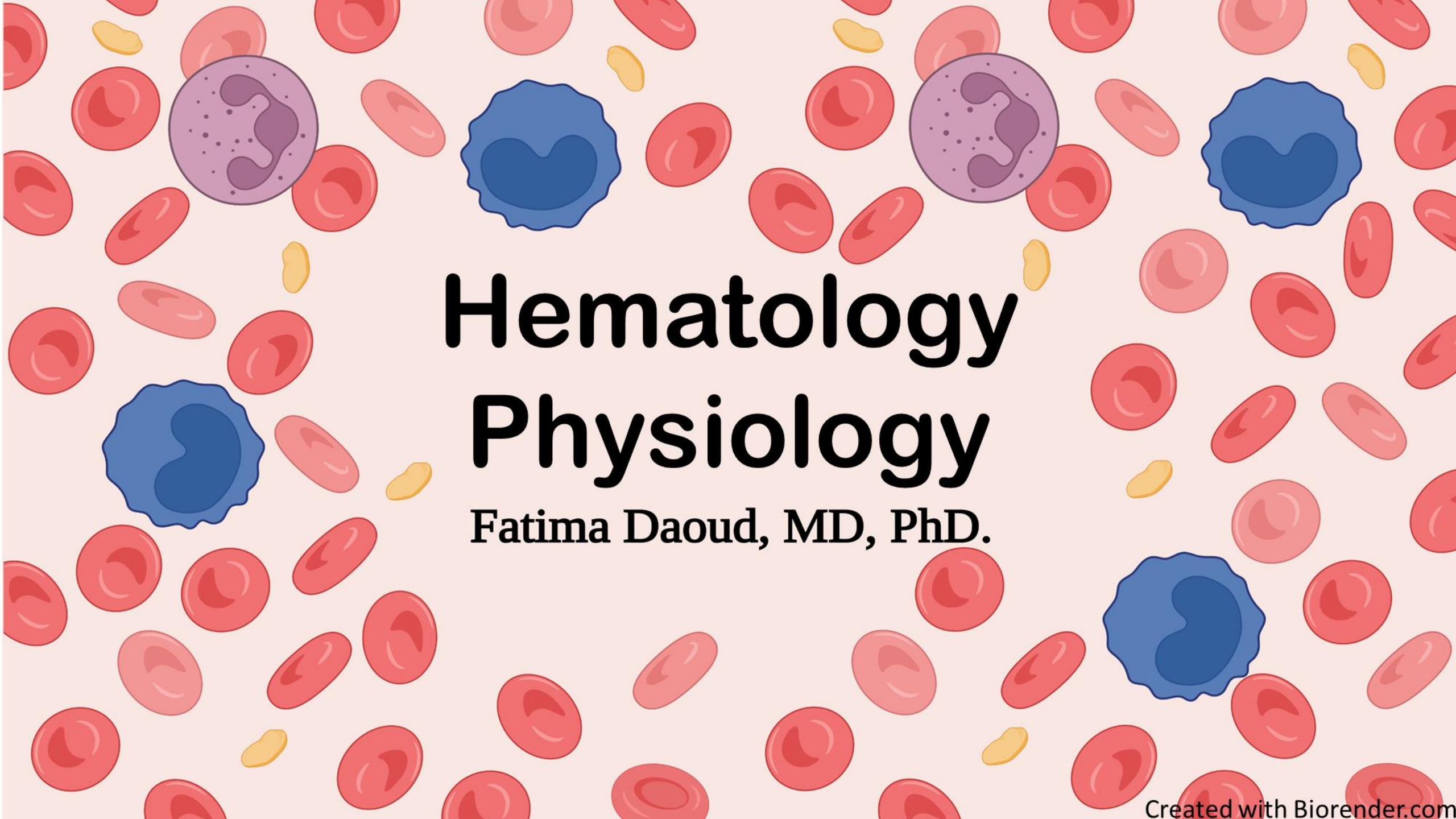
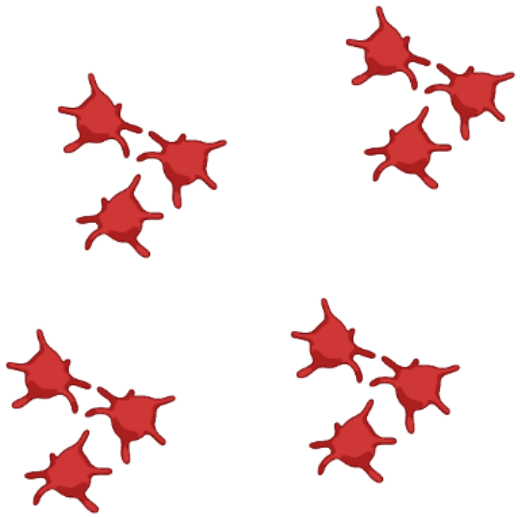


