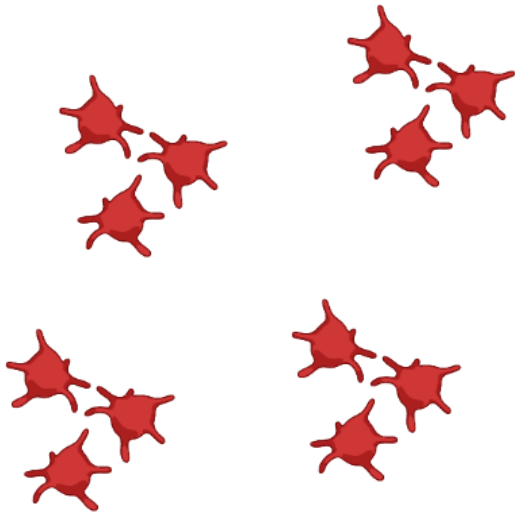
The background of the slide is a light pink color, densely populated with various blood cells. There are numerous red blood cells, depicted as red, biconcave discs. Interspersed among them are several white blood cells, shown as larger, spherical cells with purple or blue nuclei and granules. Small, yellow, oval-shaped platelets are also scattered throughout the field. The overall appearance is that of a microscopic view of a blood smear.

Hematology

Physiology

Fatima Daoud, MD, PhD.

Platelets (Thrombocytes)

