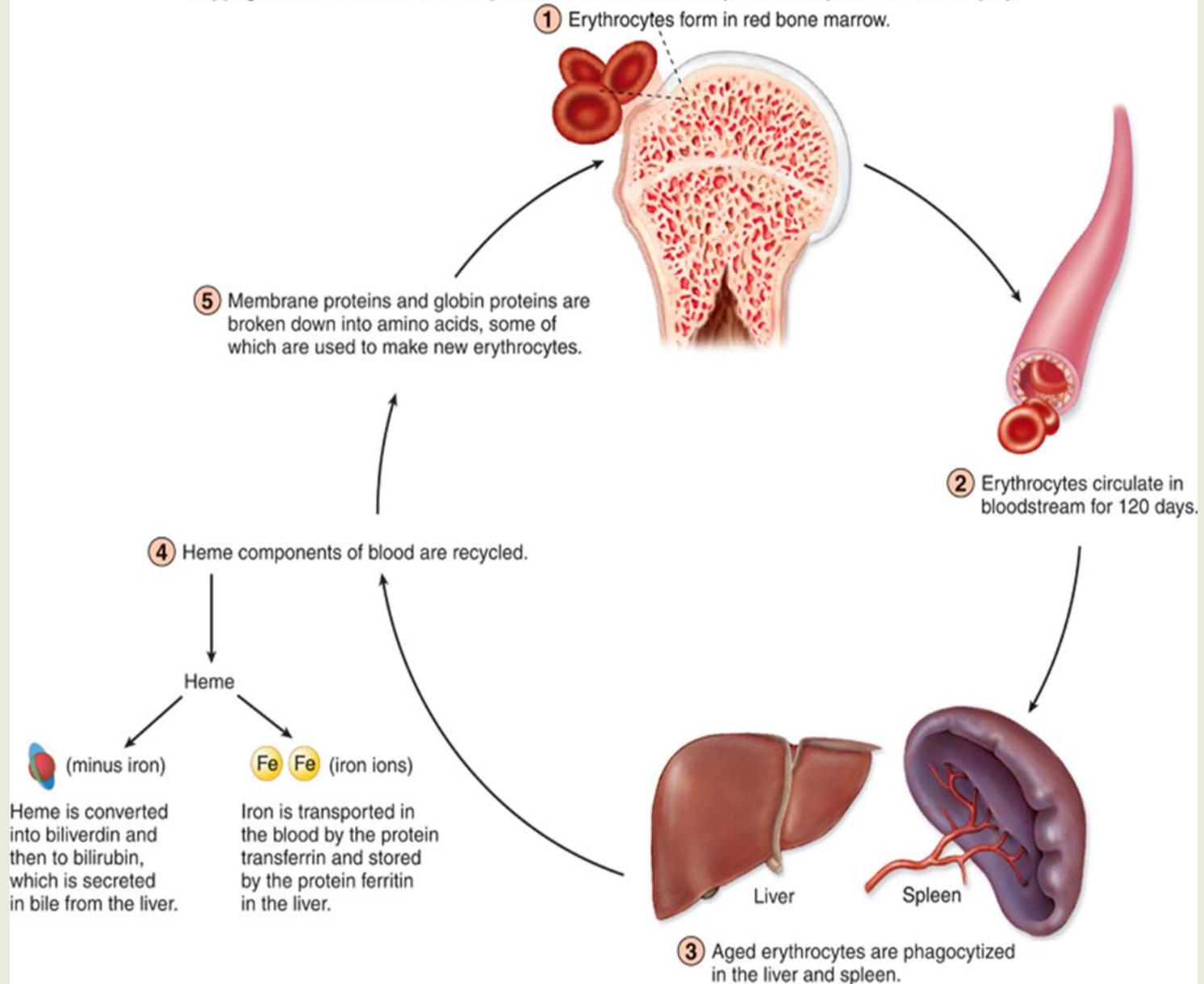


Blood System II: Hemostasis & blood clotting; Blood types: ABO, Rh, the advancement of blood identificationB:

Herwi

Forming and destruction of red blood cell

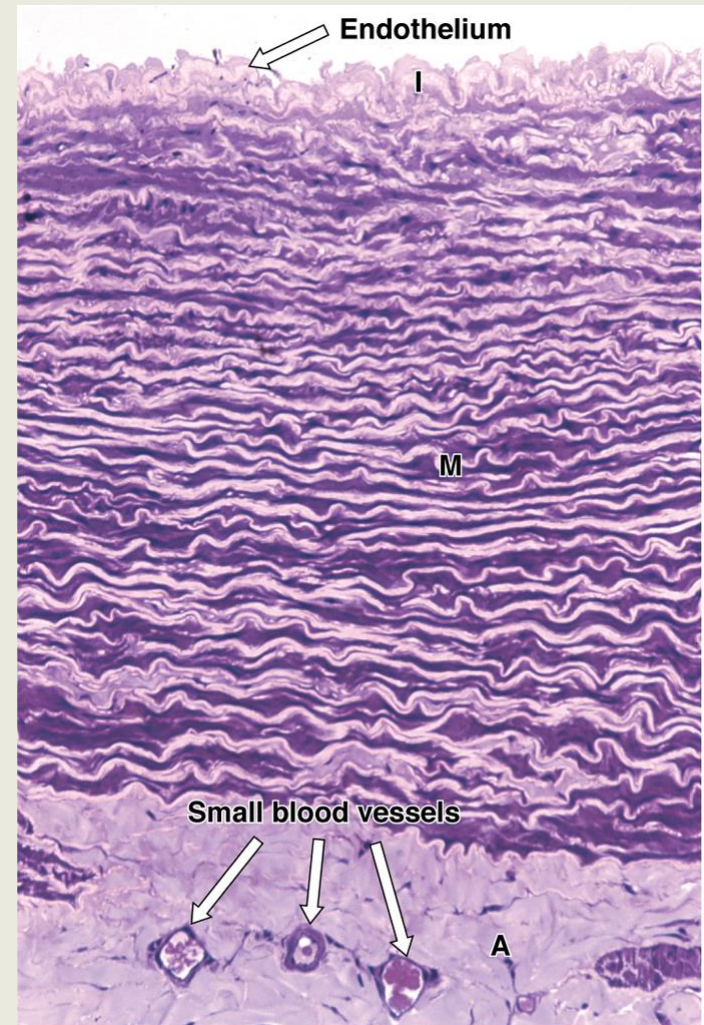
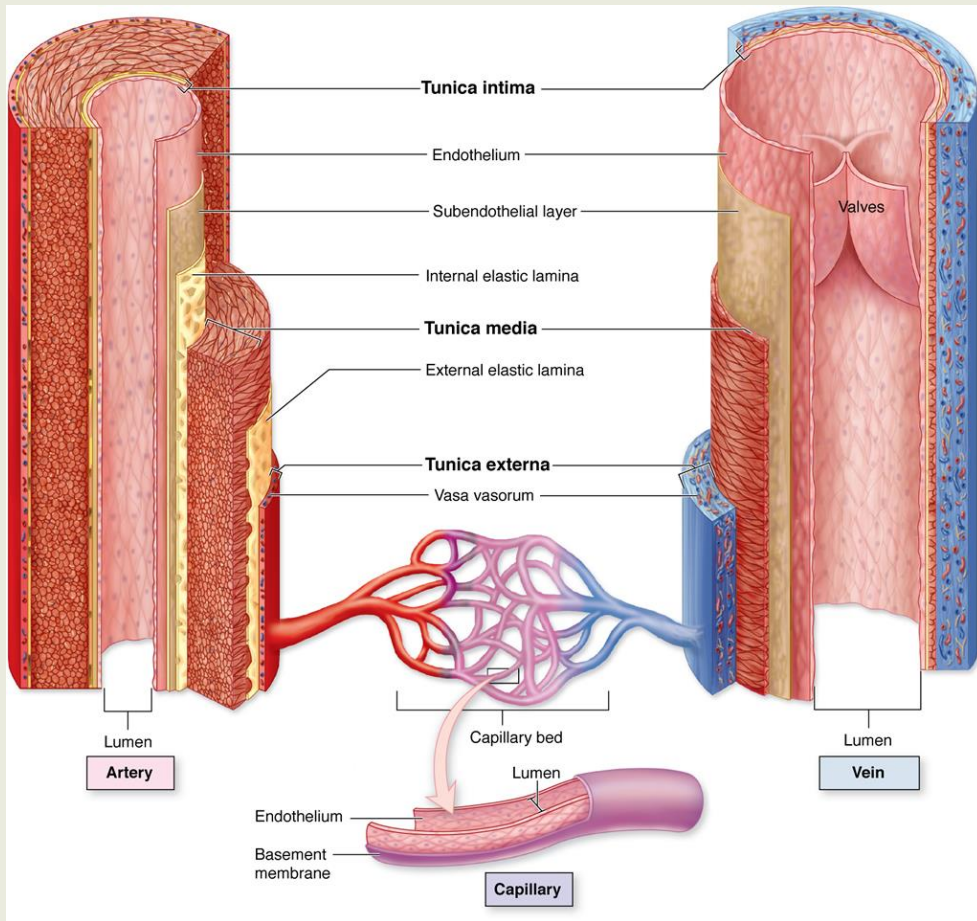
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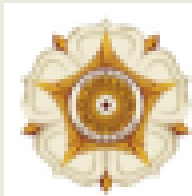


Hemostasis: is a sequence of responses that stops bleeding

- When blood vessels are damaged or ruptured the hemostatic response must be quick
- Three mechanism reduce blood loss
 - 1. Vascular spasm**
 - 2. Forming plug platelet**
 - 3. Blood clotting (coagulation)**
 1. platelet adhesion
 2. platelet release reaction
 3. platelet agregation
 4. platelet plug

Struktur pembuluh darah





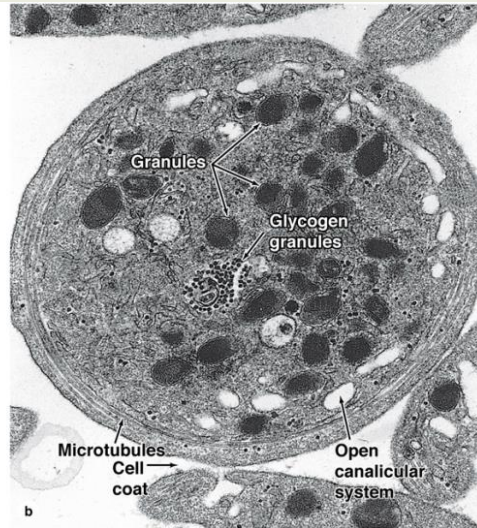
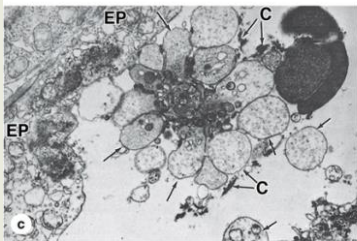
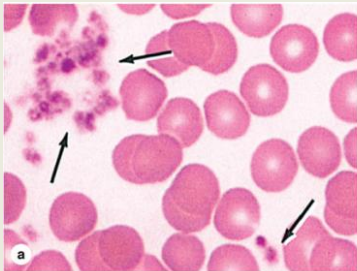
The role of platelets in controlling hemorrhage

