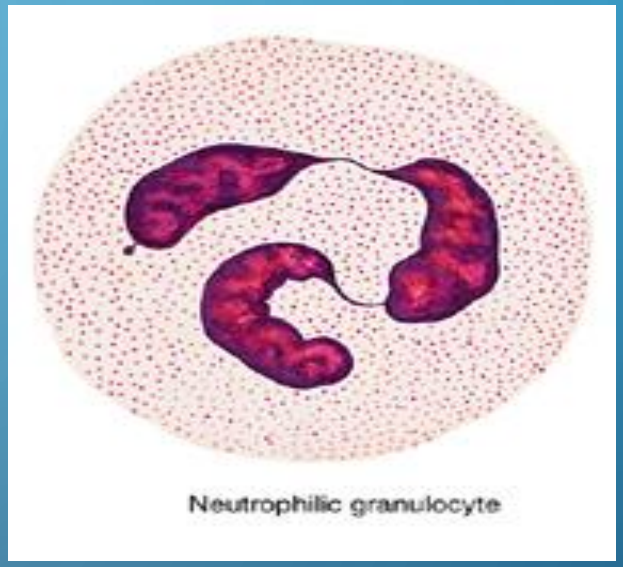
MEDICAL BIOLOGY

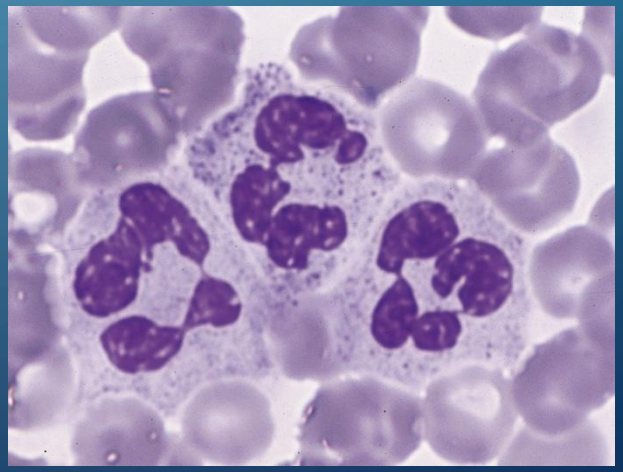
NEUTROPHILS:

- Are called also polymorphonuclear leukocytes,

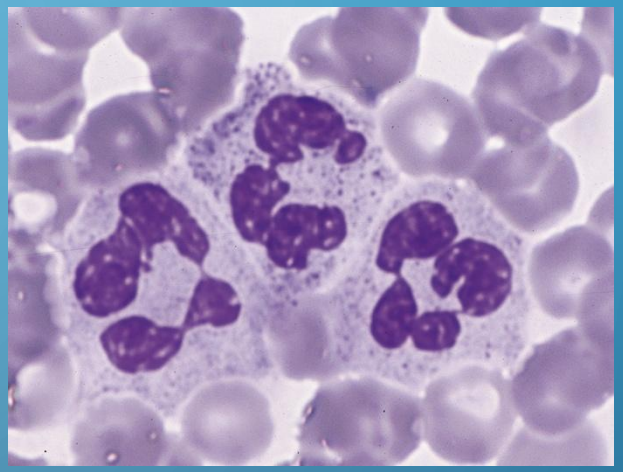
- they constitute about 60-70% of the circulating leukocytes,

- their nucleus consist of 2-5 lobes (usually 3) linked together by fine chromatine thread.

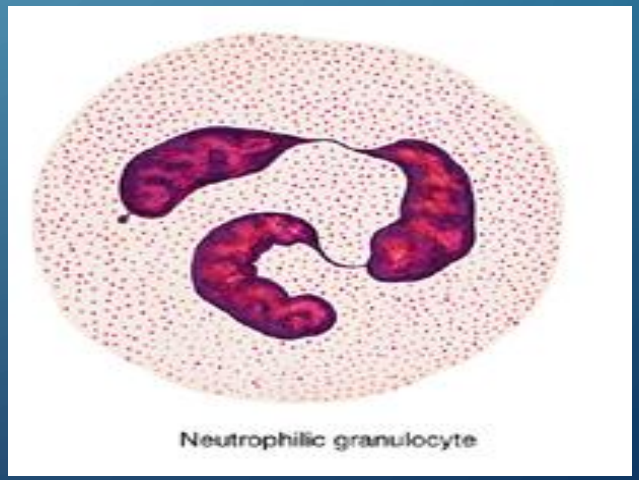




- These cells circulate in the blood in a resting state but with appropriate activation they leave the blood and enter the tissues where they become highly motile, phagocytic cells and their primary function is to ingest and destroy the invading organisms.