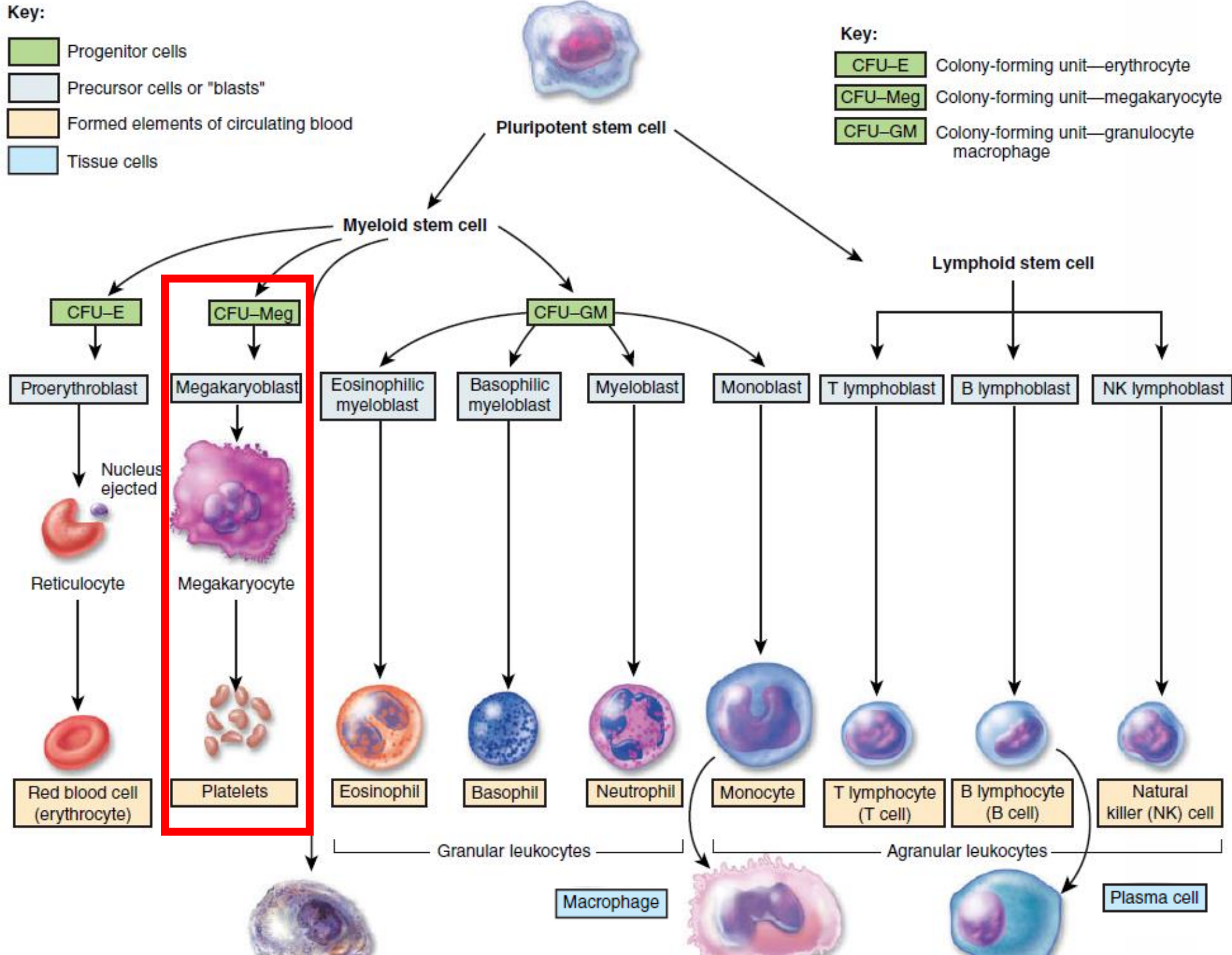


Key:

- 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



Platelets

Overview

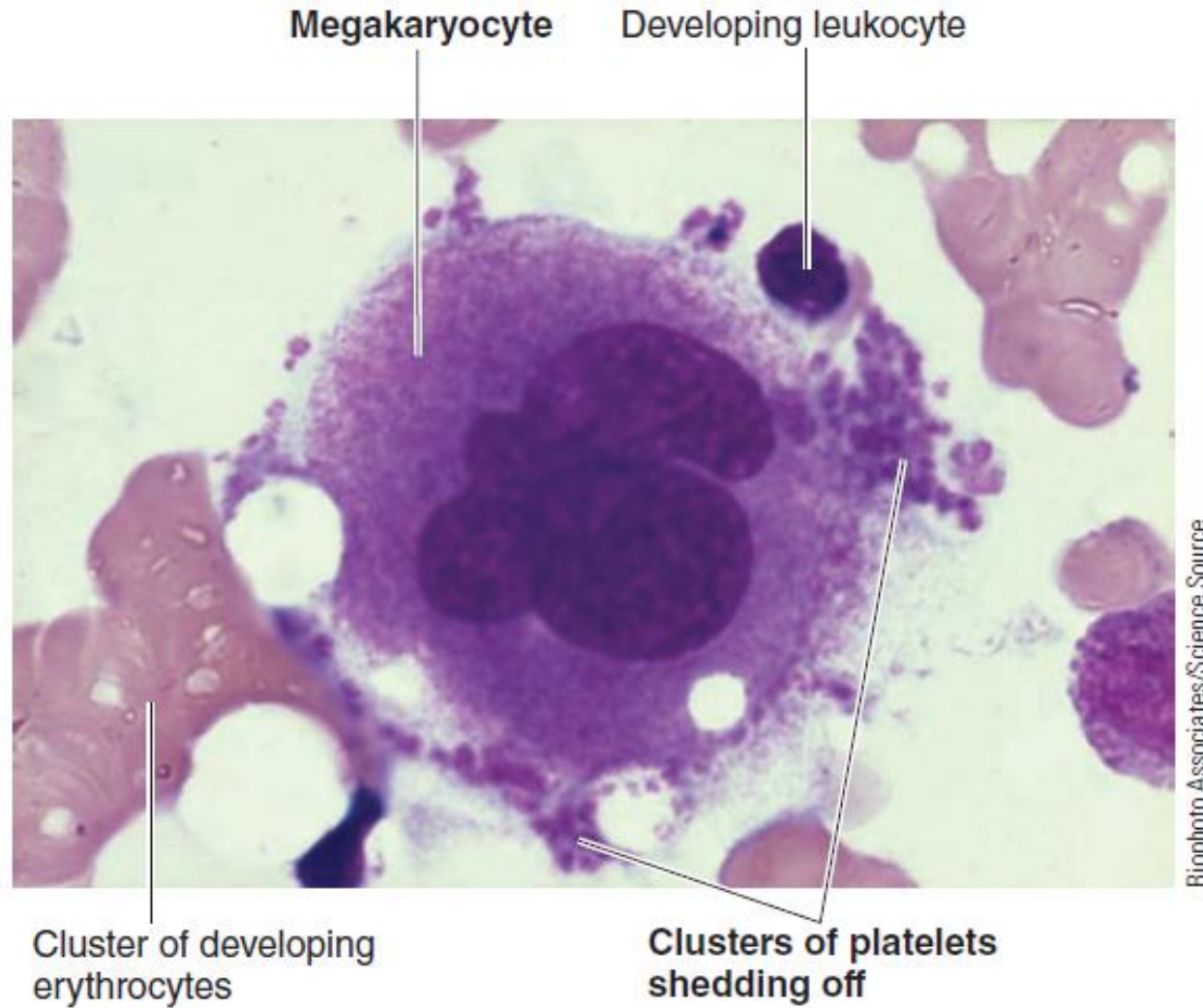
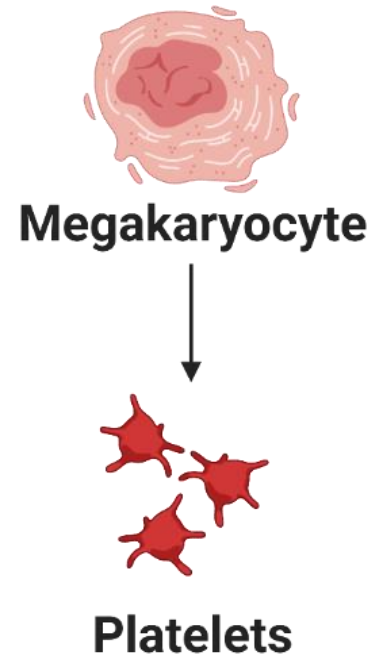