- **Primary aggregation**
- Disruption in the microvascular endothelium
- Platelet aggregation to collagen via collagen-binding protein in the platelet membrane
- A platelet plug is formed as a first step to stop bleeding
- **Secondary aggregation**
- Platelet in the plug release an adhesive glycoprotein and ADP are potent inducer of platelet aggregation increasing the size of the plug
- **Blood coagulation**
- During aggregation : fibrinogen, von Willebrand factor and other, various factor interaction of plasma protein giving rise to a fibrin that forms a 3-dimensional network of fiber trapping red blood cell and more platelets to form a blood clot (trombus)
- **Clot retraction**
- **Clot removal**
- Protected by the clot, the vessel wall is restored by new tissue and the clot removed mainly by proteolytic enzyme plasmin

Vaskuler spasm

- Arteriole- arteries are damage, smooth muscle contracts reduces blood loss for several minutes – hours

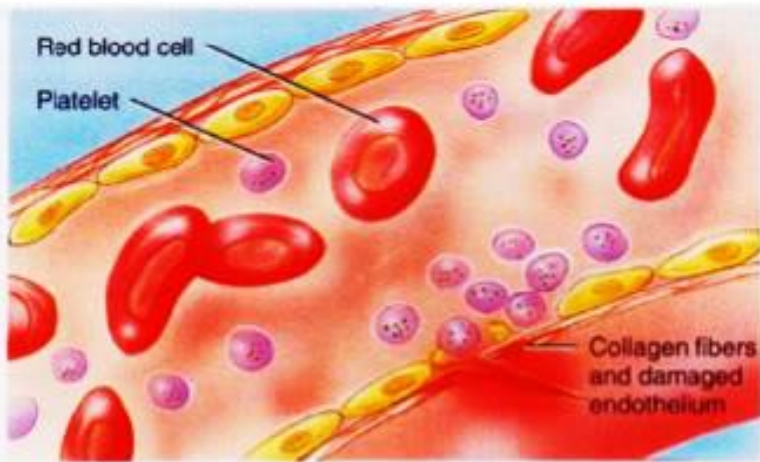
Forming plug platelet



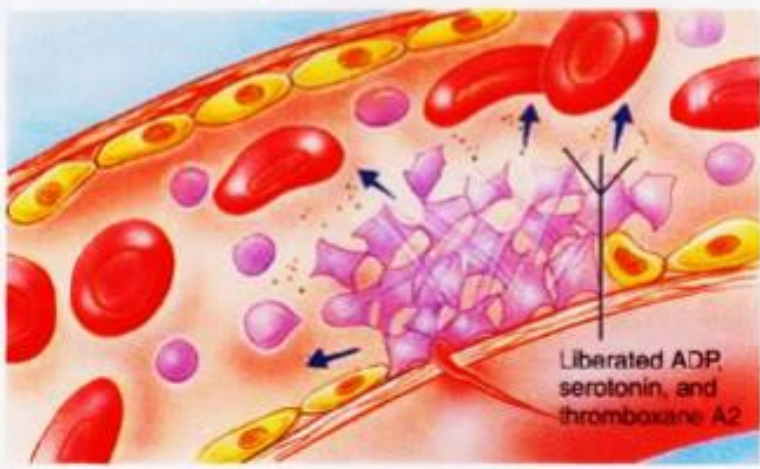
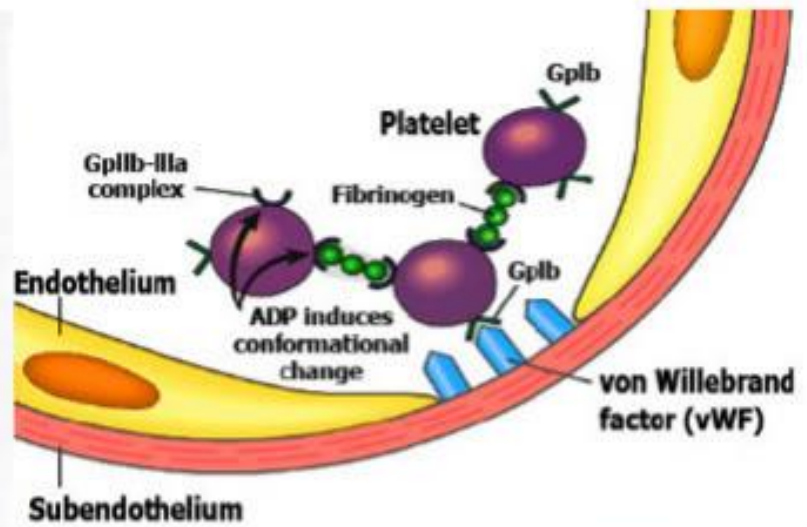
Granule containing ATP, clotting factor, ADP, Ca²⁺, serotonin release
Platelet-derived growth factor (PDGF)

↓
hormon can cause proliferation of vascular endothelial cell smooth muscle, fibroblast to help damaged blood vessel

