THROMBOCYTOPENIA

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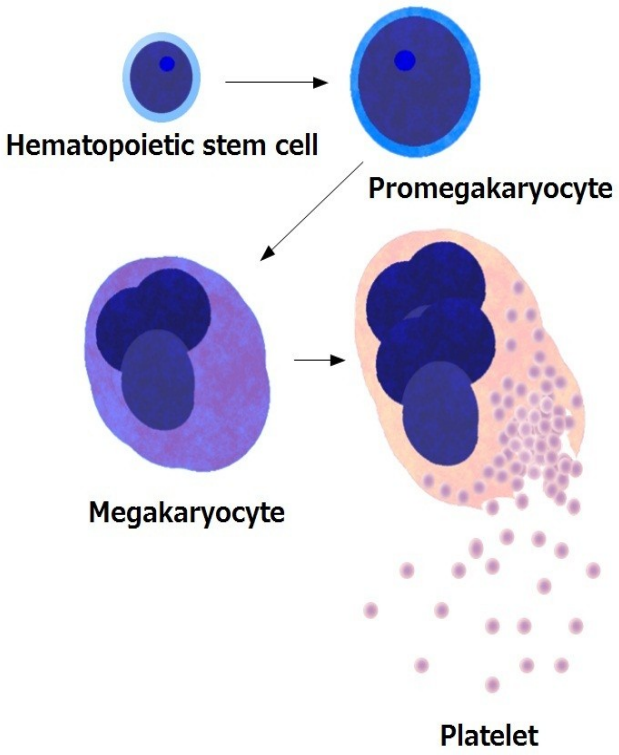
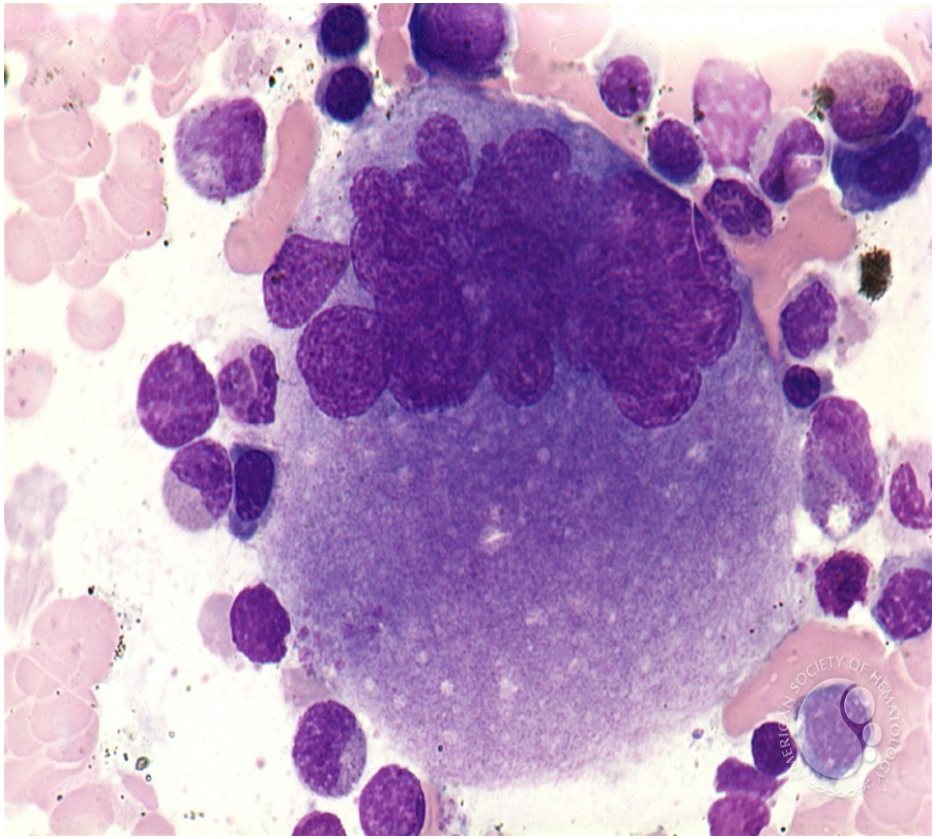
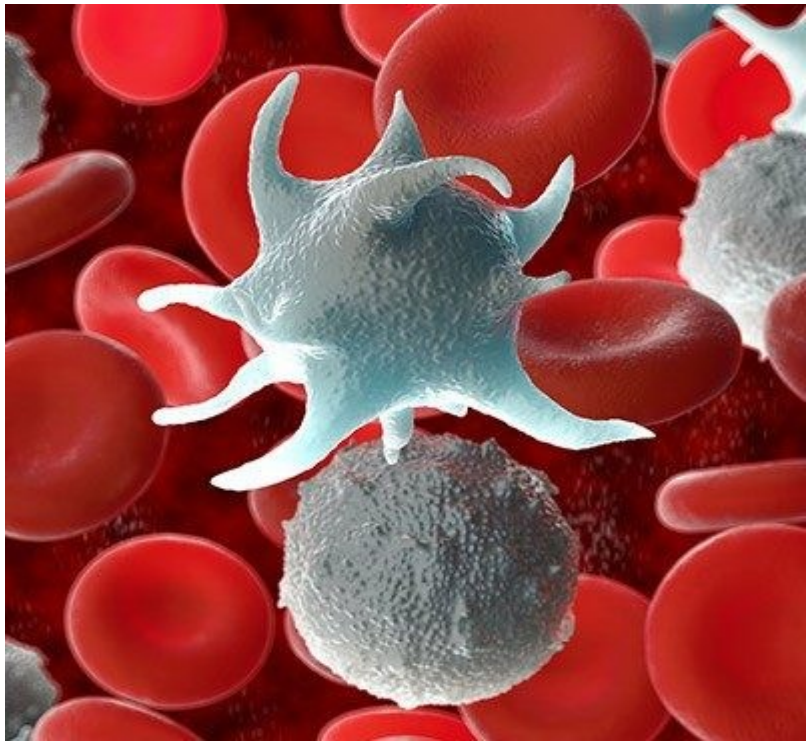