Figure 11-10 A megakaryocyte forming platelets.

Platelets

Characteristics

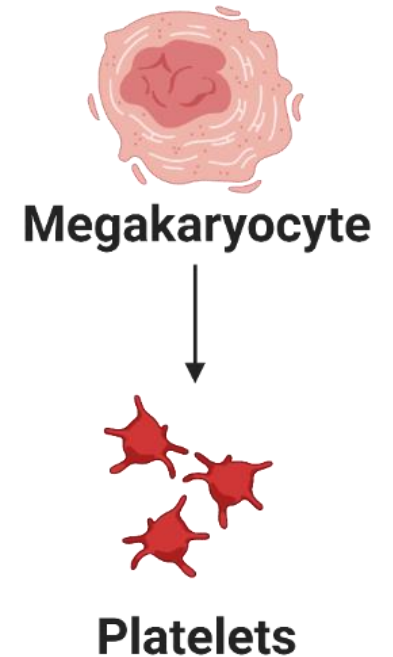
- The normal concentration of platelets in the blood is between 150,000 and 450,000/ μL .
- Half-life in the blood of 8 to 12 days.
- Eliminated from the circulation mainly by the tissue macrophage (Spleen).



Platelets

Cytoplasm

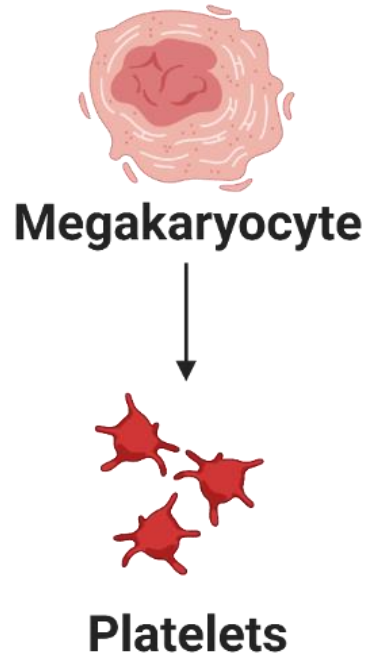
- They do not have nuclei.
- However they contain:
 1. Contractile proteins: actin, myosin, and thrombosthenin.
 2. Residuals of both the endoplasmic reticulum and the golgi apparatus.
 3. Mitochondria (ATP).
 4. Enzyme systems that synthesize prostaglandins.
 5. Fibrin-stabilizing factor.
 6. Vascular endothelial cells, vascular smooth muscle cells, and fibroblasts growth factors.