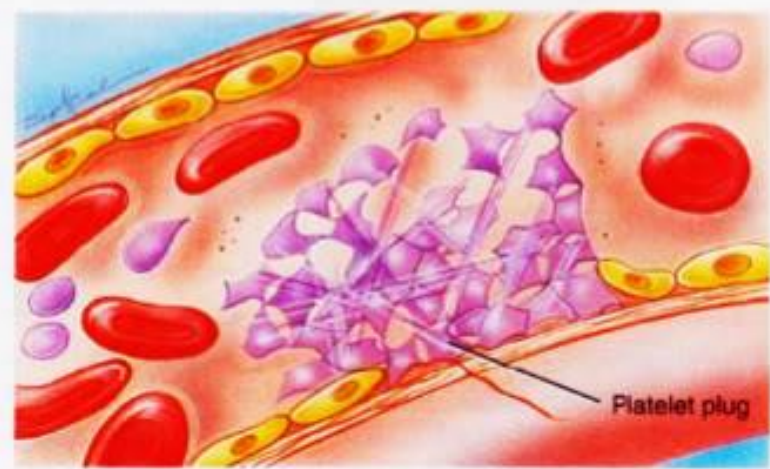
Forming platelet



1 Platelet adhesion



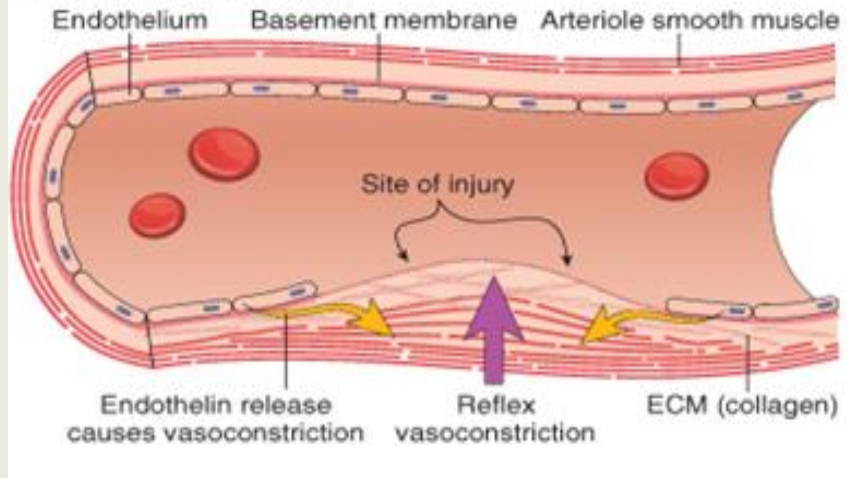
2 Platelet release reaction



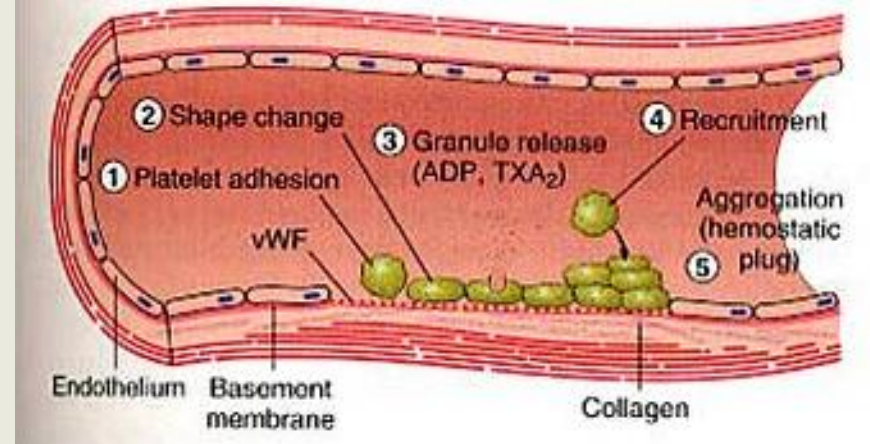
3 Platelet aggregation

Hemostasis

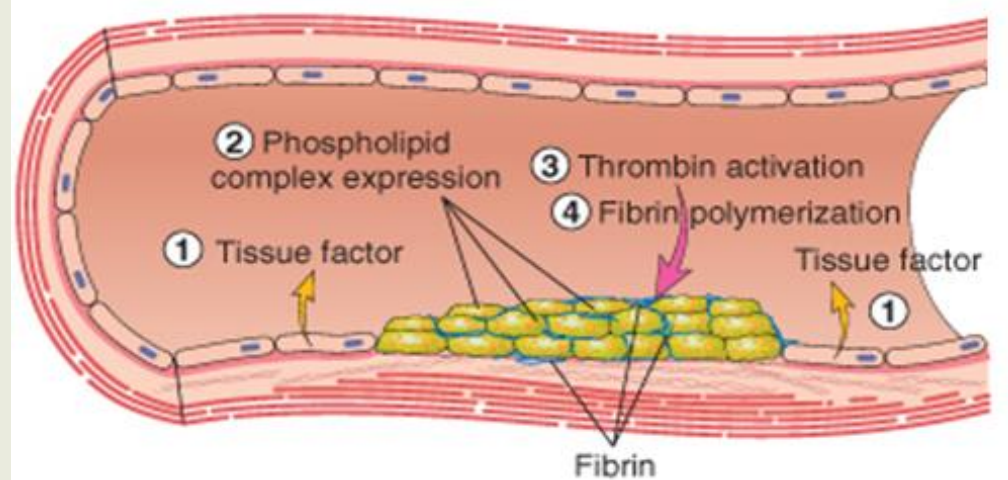
A. VASOCONSTRICTION



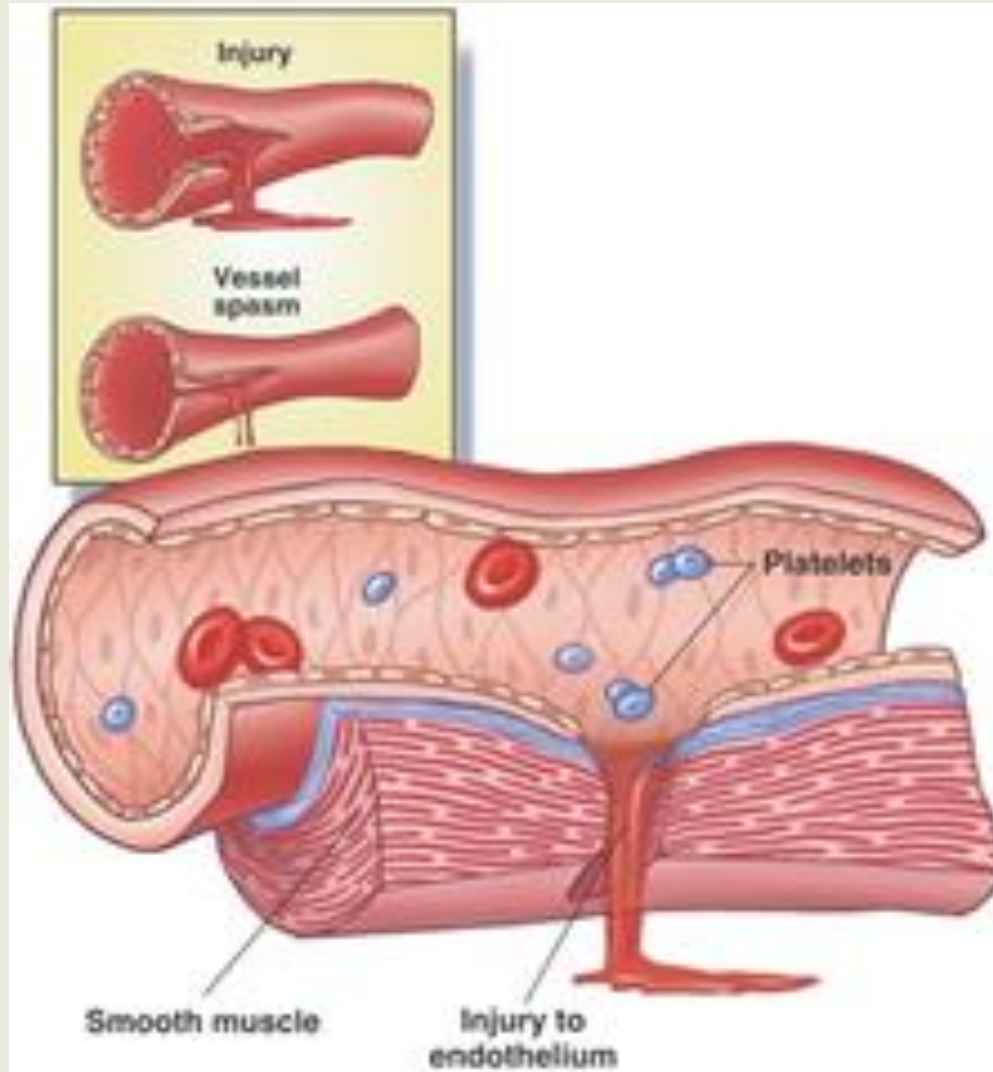
B. PRIMARY HEMOSTASIS



C. SECONDARY HEMOSTASIS



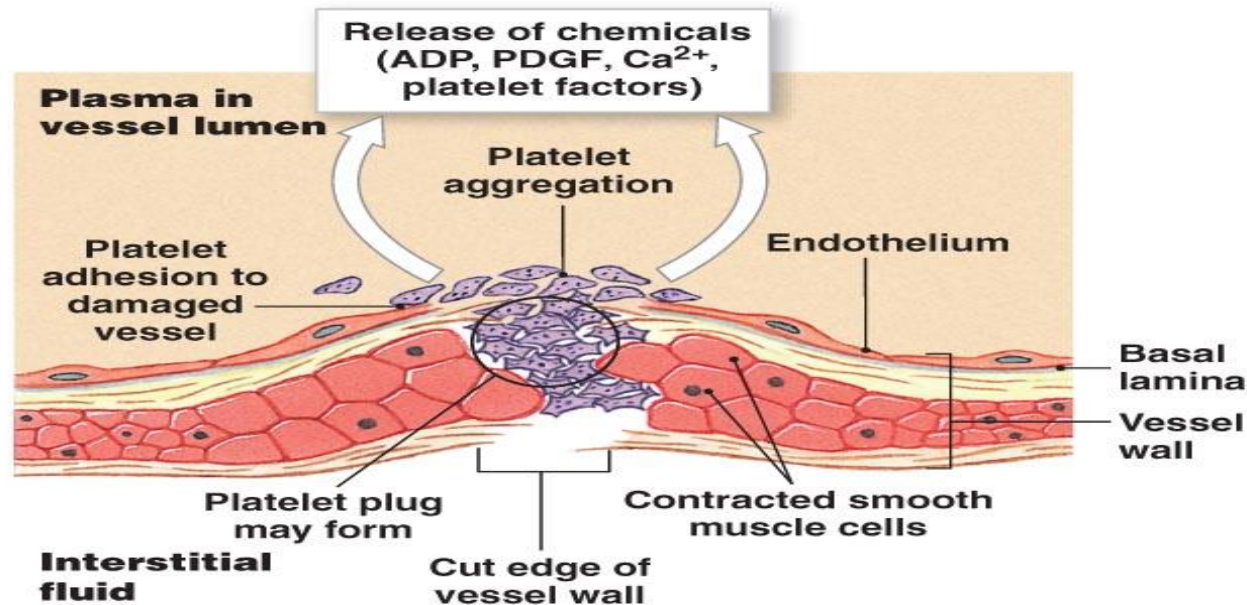
Vasculare phase



The platelet phase of hemostasis

Platelet Phase

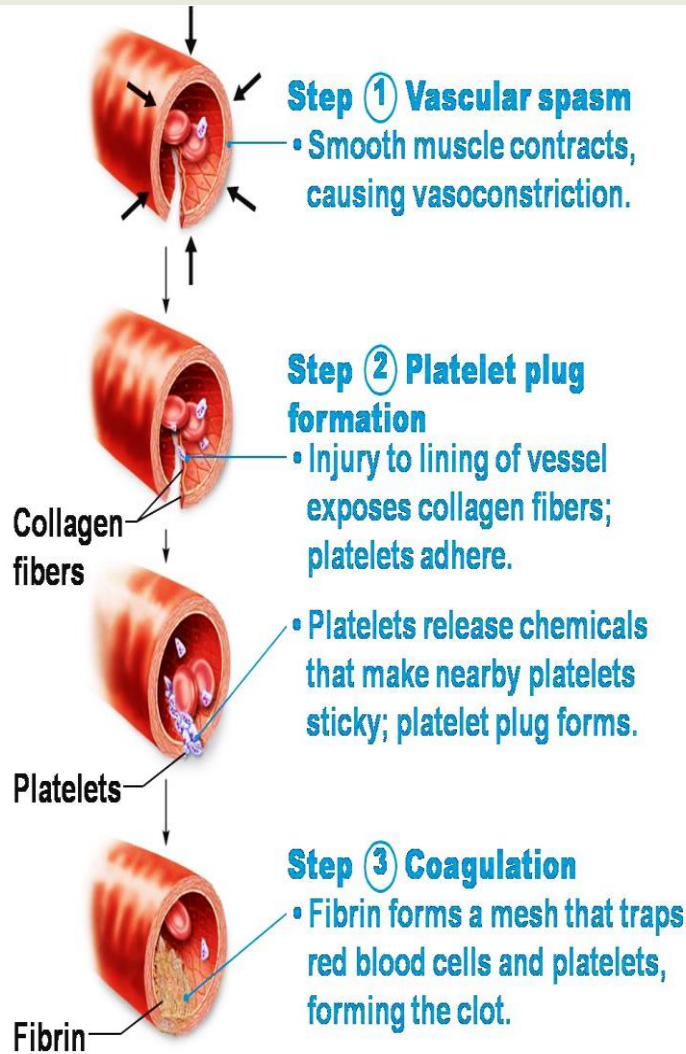
Begins with the attachment of platelets to sticky endothelial surfaces, to the basal lamina, to exposed collagen fibers, and to each other



Chemicals Released by Activated Platelets

- Adenosine diphosphate (ADP), which stimulates platelet aggregation and secretion
- Several chemicals that stimulate vascular spasms
- **Platelet factors**, proteins that play a role in blood clotting
- **Platelet-derived growth factor (PDGF)**, a peptide that promotes vessel repair
- Calcium ions, which are required for platelet aggregation and in several steps in the clotting process

