



Kazakhstani Medical  
University

## Topic: Platelet granules

Finished: Keldibek D  
She checked

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# Plan:

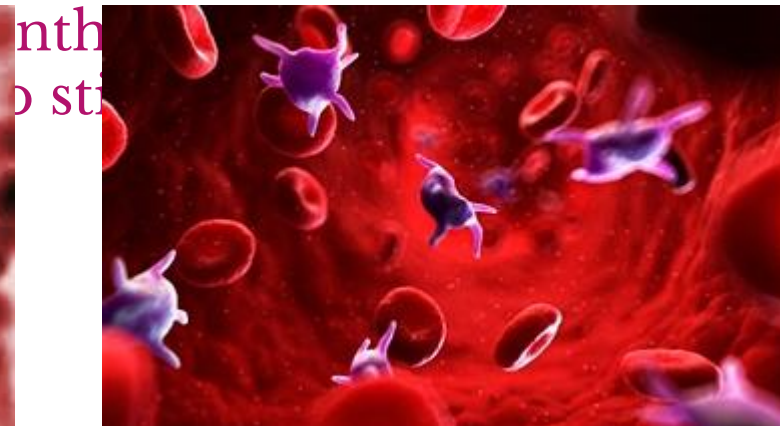
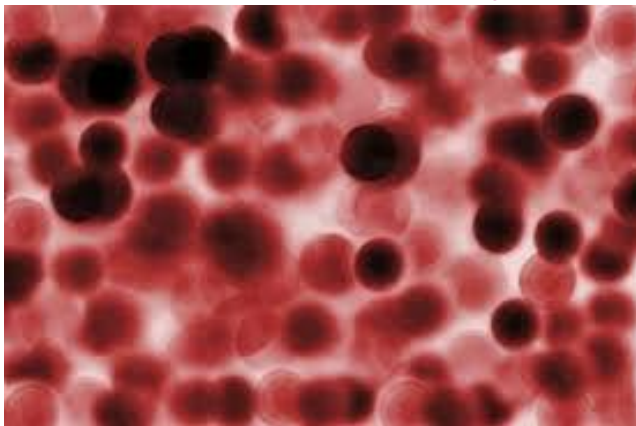
- I. What platelets? Define:
- II. Platelet structure:
- III. Functions:
- IV. Disease:
- V. Treatment:
- VI. Conclusion:
- VII. Literature:

# What platelets? Define:

Platelets, also called thrombocytes (thromb- + -cyte, "blood clot cell"), are a component of blood whose function (along with the coagulation factors) is to stop bleeding by clumping and clotting blood vessel injuries. Platelets have no cell nucleus: they are fragments of cytoplasm that are derived from the megakaryocytes of the



- ▶ A feature of the platelet is its ability to activate - the quick and usually irreversible transition to a new state. Activation stimulus may be virtually any disturbance of the environment, down to simple mechanical stress. However, the major physiological activators of platelets are considered to be collagen (the main protein of the extracellular matrix), thrombin (the main protein of plasma coagulation), ADP (adenosine diphosphate, emerging from the destroyed vessel cells or secreted by the platelets) and thromboxane A<sub>2</sub>