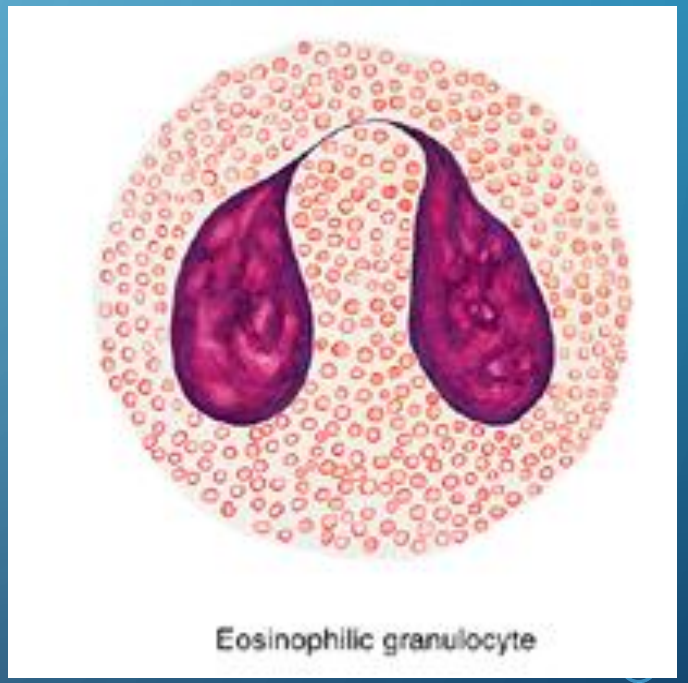


- Once neutrophils perform their function of killing microorganisms they die, resulting in the formation of pus, the accumulation of dead WBC with bacteria and tissue fluid.



EOSINOPHILS:

- they form only 2-4% of total WBC count.
- They have a characteristic bilobed nucleus.
- Their main feature is the presence of many large & elongated granules that are eosinophilic.
- Number of eosinophils increase greatly in many types of parasitic infestations & the protection against the parasitic disease is one of their major functions. They also increase in allergic states.

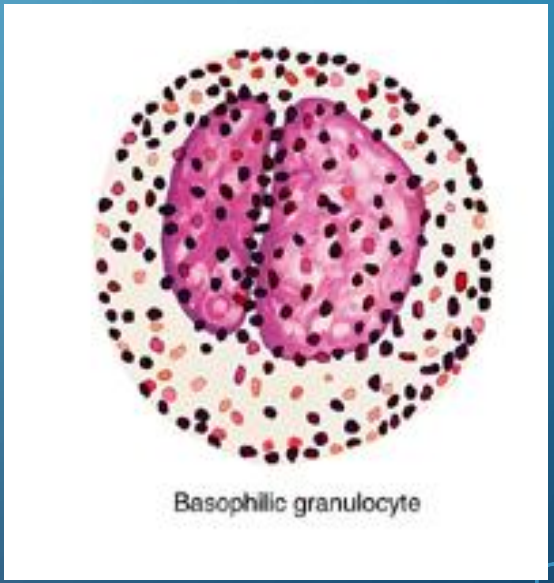


BASOPHILS:

- Constitute less then 1% of the total WBC count,

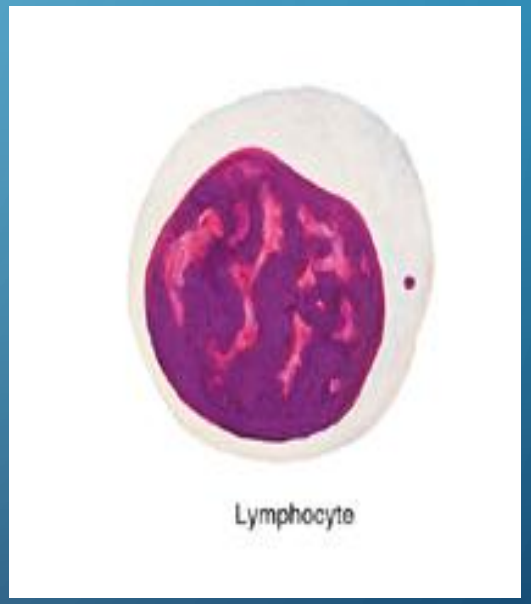
- They have a cytoplasmic granules that are large and intensely basophilic they are irregular in size & shape contain histamine (vasodilator) and heparin (anticoagulant).