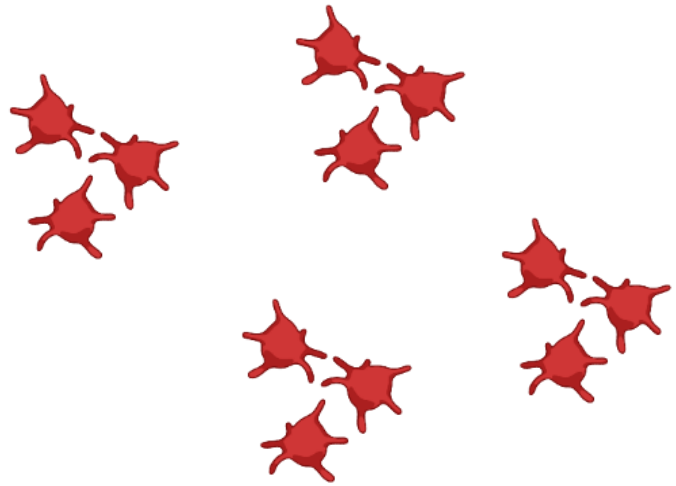
Hematology Physiology

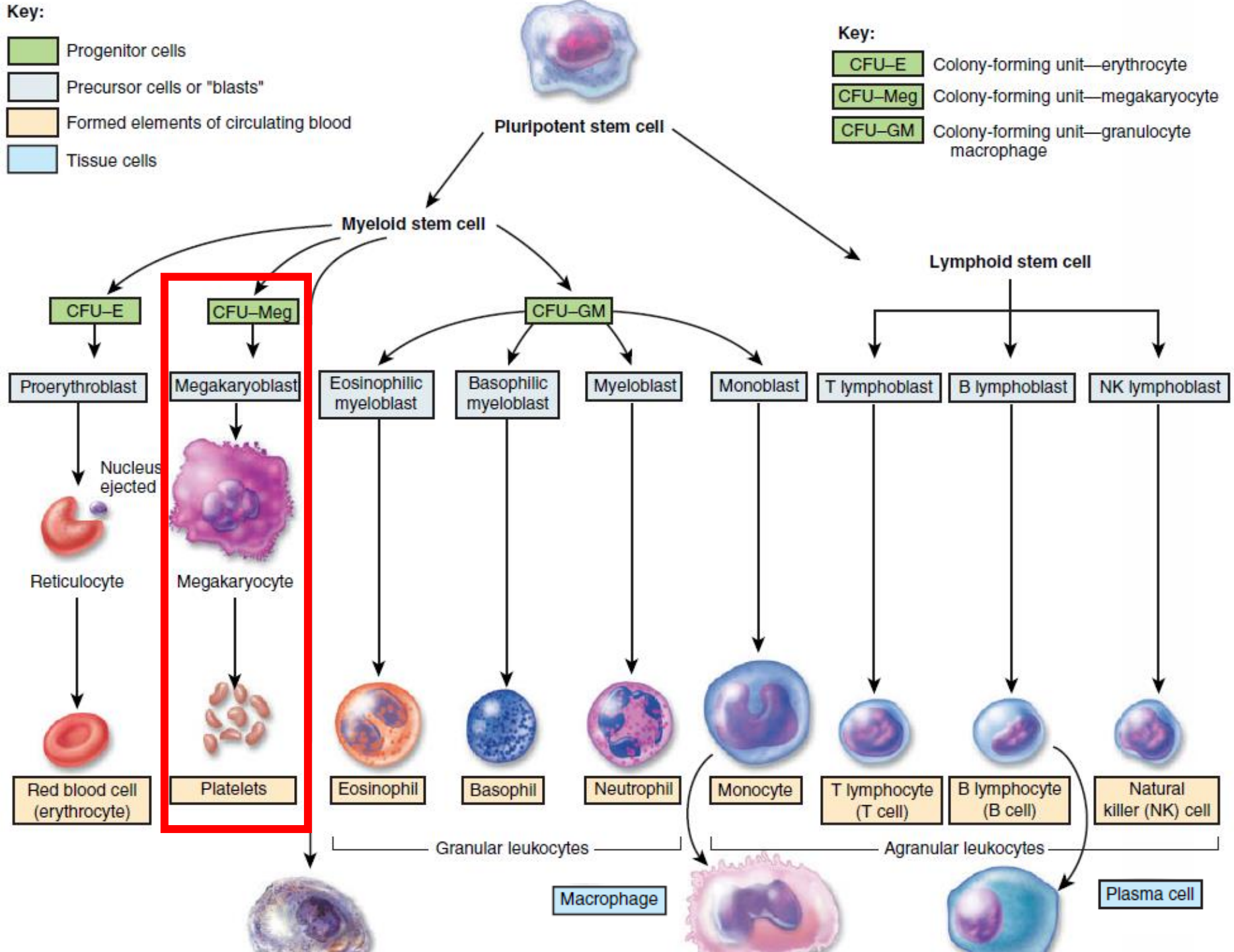
Fatima Daoud, MD, PhD.