Platelets

membrane

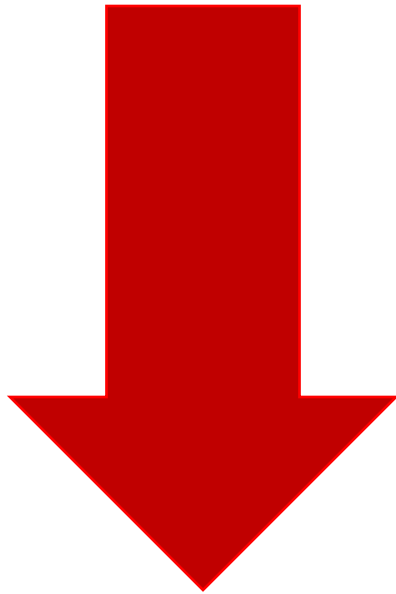
- There is a coat of glycoproteins that repulses adherence to normal endothelium and yet causes adherence to injured areas of the vessel wall.
- Contains large amounts of phospholipids that activate multiple stages in the blood-clotting process.



Platelets

Thrombocytopenia

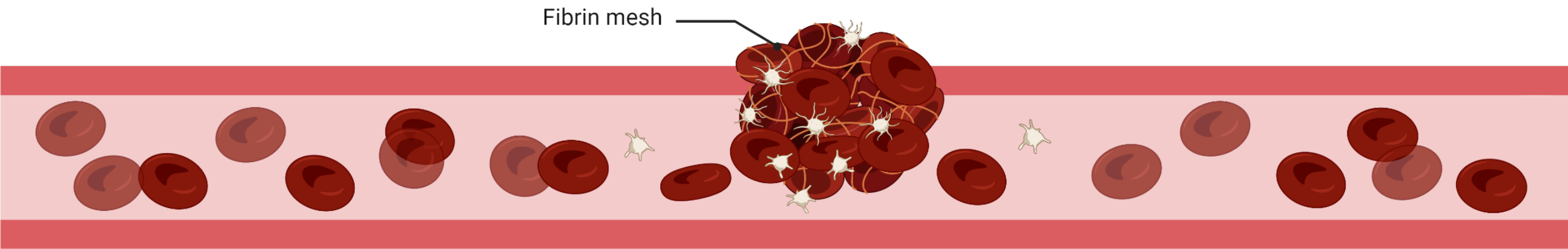
- Cutaneous and mucosal bleeding
- Easily bruising
- Petechiae
- Increased bleeding time