- By migrating into connective tissues, basophils appear to transiently supplement the functions of mast cells. Like mast cells, basophils have surface receptors for immunoglobulin E (IgE) and secrete heparin and histamine in response to various antigens and allergens.


Basophilic granulocyte

LYMPHOCYTES:

- Are groups of spherical cells with similar morphological characters,
- they have an ovoid nucleus,
- the cytoplasm of the cell is scanty and can be seen as a thin rim around the nucleus.
- Lymphocytes make up 20-25% of WBCs.



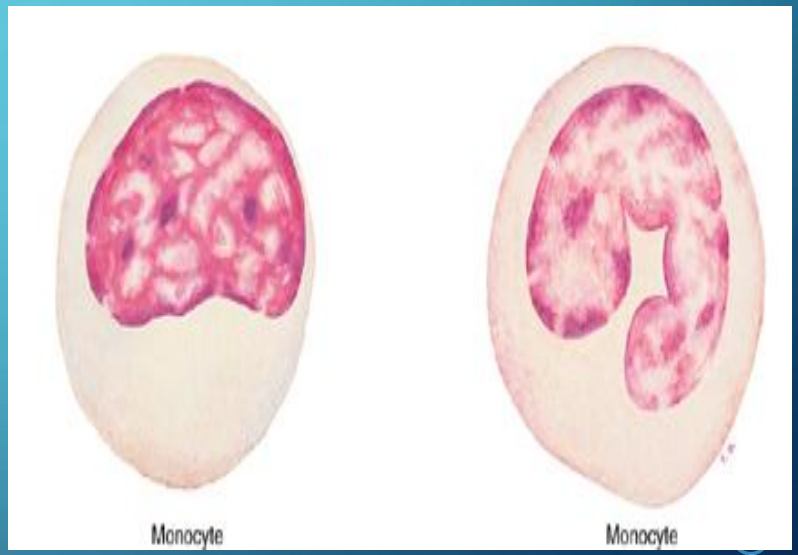
- Major classes include:
- B lymphocytes,
- helper and cytotoxic T lymphocytes (CD4+ and CD8+, respectively), and
- natural killer (NK) cells.
- These and other types of lymphocytes have diverse roles in immune defenses against invading microorganisms and certain parasites or abnormal cells.
- The B cells produce antibodies that are used to attack invading bacteria, viruses, and toxins. The T cells destroy the body's own cells that have themselves been taken over by viruses or become cancerous.

- Activation of B lymphocytes after an immune response to a foreign particle leads to their differentiation into plasma cells.

- Plasma cells are large cells with eccentric rounded nucleus, and they are responsible for active synthesis of immunoglobulins. Plasma cells are seen in small population in lymphoid organs.

MONOCYTES:

- Are spherical cells with oval or kidney shaped nucleus which is often placed eccentrically.
- Their cytoplasm is basophilic.
- Monocytes can live in the blood for 8 hours, after which they move in to the connective tissue, where they may remain for a few months or longer.
- Blood monocytes are the precursor cells of tissue macrophages and other cells of the mononuclear phagocytic system such as kupffer cells in the liver, pulmonary and alveolar macrophages.
- They constitute 3-8% of the blood leukocytes.



"Never Let Monkeys Eat Banana"

(60,30,6,3,1)

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Neutrophils - 60%

Lymphocytes - 30%

Monocytes - 6%

Eosinophils - 3%

Basophils - 1%

Increase in differential WBC count,

Pharmacology Guru
Learning Institute

Tell us :

TYPES OF WBC

- **Granulocytes**
  - **Neutrophil** → **Bacterial** infection
  - **Eosinophil** → **Parasite** infection, **Allergy** & **Asthma**
  - **Basophil** → **Chronic** Inflammation
- **Agranulocytes**
  - **Monocyte** → **Inflammation** and Infection
  - **Lymphocyte** → **Viral** infection