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Platelets (Thrombocytes)




Key:
Progenitor cells
Precursor cells or "blasts"
Formed elements of circulating blood
Tissue cells
Key:
CFU–E Colony-forming unit—erythrocyte
CFU–Meg Colony-forming unit—megakaryocyte
CFU–GM Colony-forming unit—granulocyte macrophage
Pluripotent stem cell
Myeloid stem cell
Lymphoid stem cell
CFU–E
CFU–Meg
CFU–GM
Proerythroblast
Megakaryoblast
Eosinophilic myeloblast
Basophilic myeloblast
Myeloblast
Monoblast
T lymphoblast
B lymphoblast
NK lymphoblast
Nucleus ejected
Reticulocyte
Megakaryocyte
Red blood cell (erythrocyte)
Platelets
Eosinophil
Basophil
Neutrophil
Monocyte
T lymphocyte (T cell)
B lymphocyte (B cell)
Natural killer (NK) cell
Granular leukocytes
Agranular leukocytes
Macrophage
Plasma cell

Platelets Overview

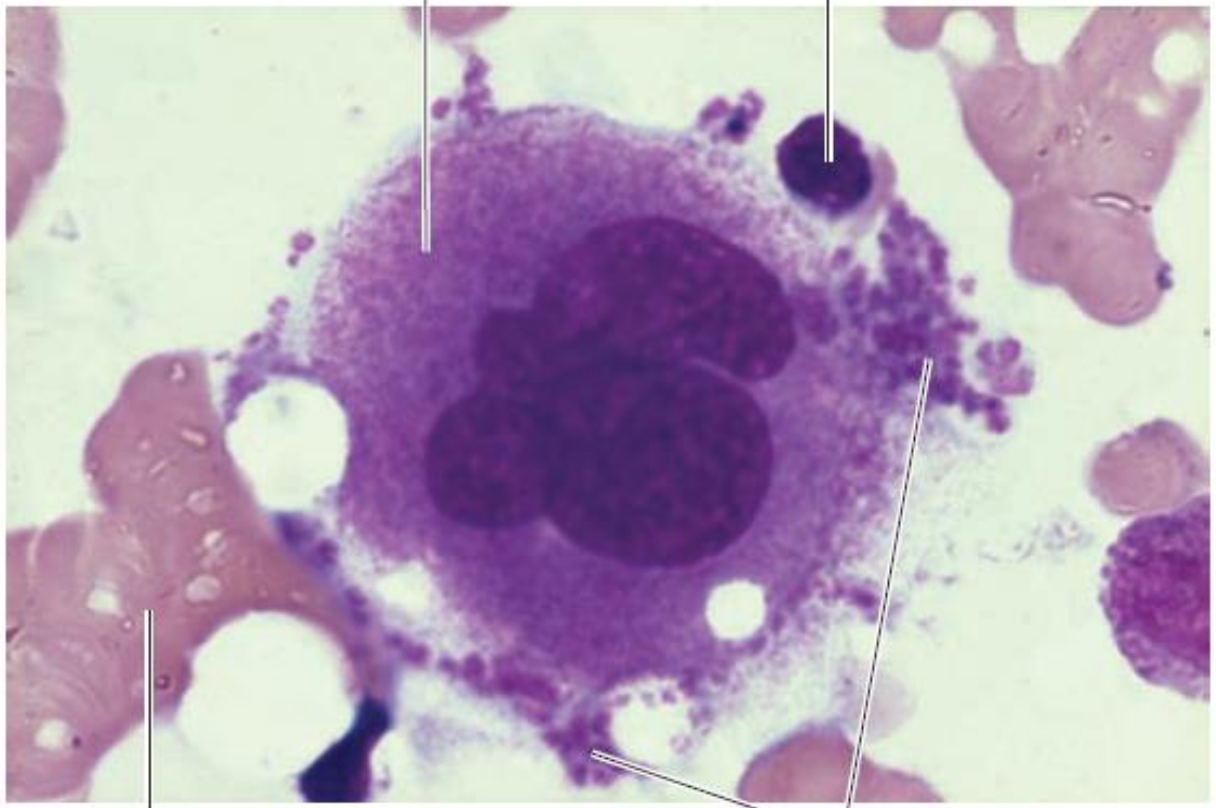
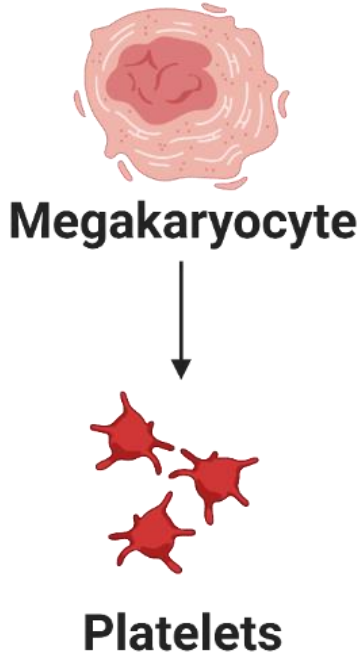


Figure 11-10 A megakaryocyte forming platelets.