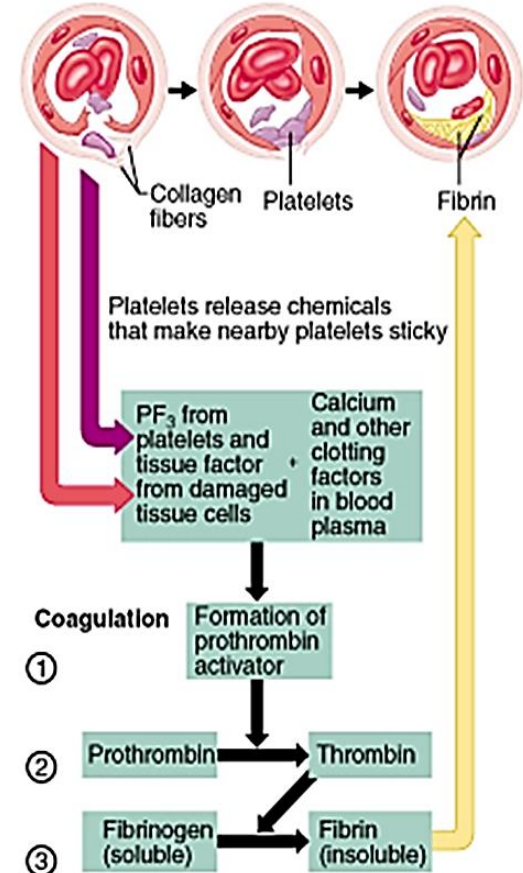
Mechanism of Hemostasis



Injury to lining of vessel exposes collagen fibers; platelets adhere

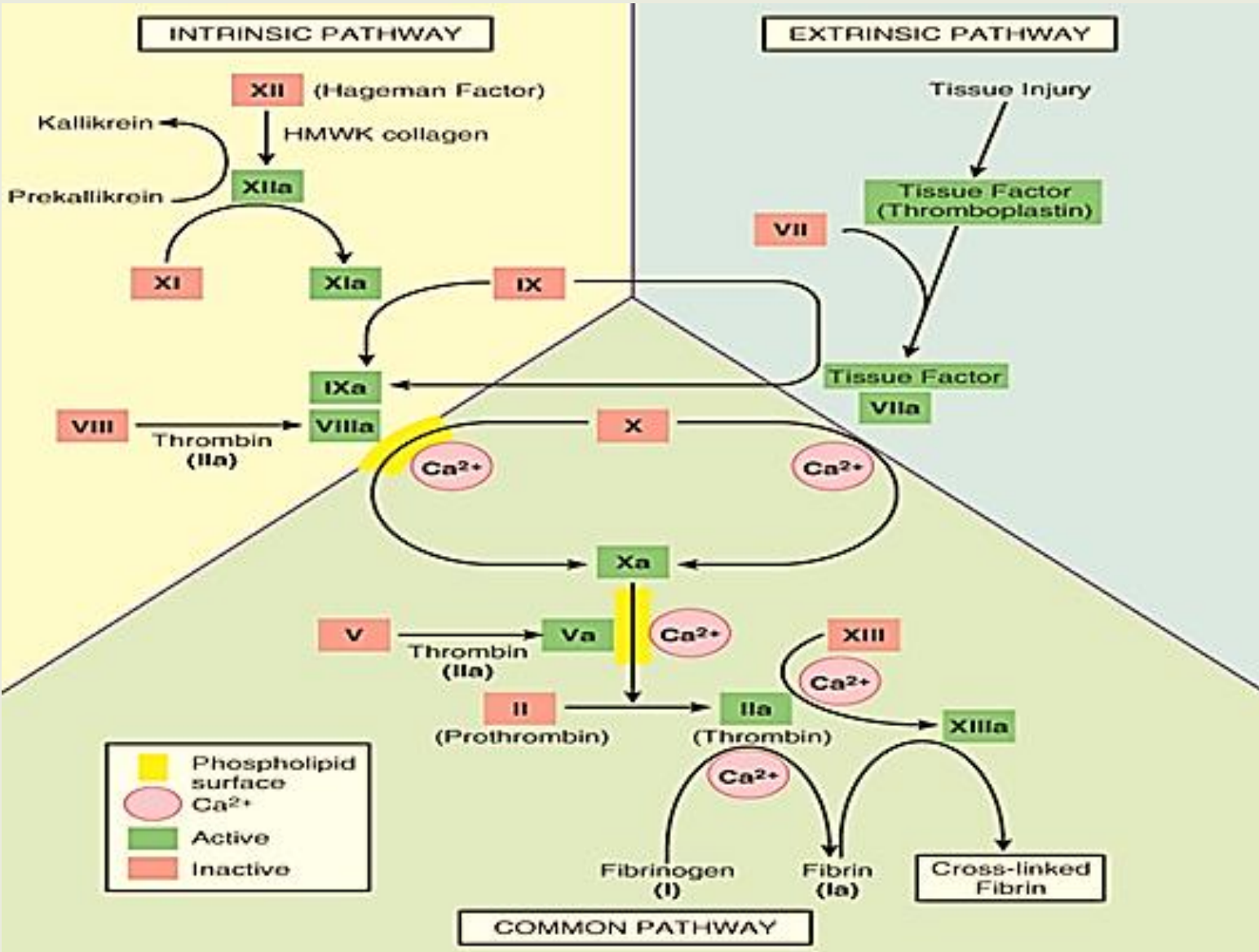
Platelet plug forms

Fibrin clot with trapped red blood cells

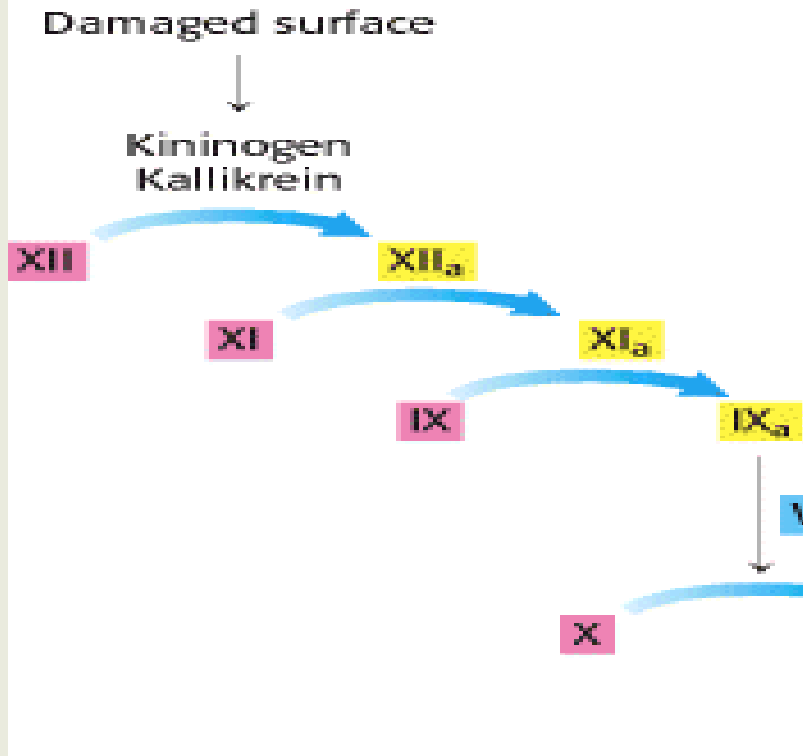


(a)