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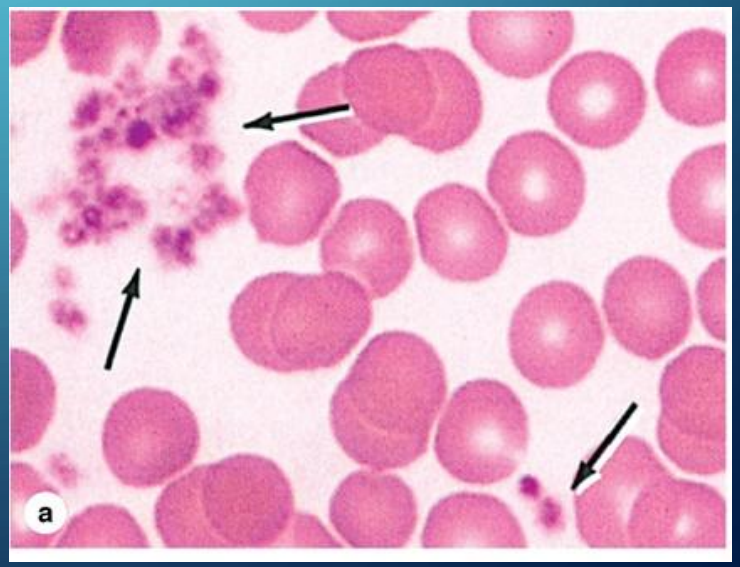
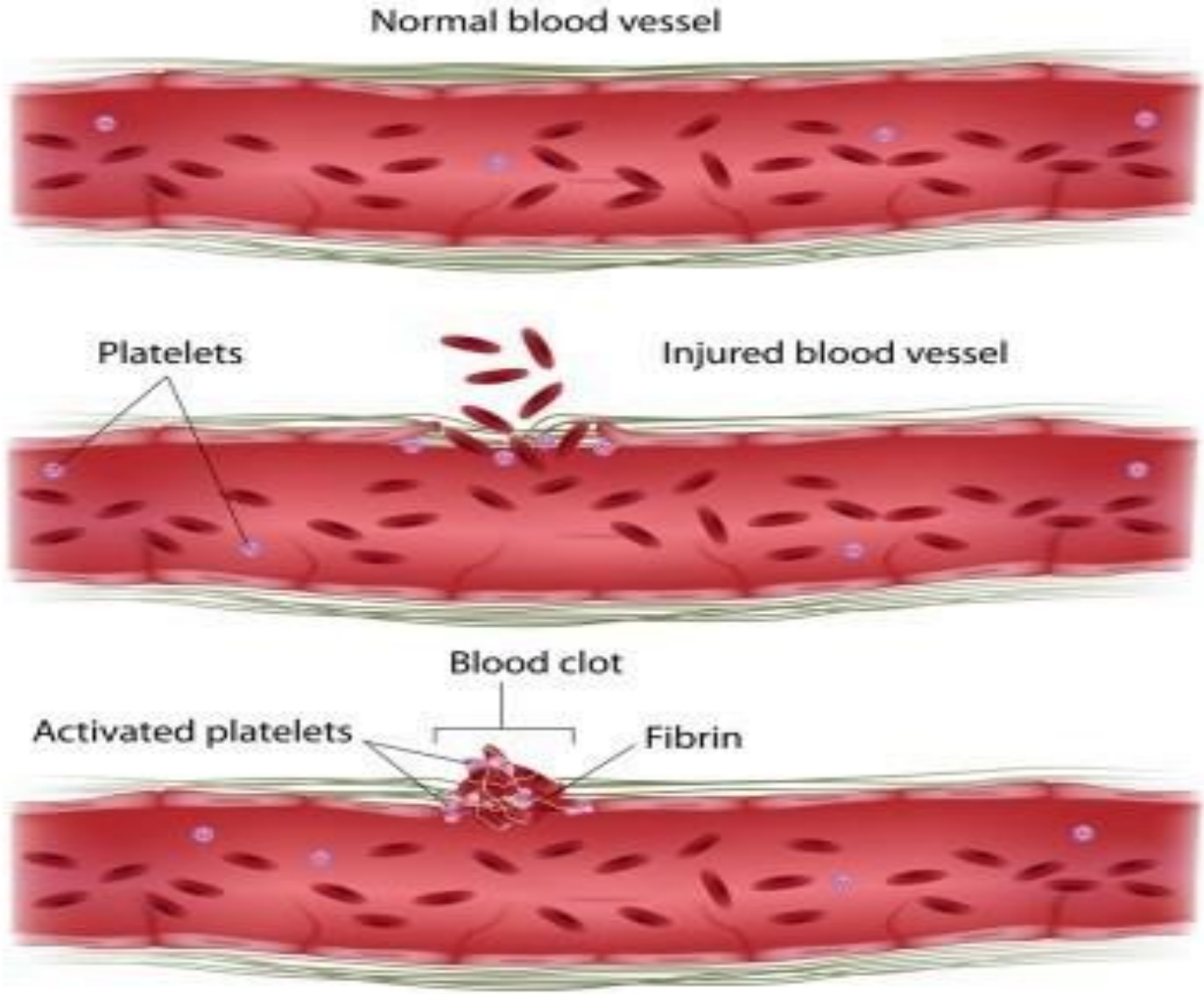
PLATELETS (THROMBOCYTES):