Platelets Characteristics

- The normal concentration of platelets in the blood is between 150,000 and 450,000/ µL.
- Half-life in the blood of 8 to 12 days.
- Eliminated from the circulation mainly by the tissue macrophage (Spleen).

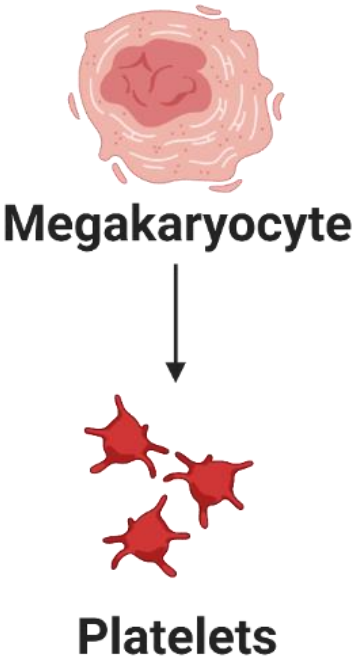


Platelets Cytoplasm

- They do not have nuclei.

- However they contain:

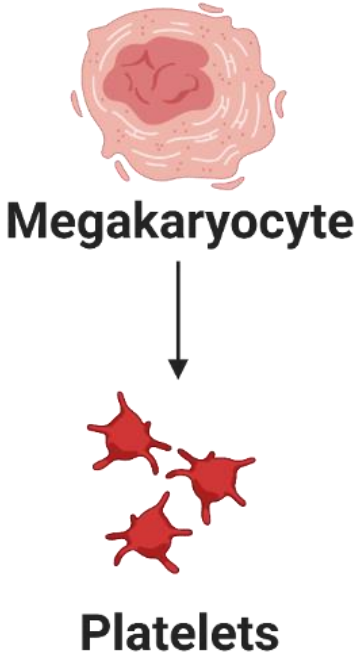
1. Contractile proteins: actin, myosin, and thrombosthenin.
2. Residuals of both the endoplasmic reticulum and the golgi apparatus.
3. Mitochondria (ATP).
4. Enzyme systems that synthesize prostaglandins.
5. Fibrin-stabilizing factor.
6. Vascular endothelial cells, vascular smooth muscle cells, and fibroblasts growth factors.



Platelets membrane

- There is a coat of glycoproteins that repulses adherence to normal endothelium and yet causes adherence to injured areas of the vessel wall.

- Contains large amounts of phospholipids that activate multiple stages in the blood-clotting process.



Platelets Thrombocytopenia

- Cutaneous and mucosal bleeding
- Easily bruising
- Petechiae
- Increased bleeding time