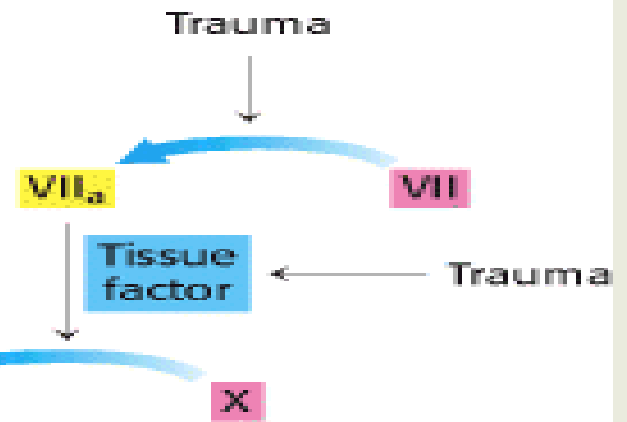
Intrinsic and extrinsic pathway



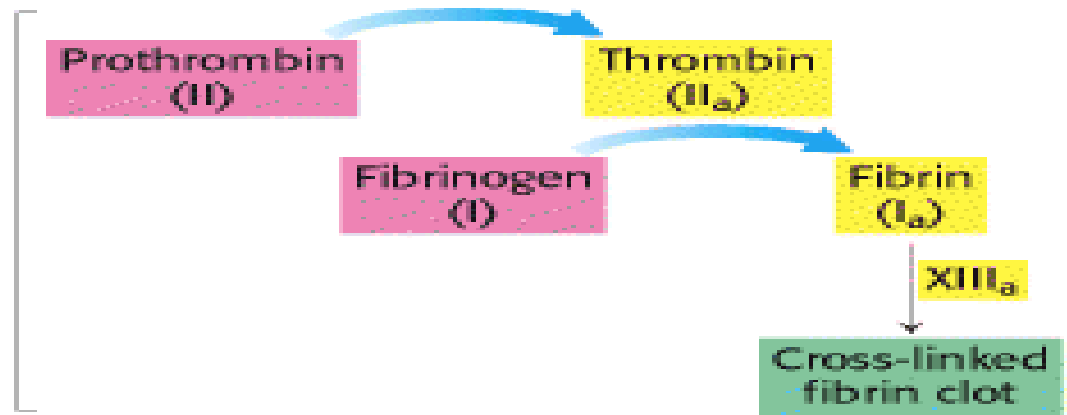
INTRINSIC PATHWAY

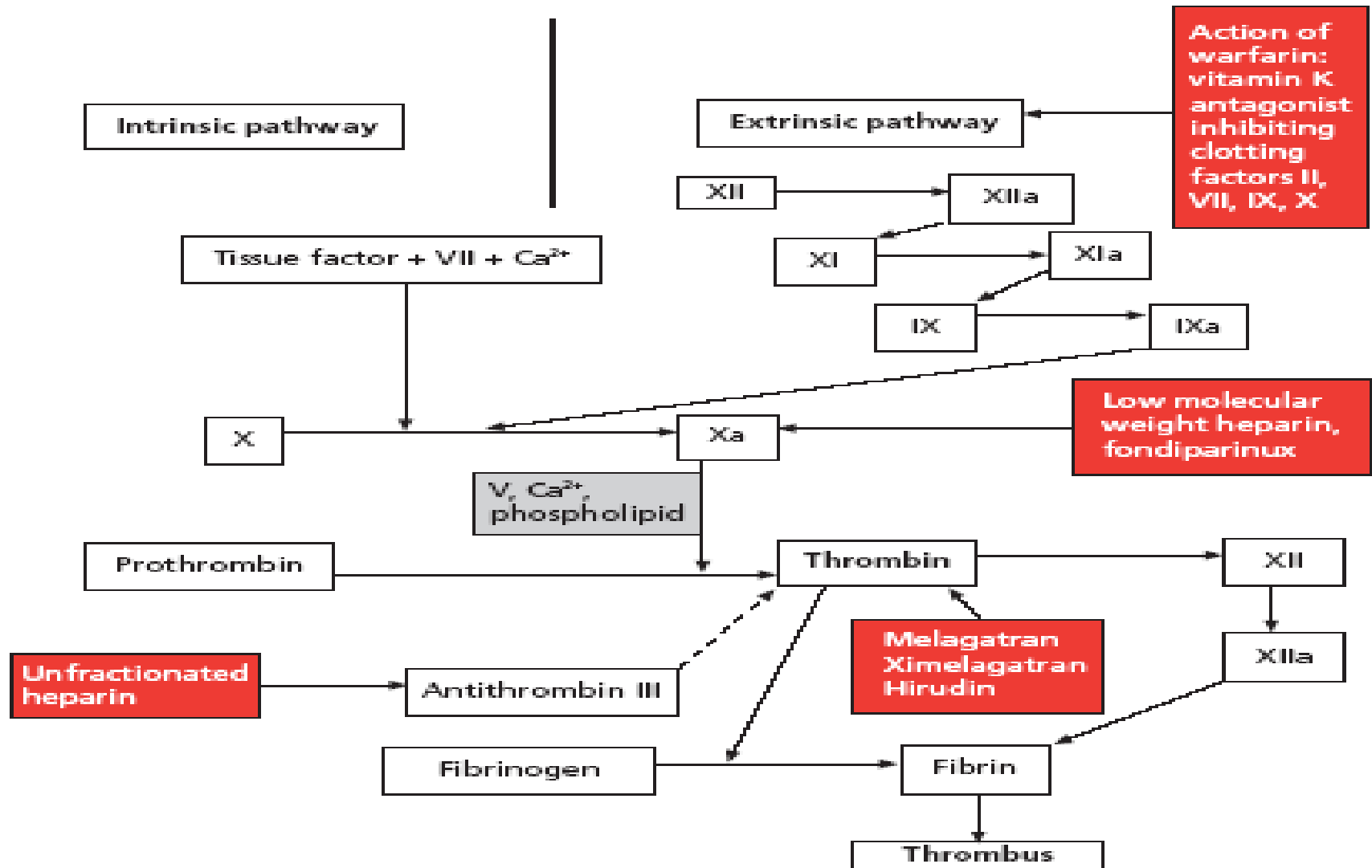


EXTRINSIC PATHWAY



FINAL COMMON PATHWAY





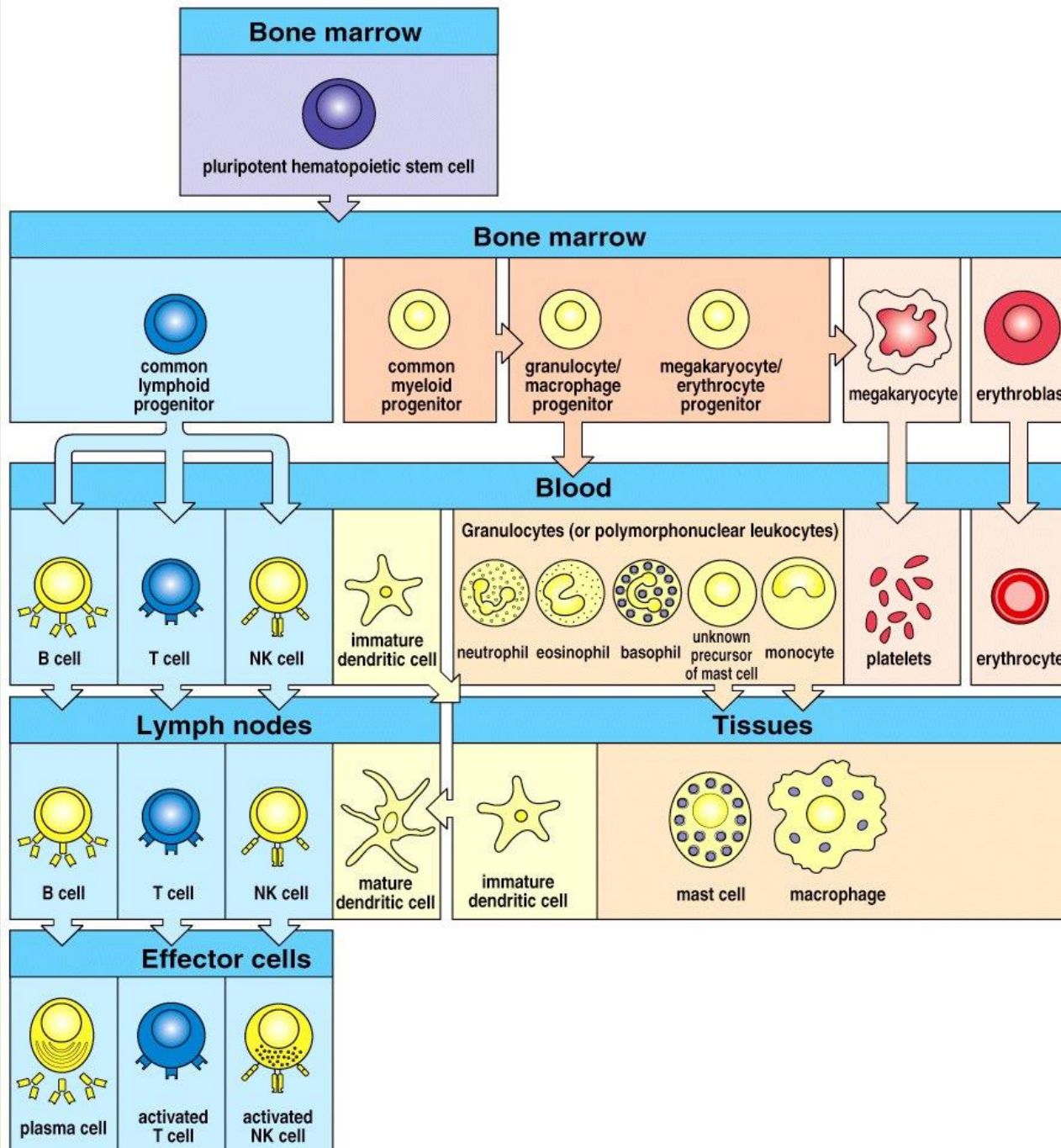
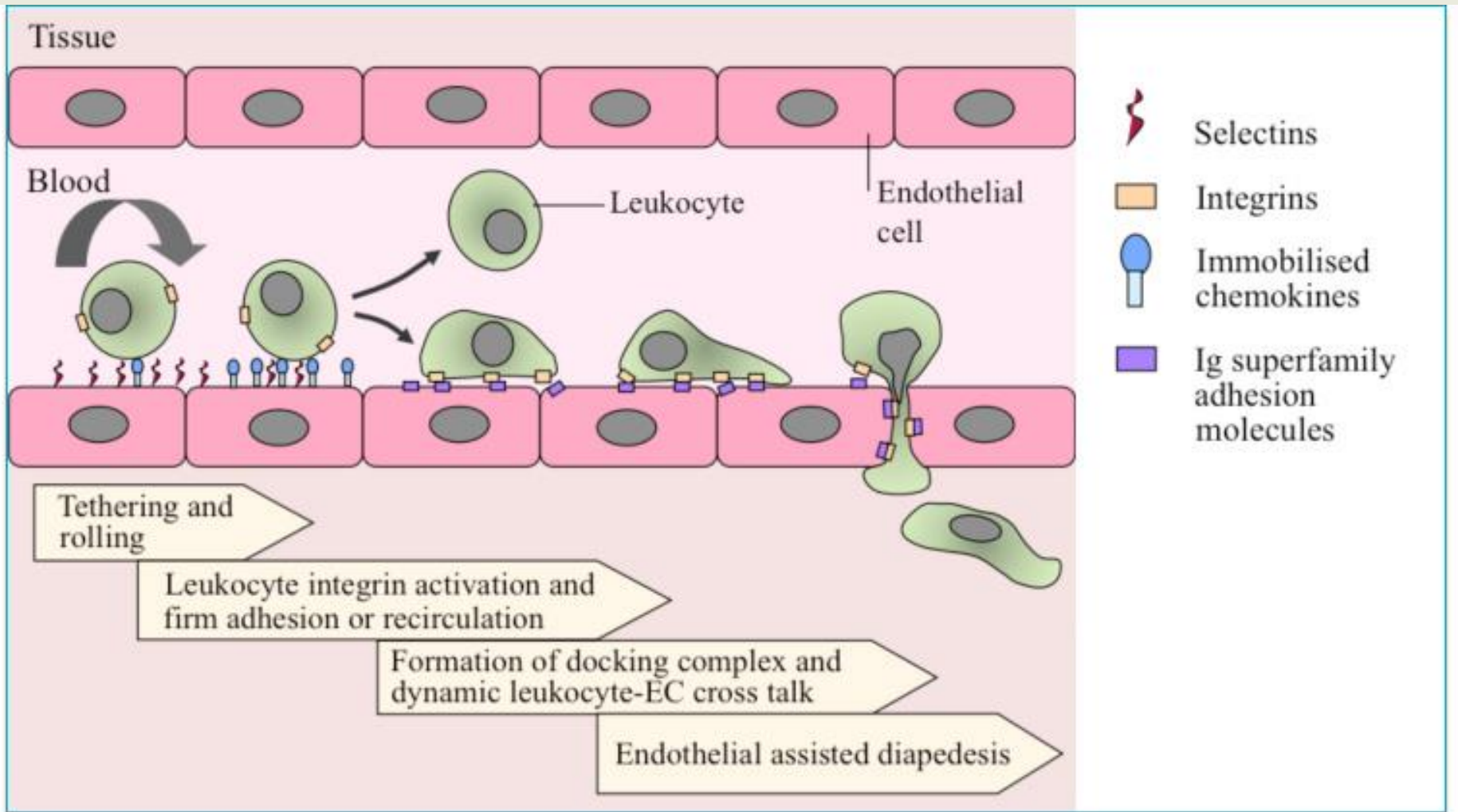
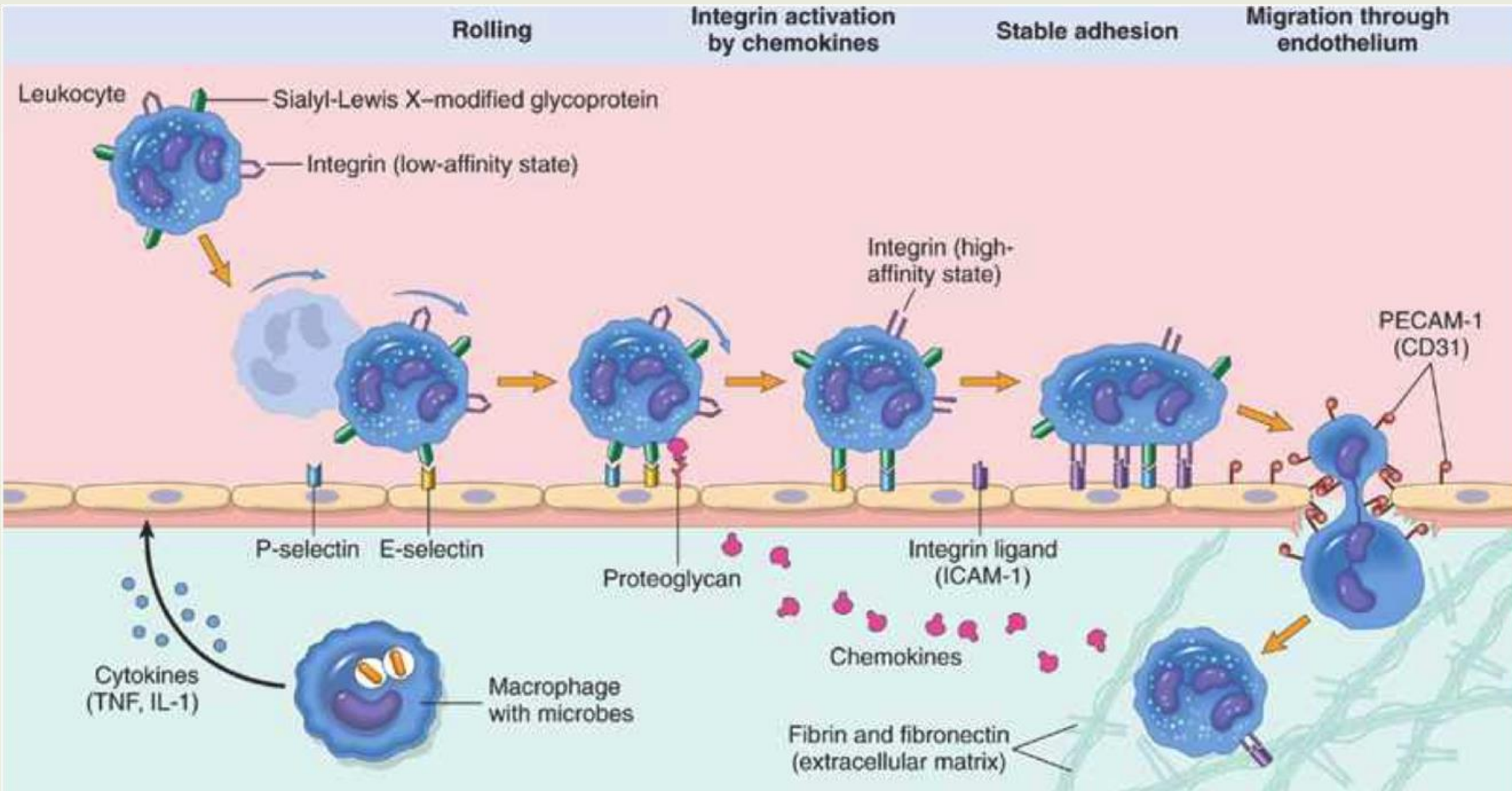