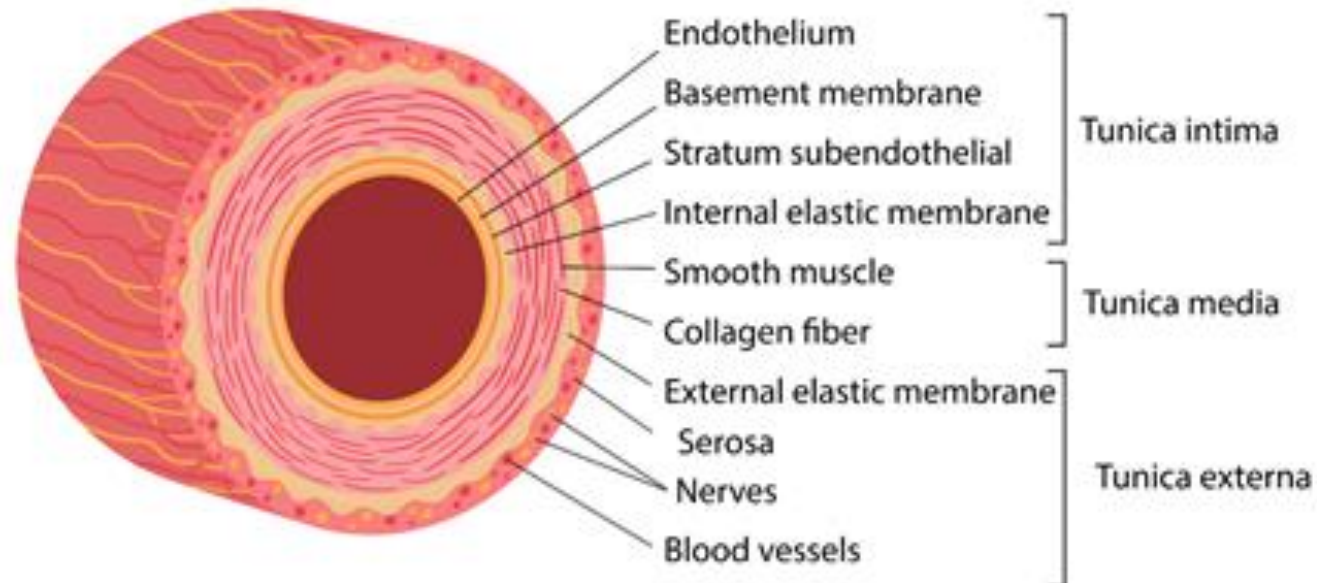
Thrombocytopenia



Hemostasis



Blood vessel anatomy

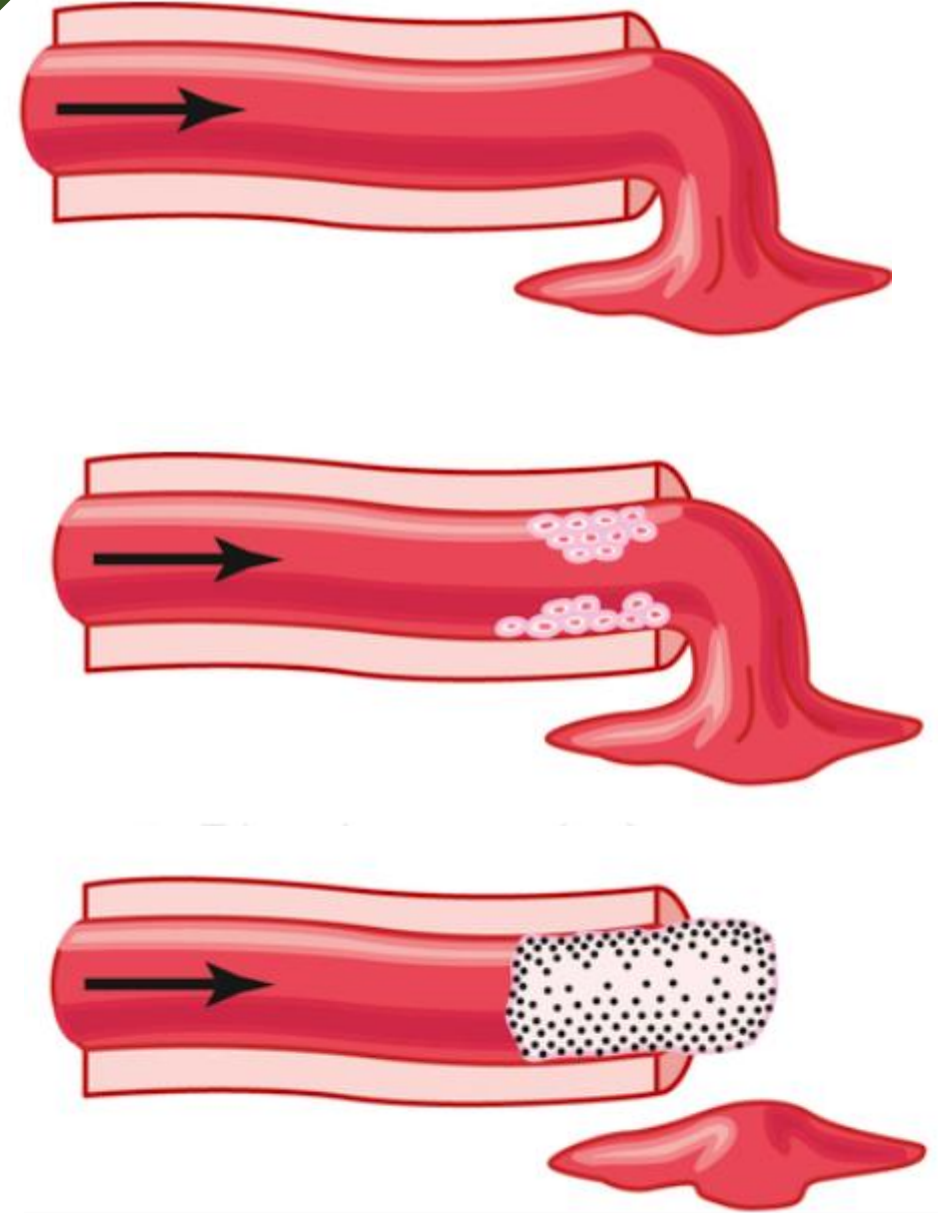


Hemostasis

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.