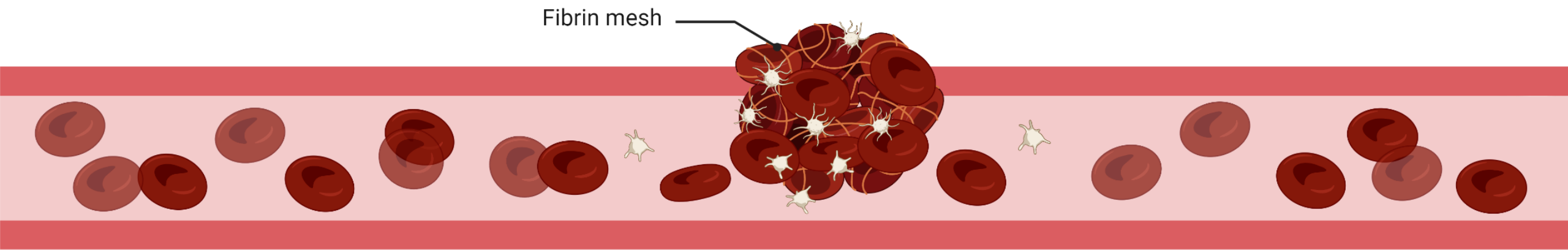
Thrombocytopenia



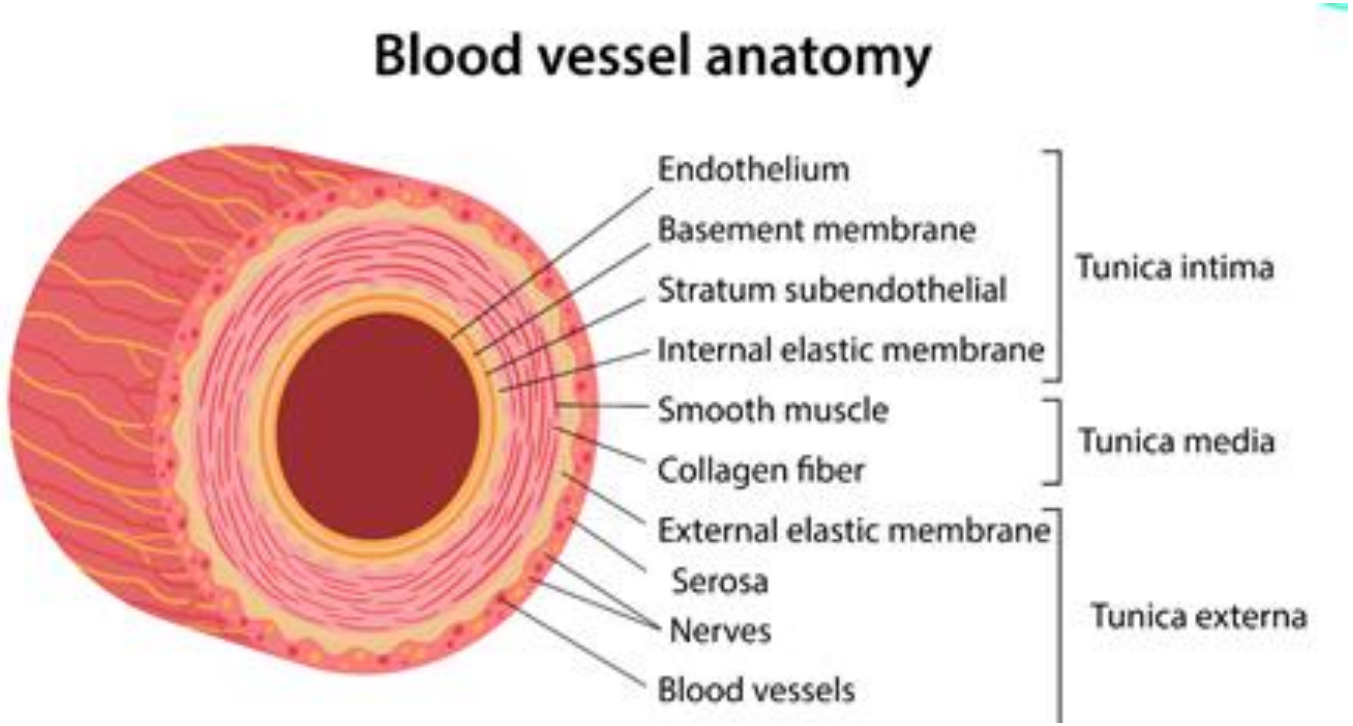


@MSD manual, pediatric UCI

Hemostasis



Hemostasis > Blood vessel anatomy

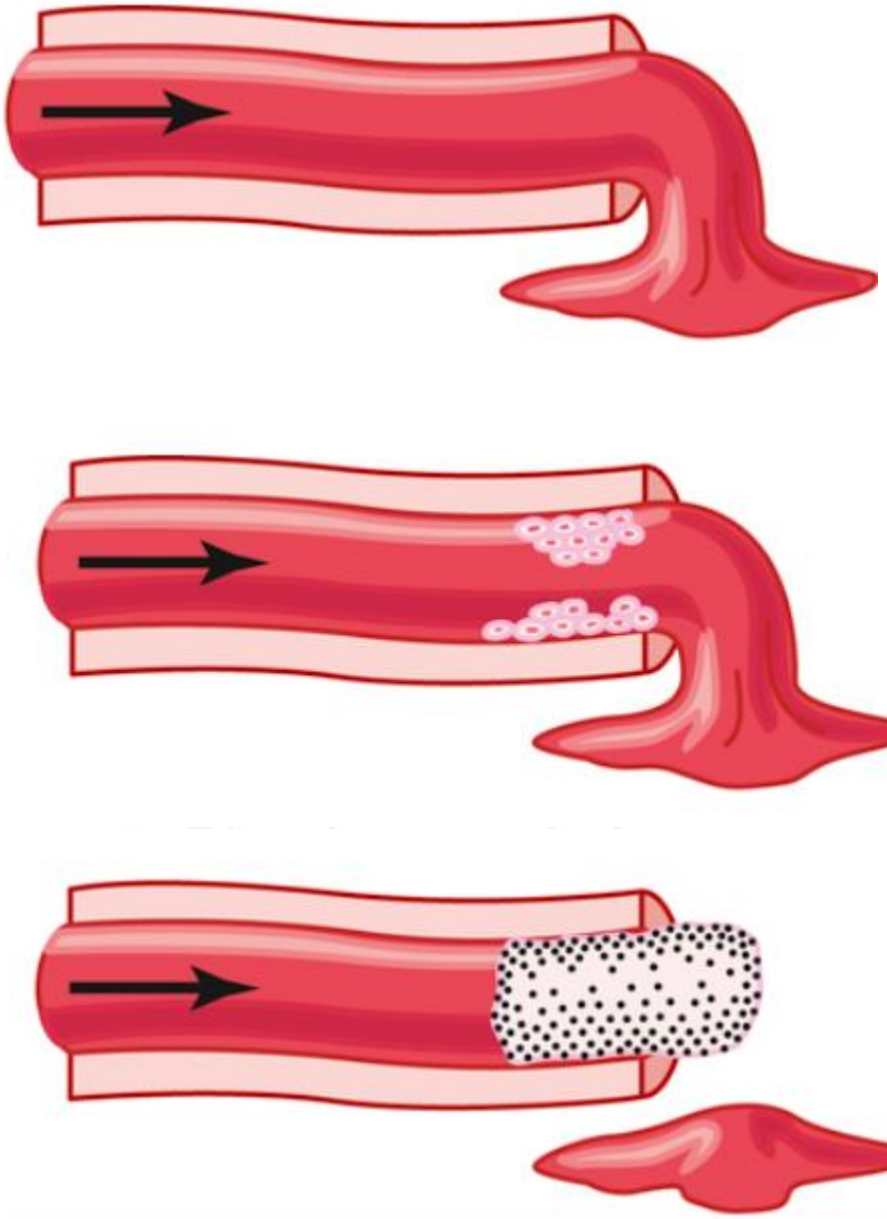


Hemostasis

Events of hemostasis

Hemostasis means prevention of blood loss and includes the following events:

(1) Vascular constriction.
(2) Formation of a platelet plug.
(3) Formation of a blood clot as a result of blood coagulation.