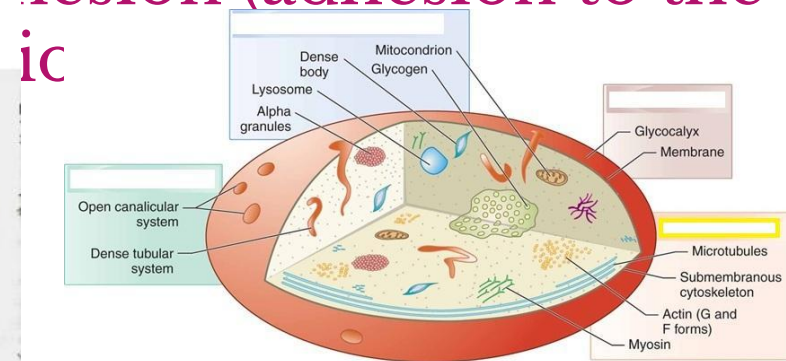
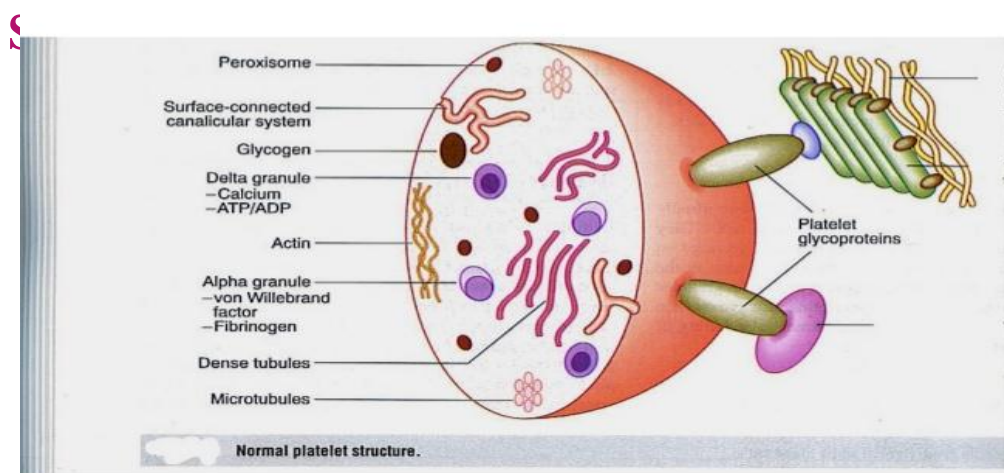
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- ▶ In normal platelet membrane does not support the clotting reaction. Negatively charged phospholipids, particularly phosphatidylserine, centered on the inner layer of the membrane, and the outer layer connects phosphatidylcholine clotting factors worse. Despite the fact that certain clotting factors and can communicate with the non-activated platelets, it does not lead to the formation of active enzyme complex. Platelet activation presumably leads to the activation of the enzyme skramblazy which starts quickly, specific, bilateral and ATP-independently to transfer the negatively charged phospholipids from one layer to another. The result is the establishment of the thermodynamic equilibrium in which the concentration of phosphatidylserine in both layers aligned. Furthermore, activation occurs when exposure and / or a conformational change in many transmembrane outer

# Platelet

## structure:

- ▶ Platelets are discoid form with a diameter of 2 to 5 microns, the amount of 5 to 10 mm<sup>3</sup>. The platelet distinguish several zones: the peripheral, sol-gel, intracellular organelles. On the outer surface of the peripheral zone is up to 50 nm thick cover containing plasma coagulation factors, enzymes, receptors, necessary for platelet activation, their adhesion (adhesion to the