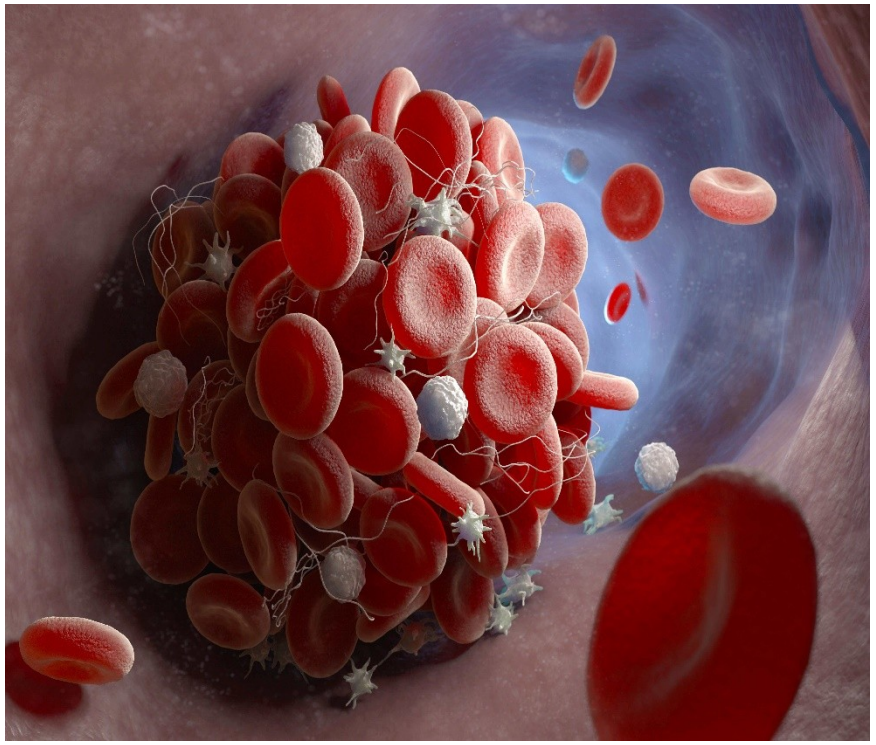




A **megakaryocyte** is a large bone marrow cell with a lobated nucleus responsible for the production of platelets, which are necessary for normal blood clotting.