(4) Growth of fibrous tissue into the blood clot to close the hole in the vessel permanently.



Hemostasis 1. Vascular constriction

- Immediately → smooth muscle contraction.
- Reduces the flow of blood from the ruptured vessel.
- The contraction results from the following:

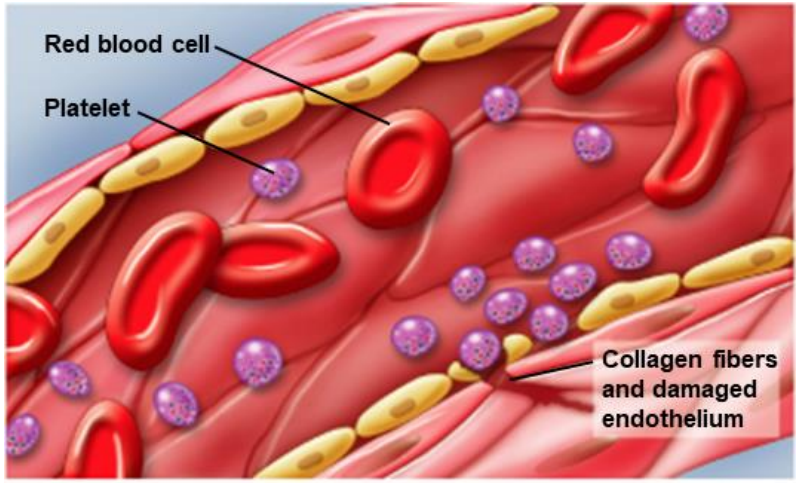
(1) local myogenic spasm

(2) local autacoid factors from the traumatized tissues, vascular endothelium, and blood platelets.

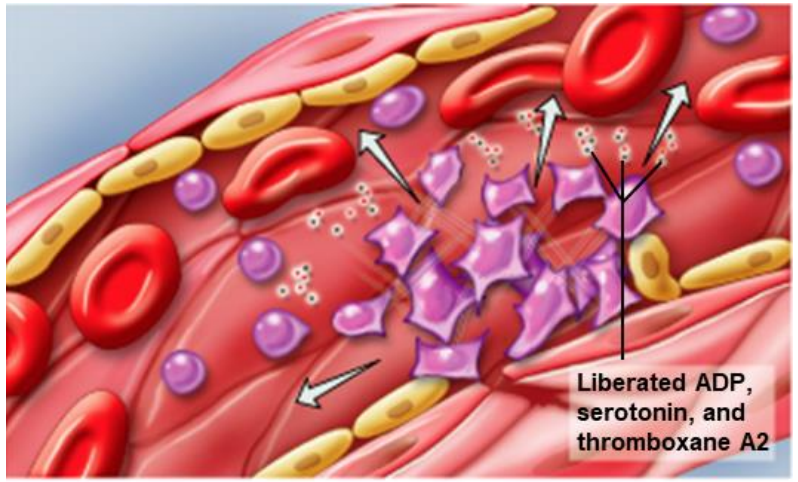
(3) nervous reflexes.