Figure 1-3 Immunobiology, 6/e. (© Garland Science 2005)

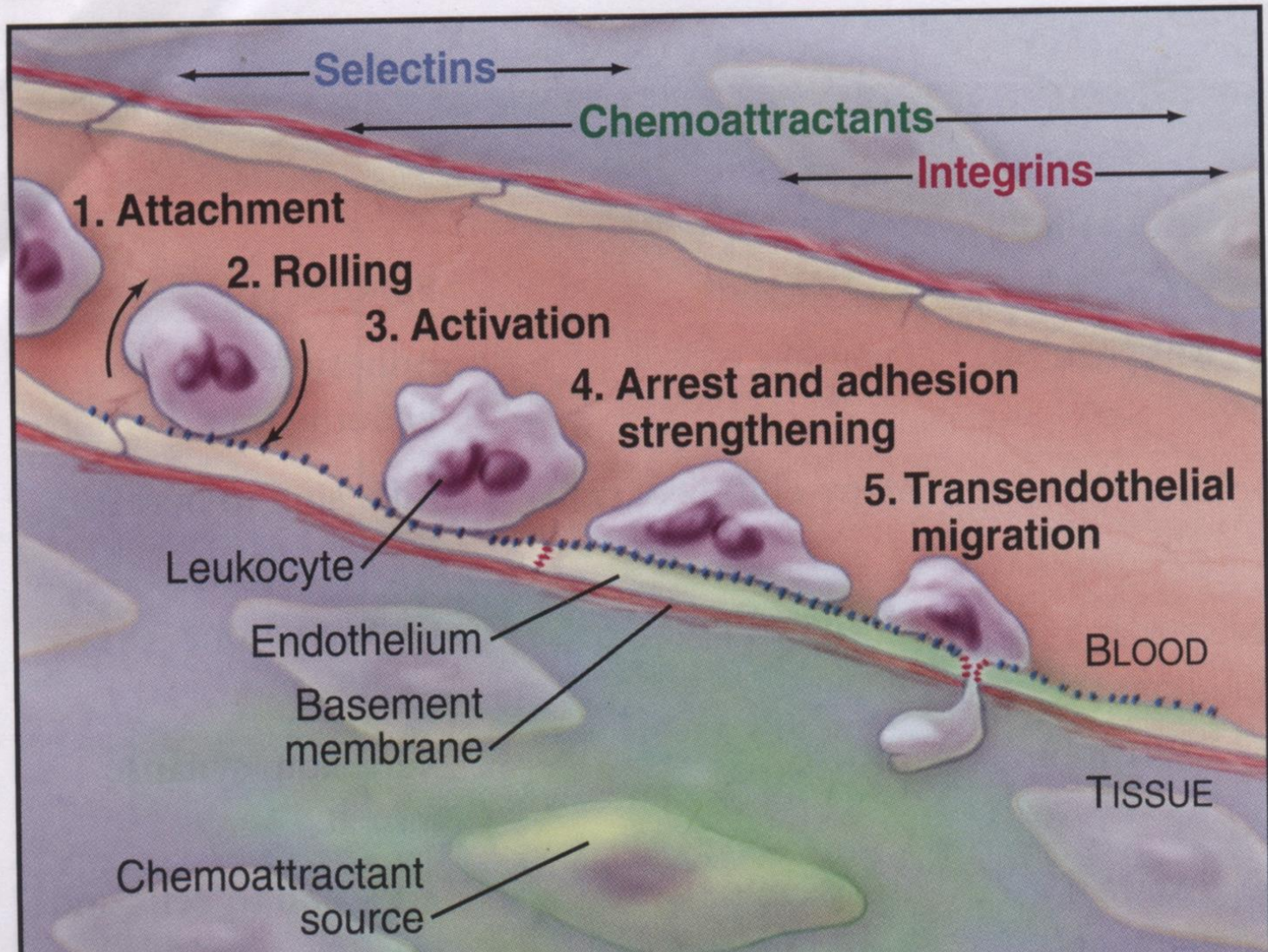
Diapedesis Leukosit



Banding leukocyte with matrix

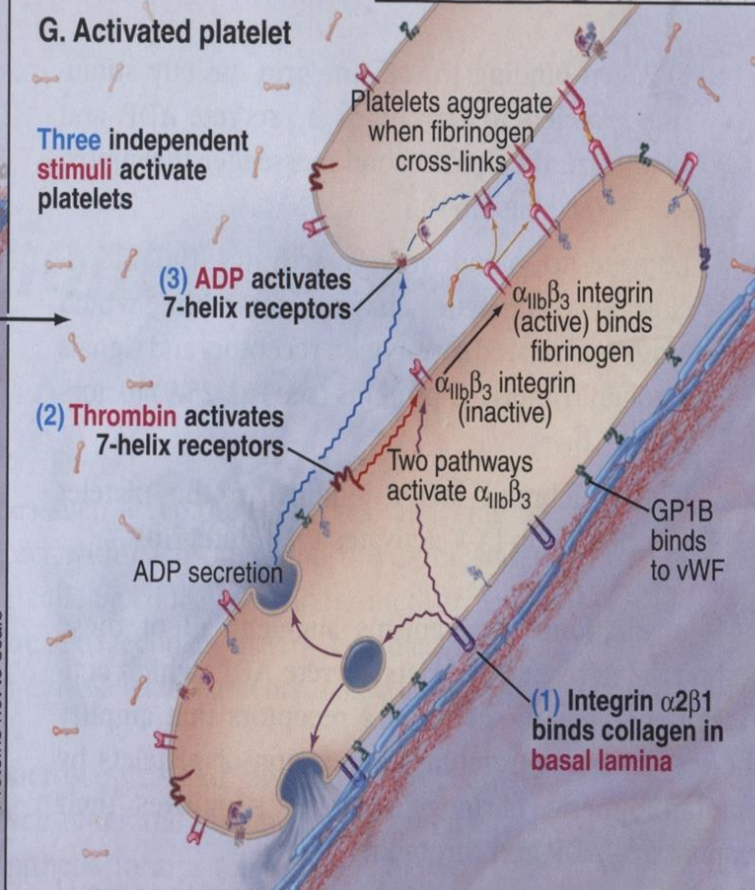
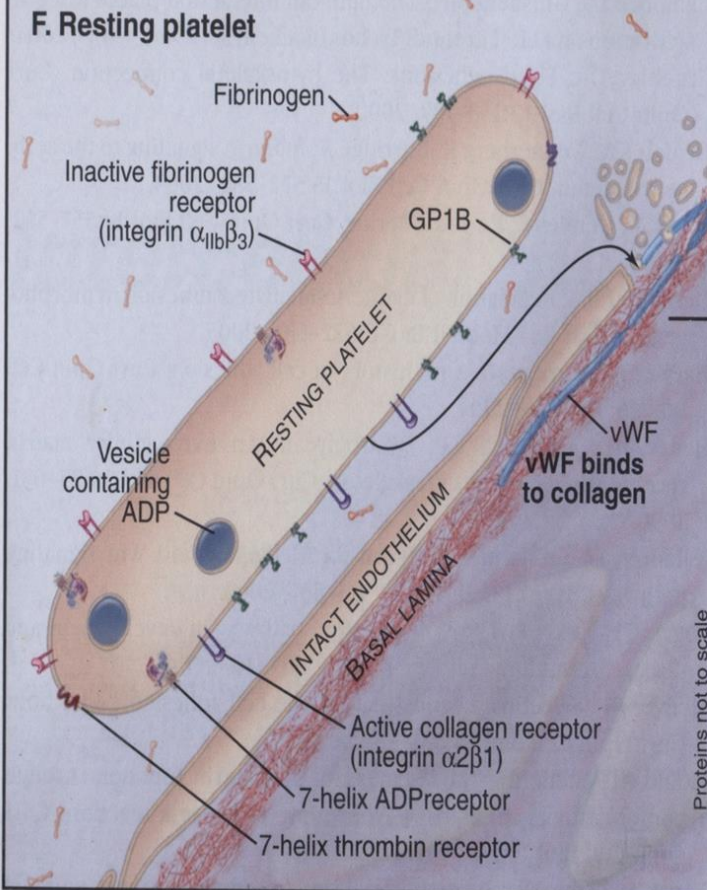
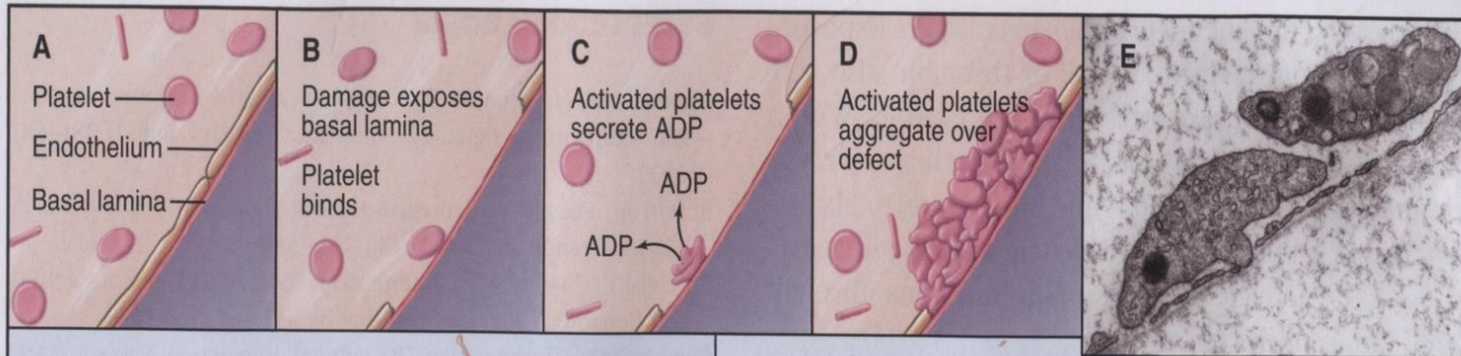