# Functions

Platelets serve  
two major  
functions

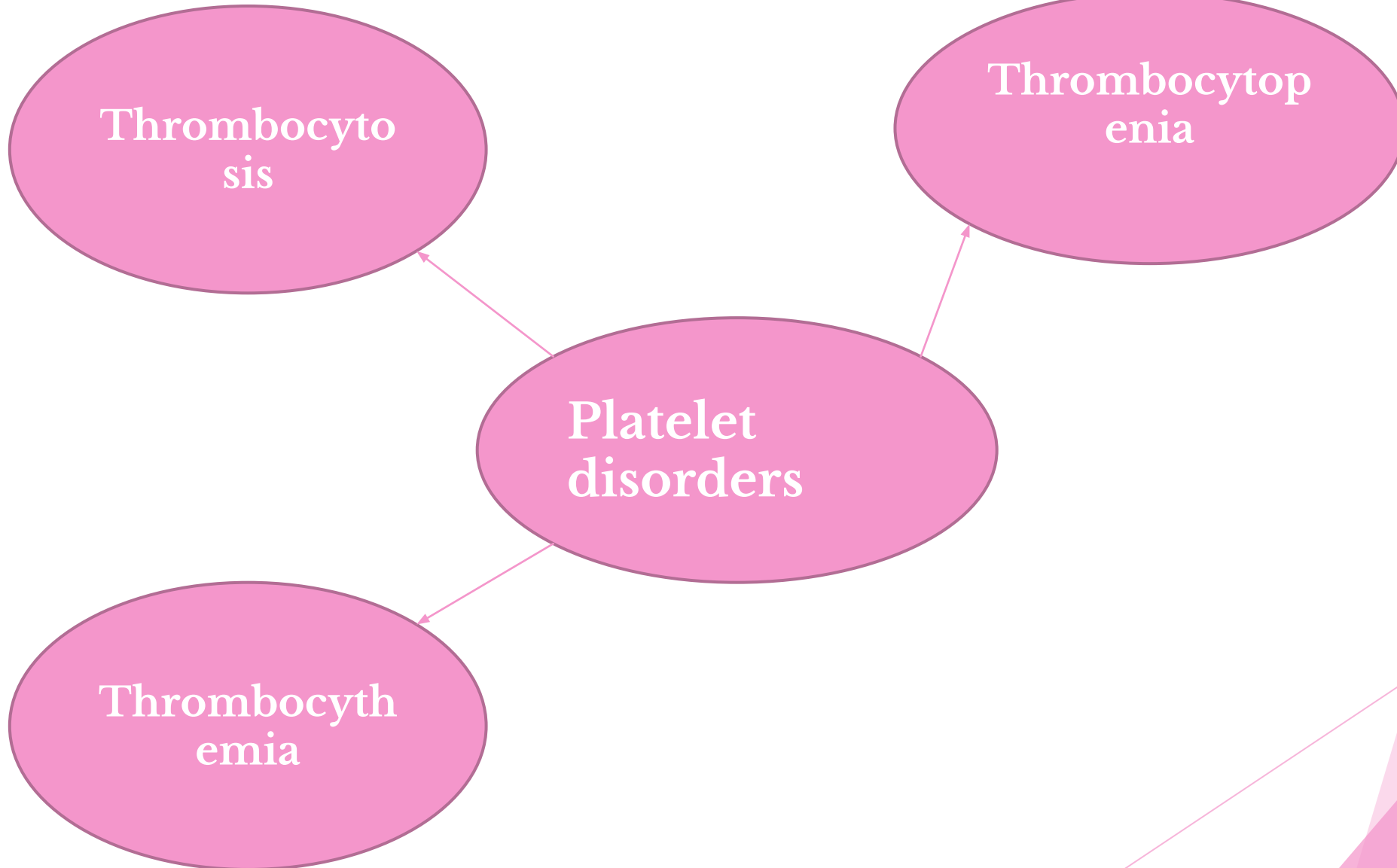
the formation of a  
platelet unit, a  
primary stopper  
closing position of  
the vessel damage

of the surface to  
accelerate the key  
reactions of plasma  
coagulation

- ▶ Relatively recently it found that platelets also play a vital role in the healing and regeneration of damaged tissue, separating himself from the damaged tissue growth factors that stimulate the division and growth of damaged cells. Growth factors are polypeptide molecules of different structure and purpose. The most important growth factors include platelet-derived growth factor (PDGF), transforming growth factor (TGF- $\beta$ ), vascular endothelial growth factor (VEGF), epithelial growth factor (EGF), fibroblast growth factor (FGF), insulin-like growth factor (IGF). The physiological plasma concentration of platelets -  $180-360 \times 10^9$  platelets per liter. Reducing the number of platelets in the blood can lead to bleeding. Increasing the number of leads to the formation of blood clots (thrombosis), which can overlap the blood vessels and lead to pathological