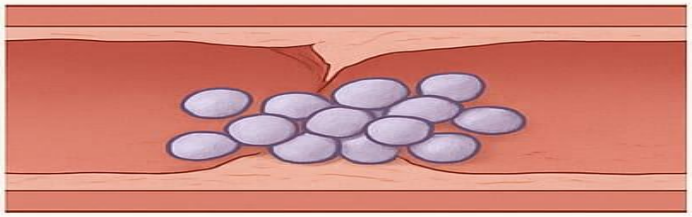
- Are non-nucleated, small, disk like cells formed from fragmentation of a giant cell in the bone marrow called megakaryocytes. Platelets will promote blood clotting & help in repairing gaps in the wall of blood vessels. They have a life span of only 10 days.
- (150-400 $\times 10^3/mm^3$)



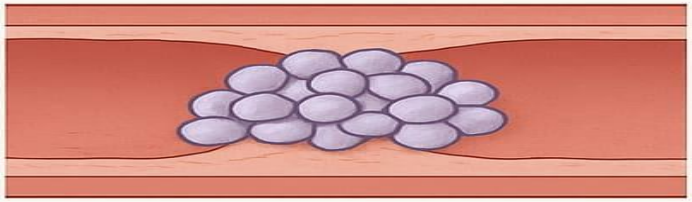
BLOOD CLOTTING:



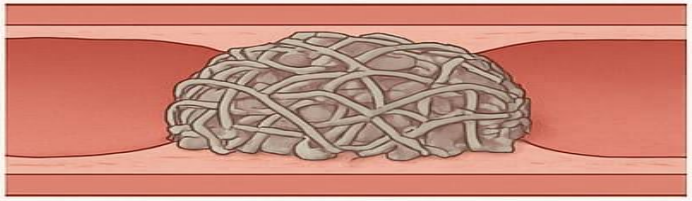
Primary aggregation
Disruptions in the microvascular endothelium, which are very common, allow the late- to form a platelet plug

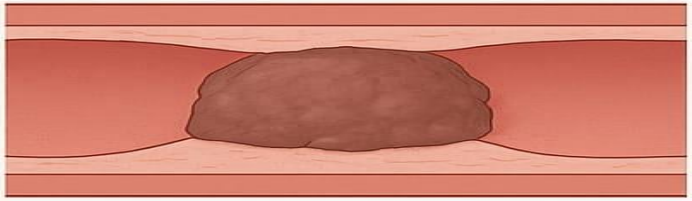


Secondary aggregation
Platelets in the plug increase the size of the plug

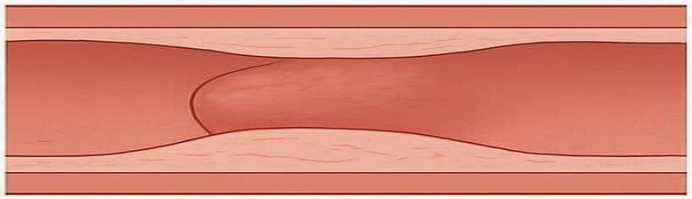


Blood coagulation
During platelet aggregation, fibrinogen from plasma, von Willebrand factor and other proteins released from the damaged endotheljum, and platelet promote the sequential interaction (cascade) of plasma proteins, giving rise to a fibrin polymer that forms a three-dimensional network of fibers trapping RBCs and more platelets to form a blood clot, or thrombus.