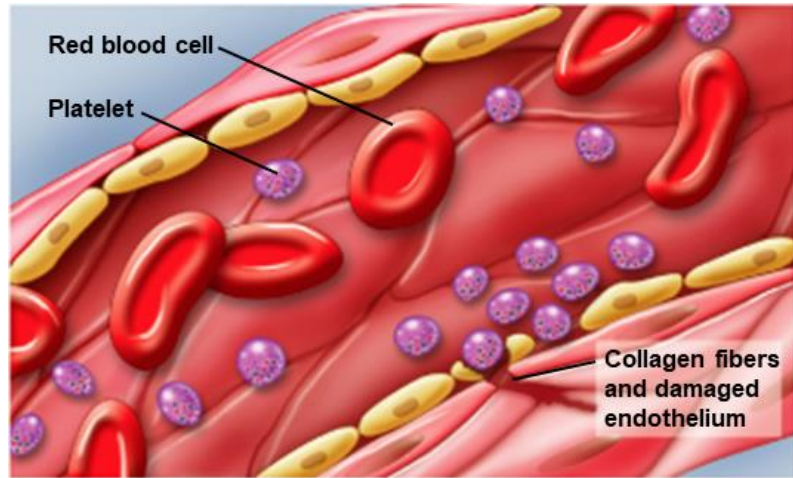
Hemostasis

1. Vascular constriction

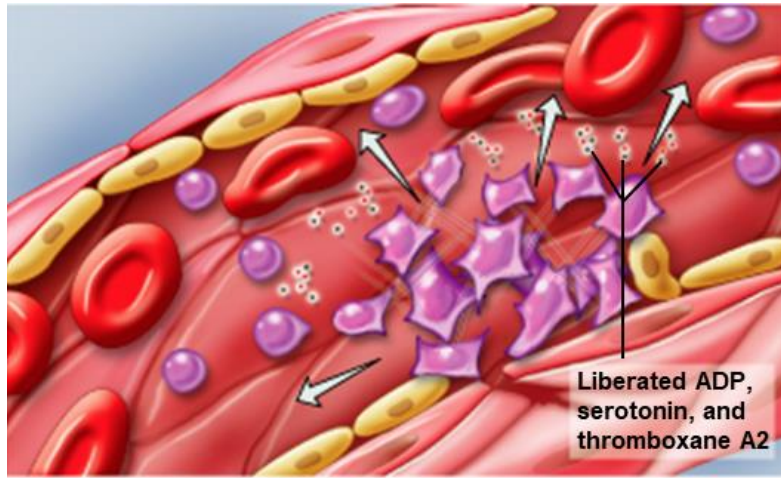
- Immediately → smooth muscle contraction.
- Reduces the flow of blood from the ruptured vessel.
- The contraction results from the following:
 - (1) local myogenic spasm**
 - (2) local autacoid factors from the traumatized tissues, vascular endothelium, and blood platelets.**
 - (3) nervous reflexes.**
- 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