Kumar et al: Robbins & Cotran Pathologic Basis of Disease, 8th Edition.
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Glikoprotein (membrane platelet)

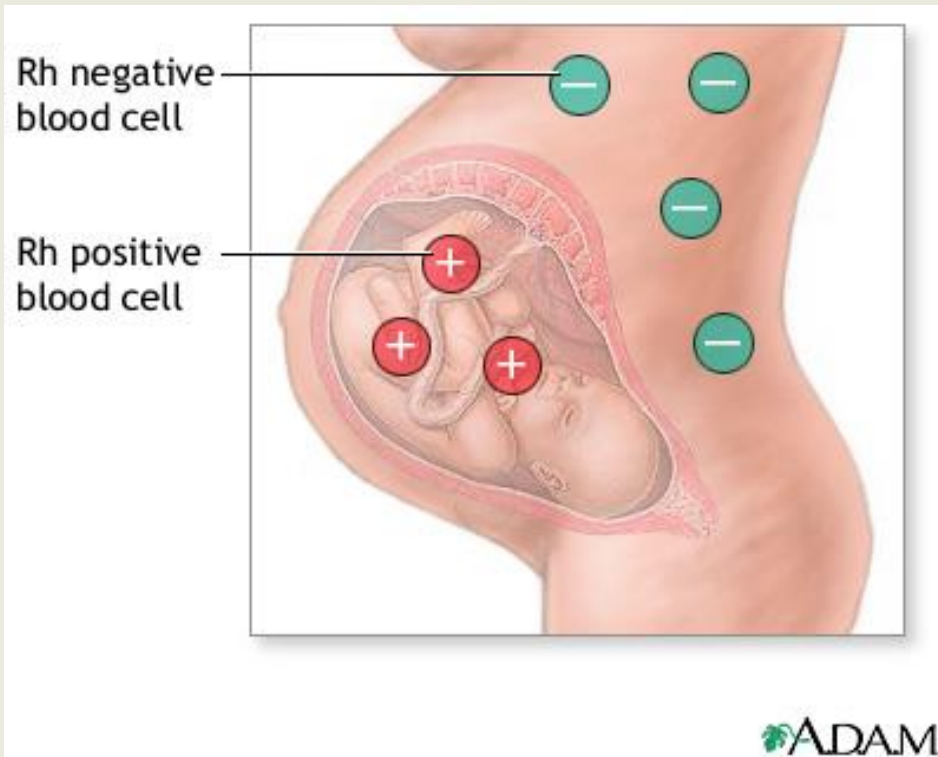
1. Glycoprotein Ib-IX-V complex (GPIb-IX-V)
(von Willebrand factor/vWF, α thrombin, pSelektin)
2. Glycoprotein VI (GPVI)
3. Glycoprotein Ia / IIa complex (GPIa / IIa = integrin $\alpha 2\beta 1$
(kolagen tipe I dan IV)
4. Glycoprotein IIb / IIIa complex (GPIIb / IIIa = integrin $\alpha IIb\beta 3$)
- menginisiasi platelet u/agregasi membentuk plug dan clotting
(vWF, fibronectin and vitronectin)
5. GPV / IIIa (GPV / IIa = integrin $\alpha 5\beta 1$)
(komponen matrik)



Antigen and antibody (type ABO)

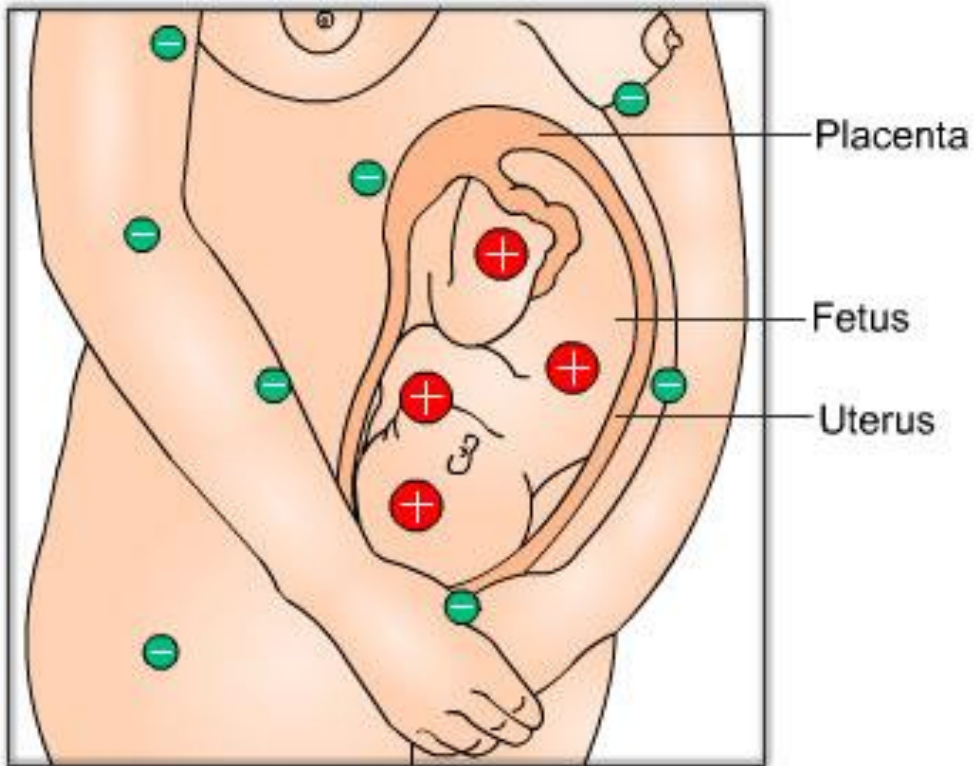
	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in Plasma	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens in Red Blood Cell	 A antigen	 B antigen	 A and B antigens	None

AB do not have anti-A or anti-B antibodies in the plasma (**universal recipient**)
 O none antigen (**universal donors**)

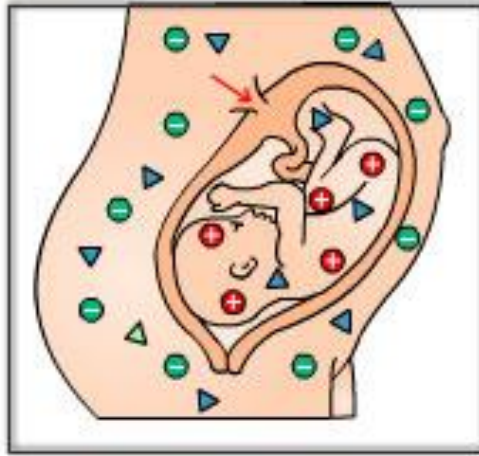
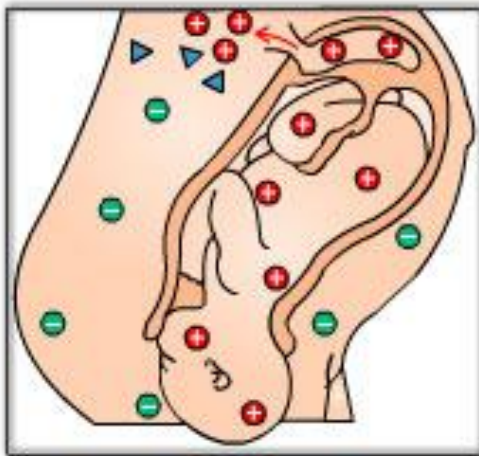