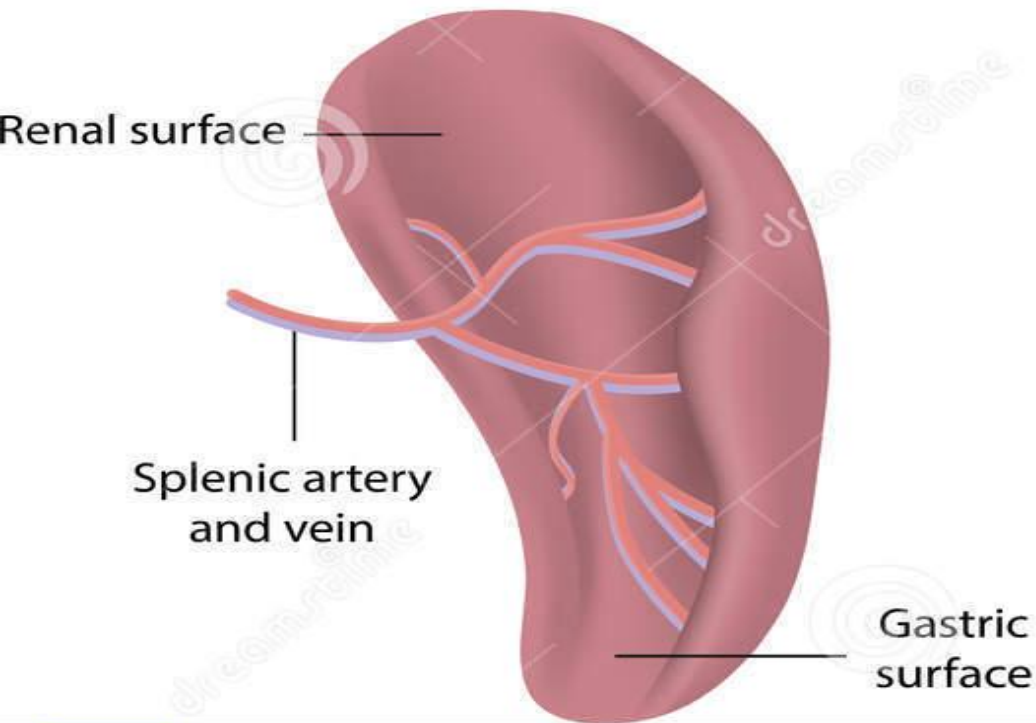


# Disease:

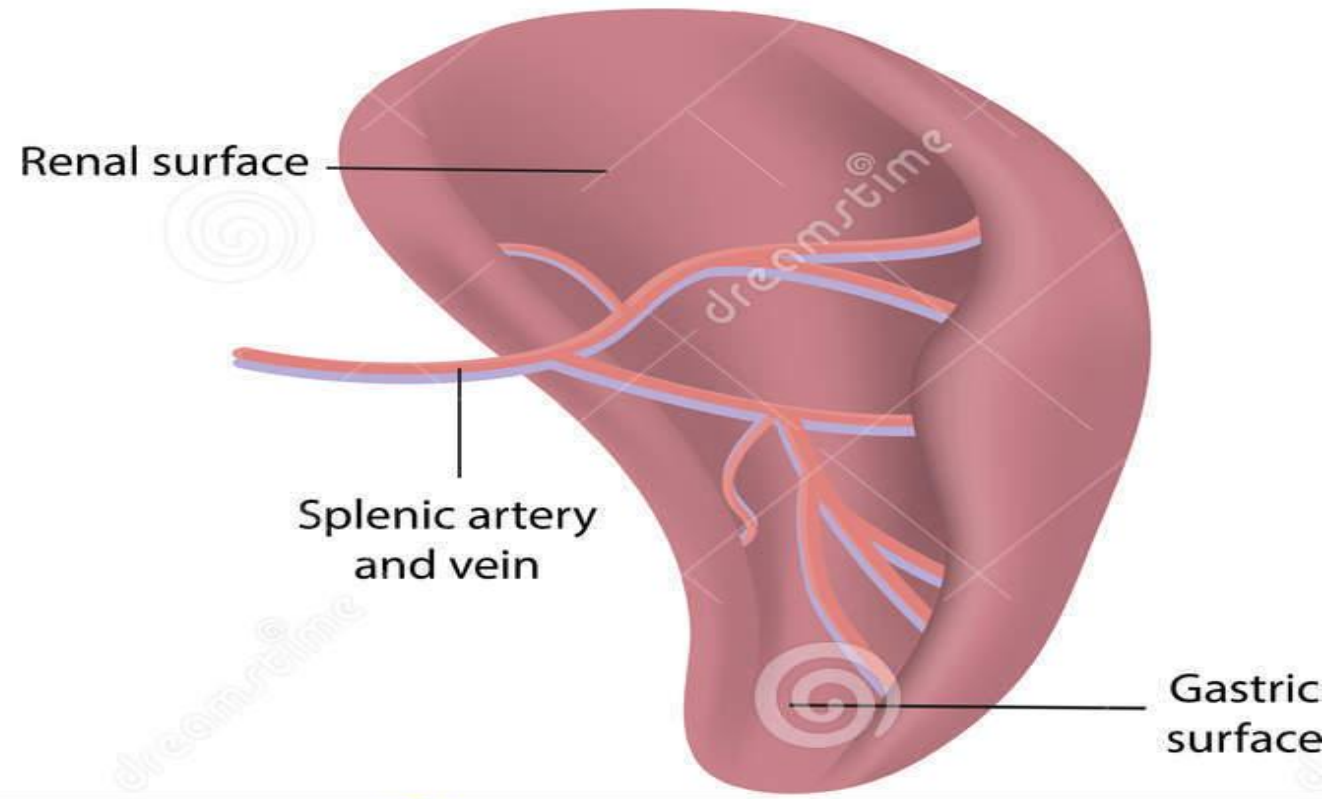


# Splenomegaly

## Healthy Spleen

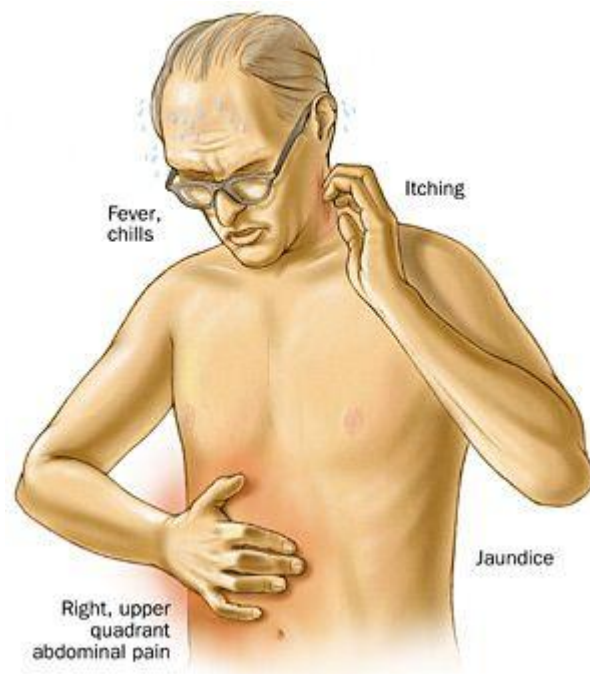


## Enlarged Spleen





Gaucher's disease



Gilbert's Syndrome

# Treatment

1) Increased platelet levels in the blood  
Conservative therapy  
Diet and products,  
reducing the level of



2) How to increase the platelets in the blood  
Diet  
Prednisolone, and  
Dexamethasone



# Conclusion:

- ▶ Platelets, also called thrombocytes (thromb- + -cyte, "blood clot cell"), are a component of blood whose function (along with the coagulation factors) is to stop bleeding by clumping and clotting

## ↳ Types of thrombocytosis

1) Primary. Most often caused by dysfunction of bone marrow cells. Classical hematologic problem leads to a sharp increase in platelet levels in patients without symptoms external problems: in rare cases, people experience headaches of unknown etiology.

2) Secondary. Called specific diseases, infections, side effects of several drugs, tumors, surgery, and other external factors.



- ▶ The physiological plasma concentration of platelets -  $180-360 \times 10^9$  platelets per liter.
- ▶ Reducing the number of platelets in the blood can lead to bleeding. Increasing the number of leads to the formation of blood clots (thrombosis), which can overlap the blood vessels and lead to pathological conditions such as stroke, myocardial infarction, pulmonary embolism or blockage of blood vessels in other body organs.
- ▶ The deficiency or disease is called trombositopatya platelets, which may be either a decrease in the number of platelets (thrombocytopenia) or breach of platelet functional activity (thrombasthenia) or increasing the number of platelets (thrombocytosis). There are diseases, reducing the number of platelets, such as heparin-induced thrombocytopenia or thrombocytopenic purpura, which typically cause bleeding.



- ▶ A feature of the platelet is its ability to activate - the quick and usually irreversible transition to a new state. Activation stimulus may be virtually any disturbance of the environment, down to simple mechanical stress. However, the major physiological activators of platelets are considered to be collagen (the main protein of the extracellular matrix), thrombin (the main protein of plasma coagulation), ADP (adenosine diphosphate, emerging from the destroyed vessel cells or secreted by the platelets) and thromboxane A<sub>2</sub> (secondary activator, synthesized and emitted by platelets; its additional function is to stimulate vasoconstriction).
- ▶ Activated platelets are able to adhere to the site of injury (adhesion) and to each other (aggregation) to form a plug, overlapping damage. Moreover, they participate in the plasma clotting through two main ways - by exposing procoagulant

# Literature:

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