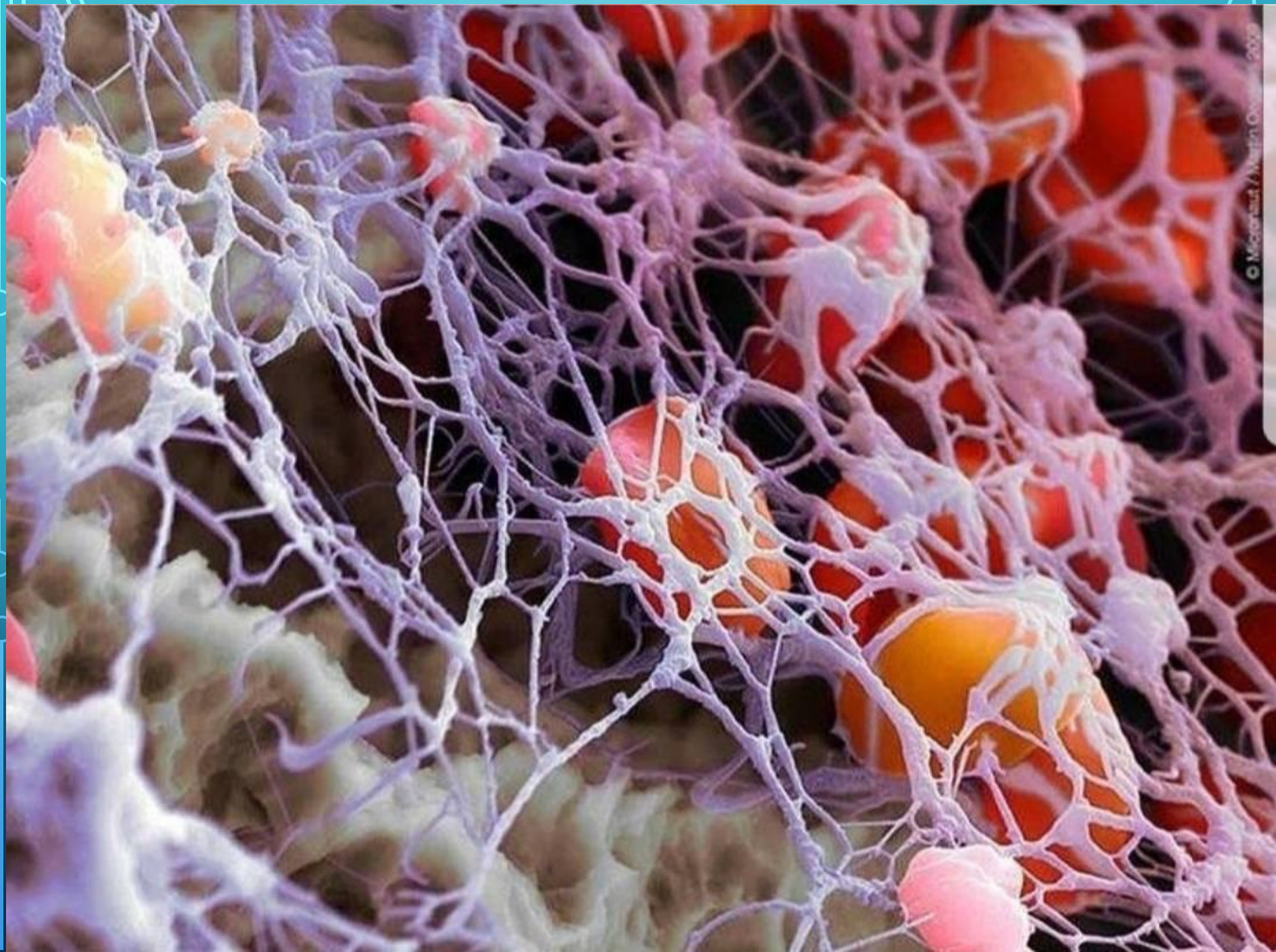




Clot retraction
The clot initially bulges into the blood vessel lumen, but soon contracts slightly



Clot removal
Protected by the clot, the endothelium and surrounding tunic are restored by new tissue, and the clot is then removed, mainly dissolved by the proteolytic enzyme plasmin, which is formed continuously through the local action of plasminogen a-



DISORDERS RELATED TO PLATELETS:

- Thrombocythaemia
- Thrombocytopenia

THANK YOU