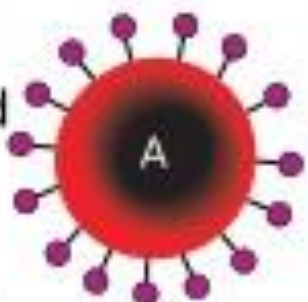
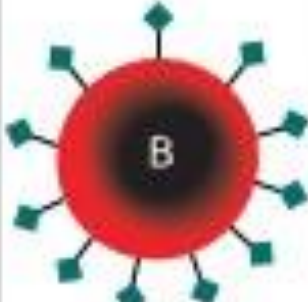
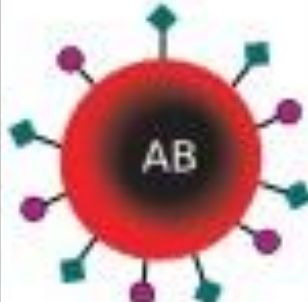
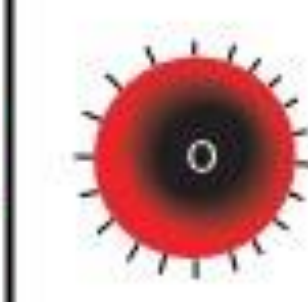






Development of hemolytic disease of the newborn
1. At birth, a small quantity of fetal blood usually leaks across the placenta into the maternal bloodstream

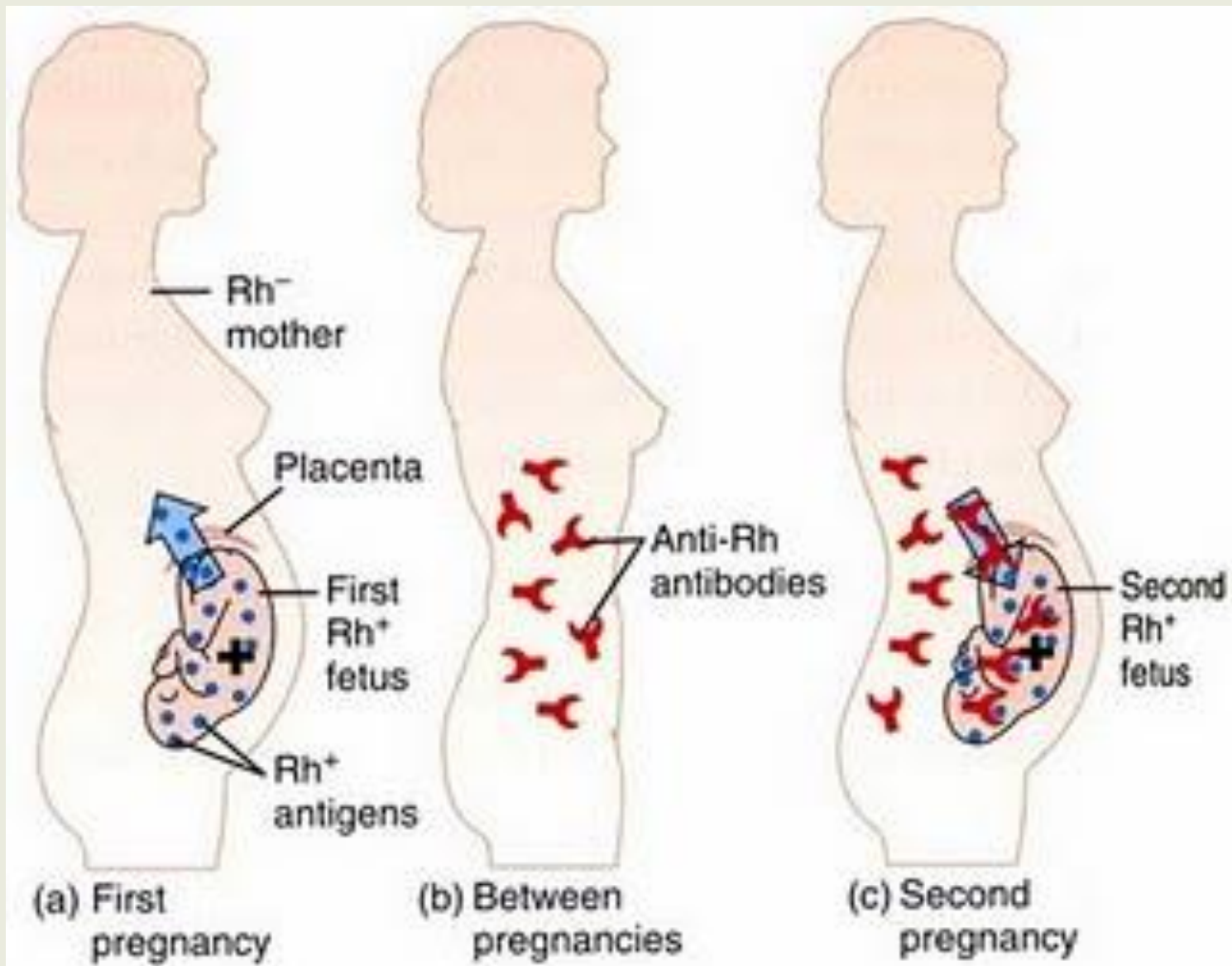
A mother and the baby is Rh negative



<http://www.medindia.net/patients/patientinfo/antenatal-care-visits.htm>



	Group A	Group B	Group AB	Group O
Red blood cell type	 A	 B	 AB	 O
Antibodies present	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens present	 A antigen	 B antigen	 A and B antigens	No antigens

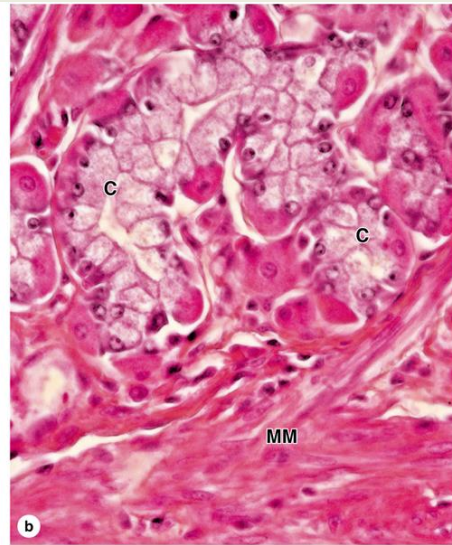
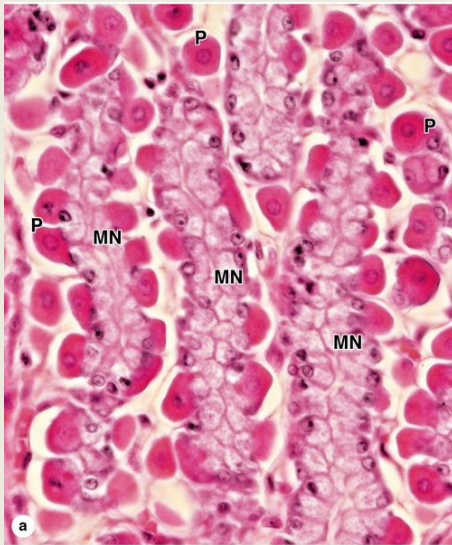


Disorder: homeostasis

- The type of anemia
- Anemia of defisiensi besi
- Insufficient hemopoiesis → anemia
pernisiiosa
- Thalasemia
- Hemophilia

Gastric glands

Glandula gastrica



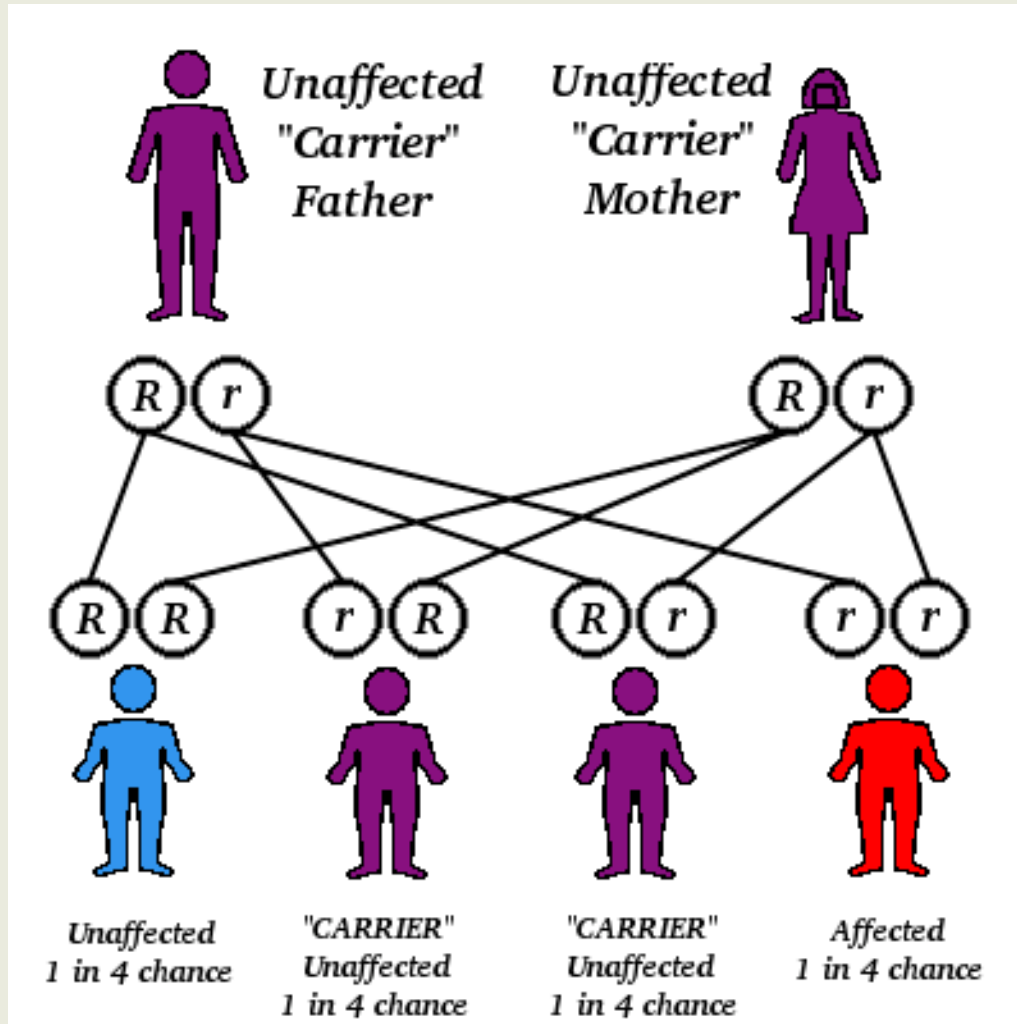
Thalassemia

- Normal
- hemoglobin (HbA) memiliki memiliki 4 protein (α globin dan β globin)
- Thalassemia
- *inherited blood disorder*

Delesi pada α atau β globin

eritrocyt lebih kecil (*microcytic*), pucat (*hypochromic*)

Autosomal recessive



Terima kasih