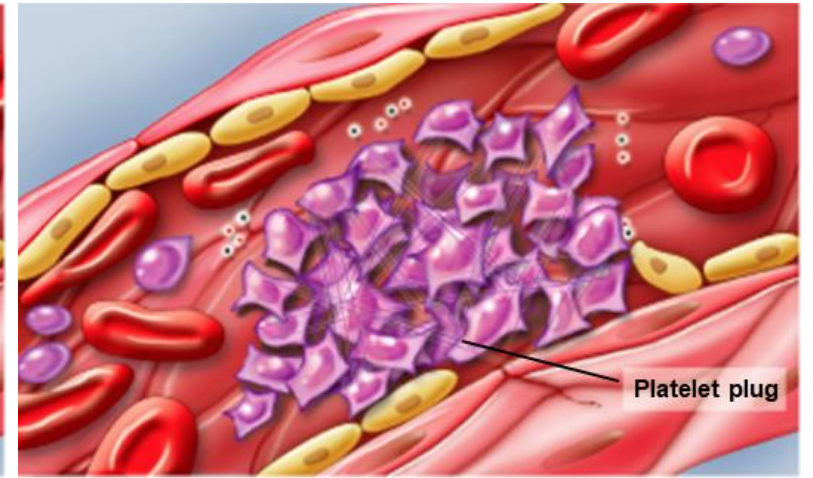
2. Platelet plug formation



1 Platelet adhesion



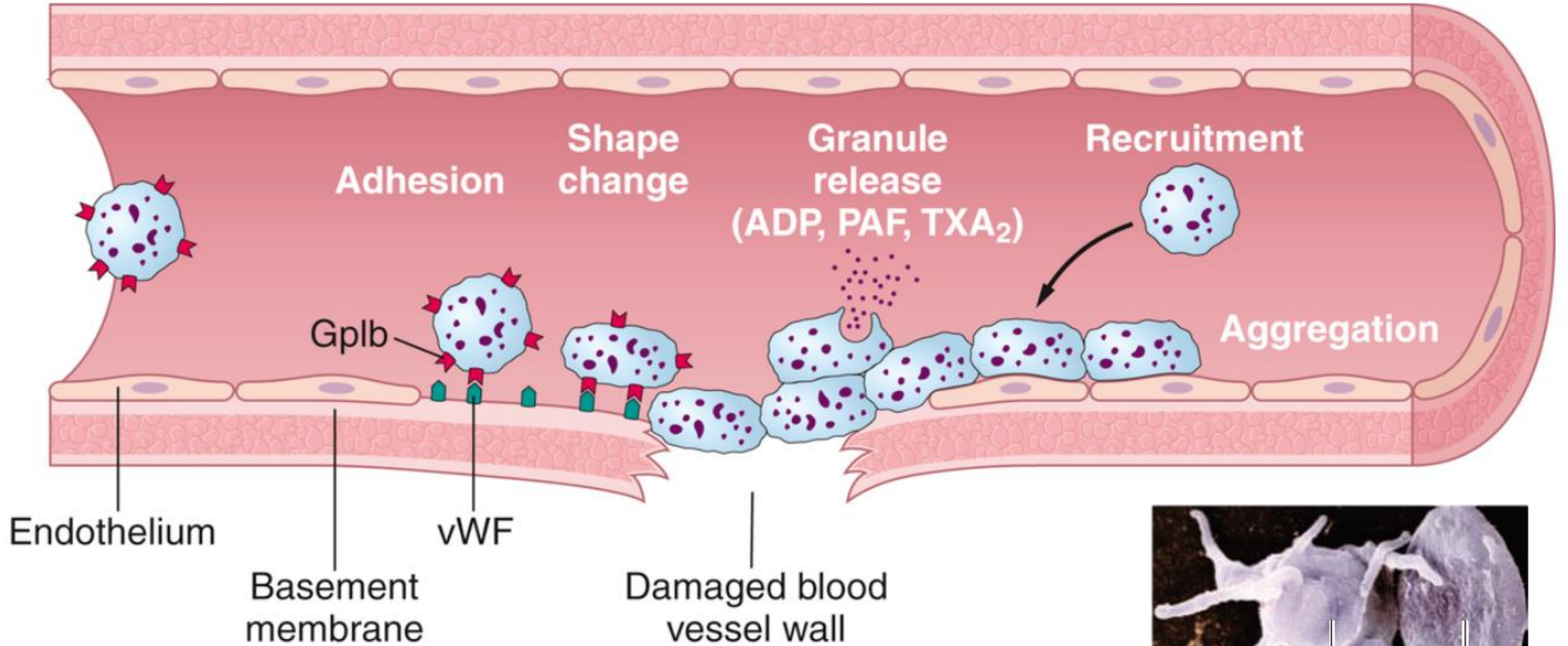
2 Platelet release reaction



3 Platelet aggregation

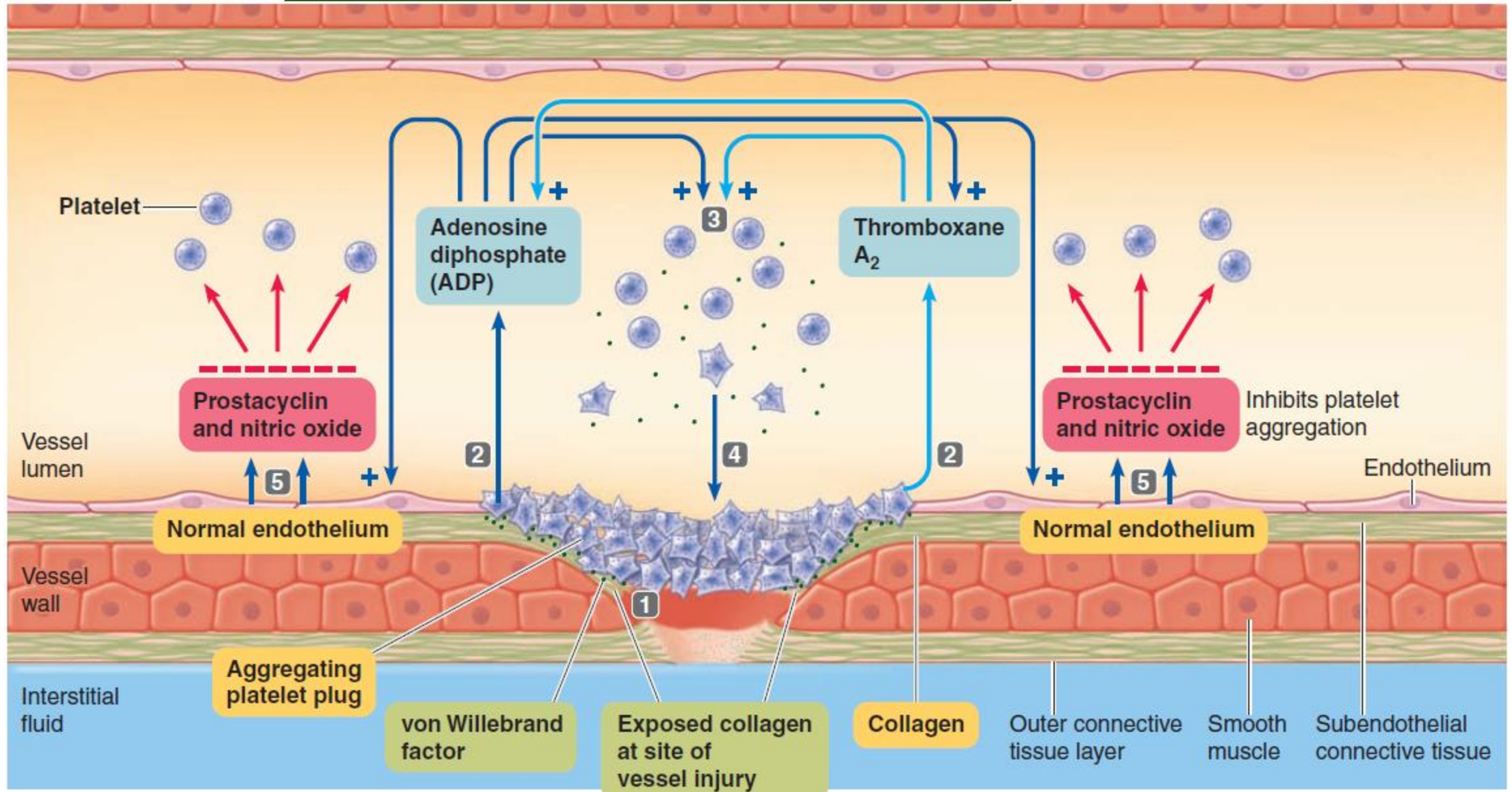
Hemostasis

2. Platelet plug formation



Hemostasis

Control of platelet plug



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**.

References

1. **Hall, John, E. and Michael E. Hall. Guyton and Hall Textbook of Medical Physiology (14th Edition).**
2. Lauralee Sherwood. Human Physiology: From Cells To Systems (9th Edition).
3. Gerard J. Tortora and Bryan Derrickson. Principles Of Human Anatomy & Physiology (15th Edition)
4. Uptodate.com