- The spasm can last for many minutes or even hours, during which time the processes of platelet plugging and blood coagulation can take place.

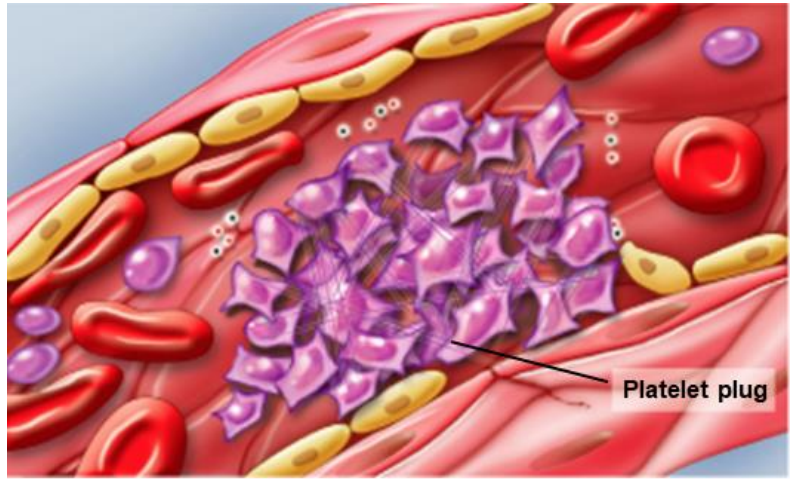
Hemostasis 2. Platelet plug formation



1 Platelet adhesion



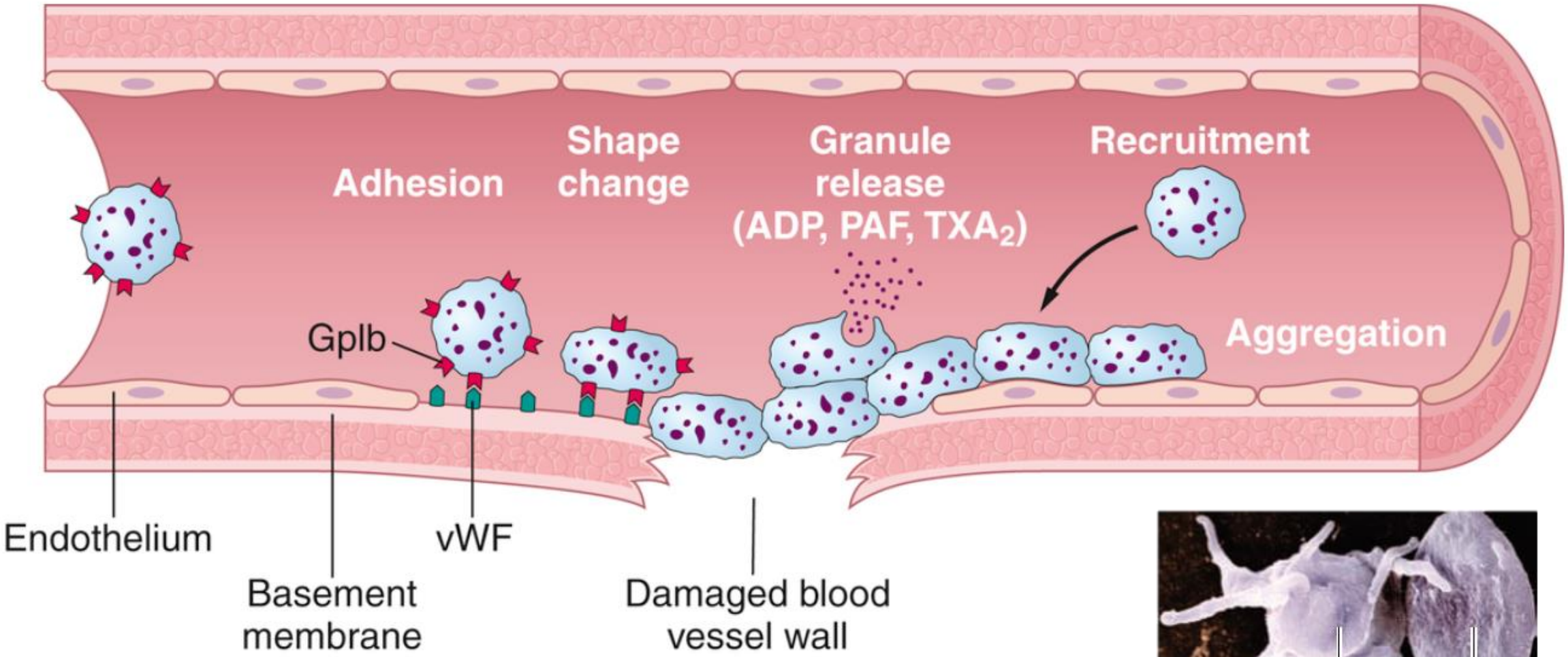
2 Platelet release reaction



3 Platelet aggregation

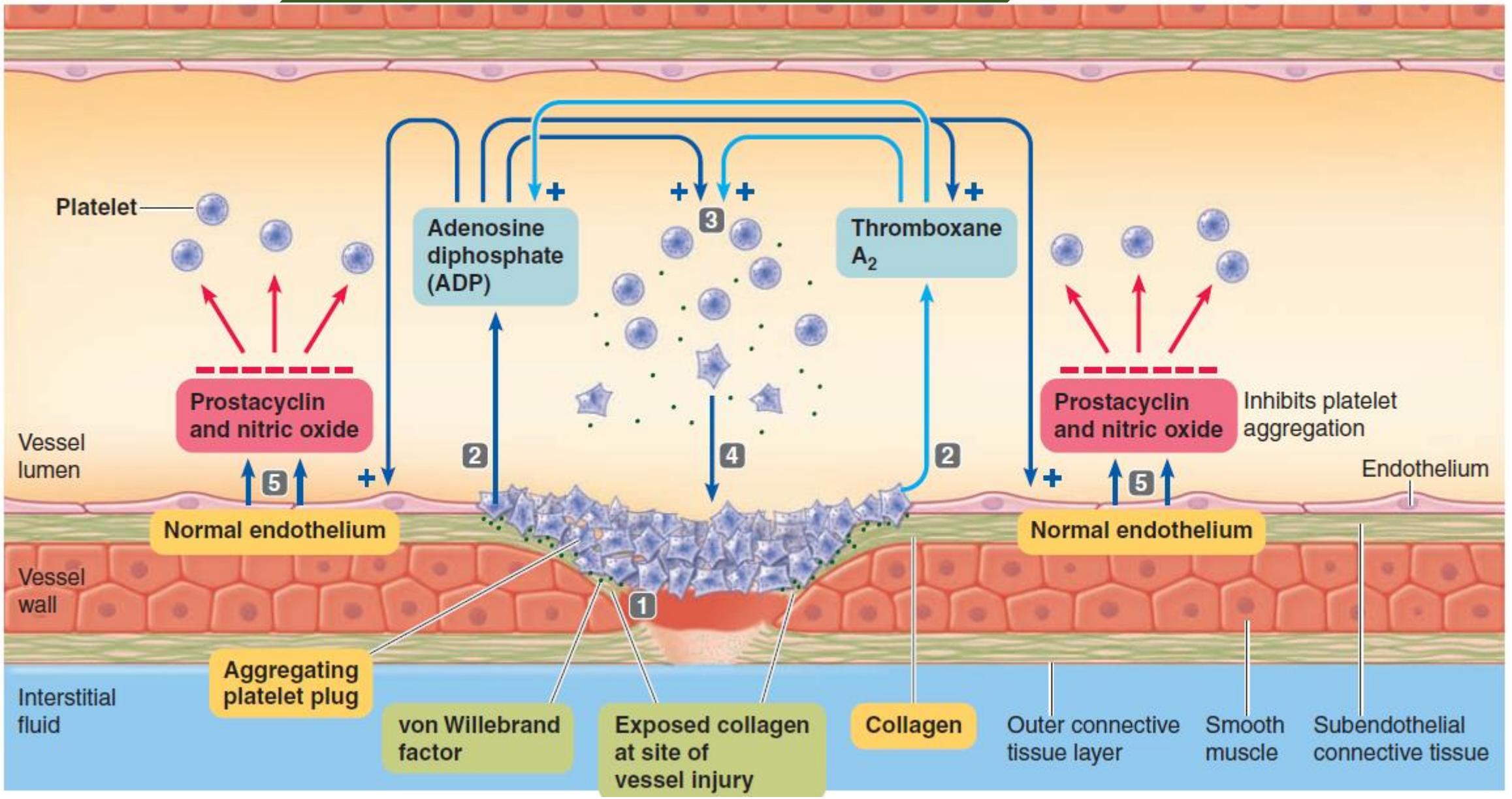
Hemostasis

2. Platelet plug formation



Hemostasis

Control of platelet plug



Hemostasis 2. Platelet plug formation

The aggregated platelet plug not only **physically seals** the break in the vessel but also performs three other important roles:

(1) The actin–myosin complex within the aggregated platelets **contracts** to **compact and strengthen** the plug.

(2) The platelet plug releases several powerful **vasoconstrictors** that induce **profound** constriction.

(3) The platelet plug releases other chemicals that **enhance blood coagulation.**

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2. Lauralee Sherwood. Human Physiology: From Cells To Systems (9th Edition).
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4. Uptodate.com