Platelets are tiny blood cells that help your body form clots to stop bleeding.

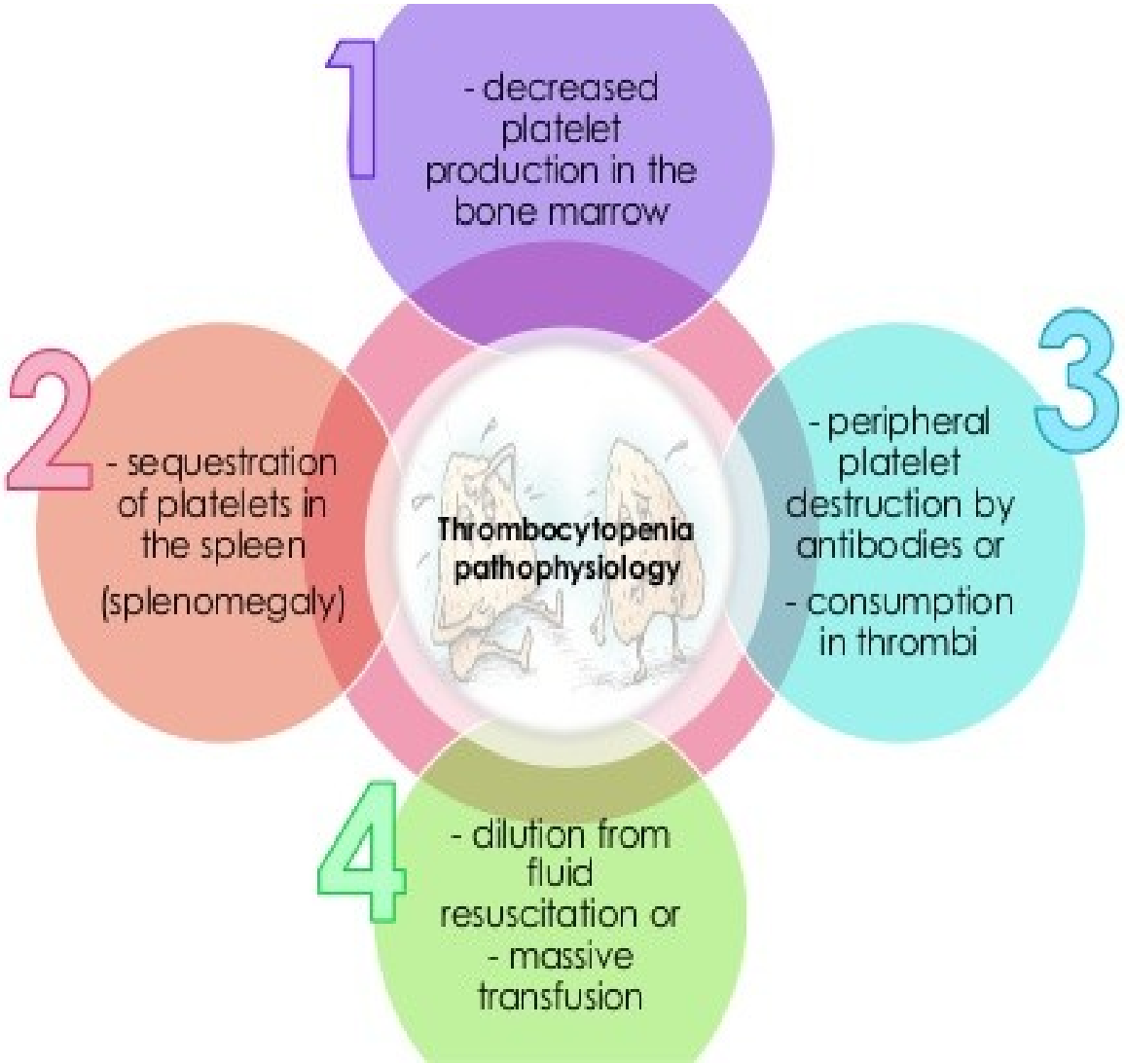
THROMBOCYTOPENIA

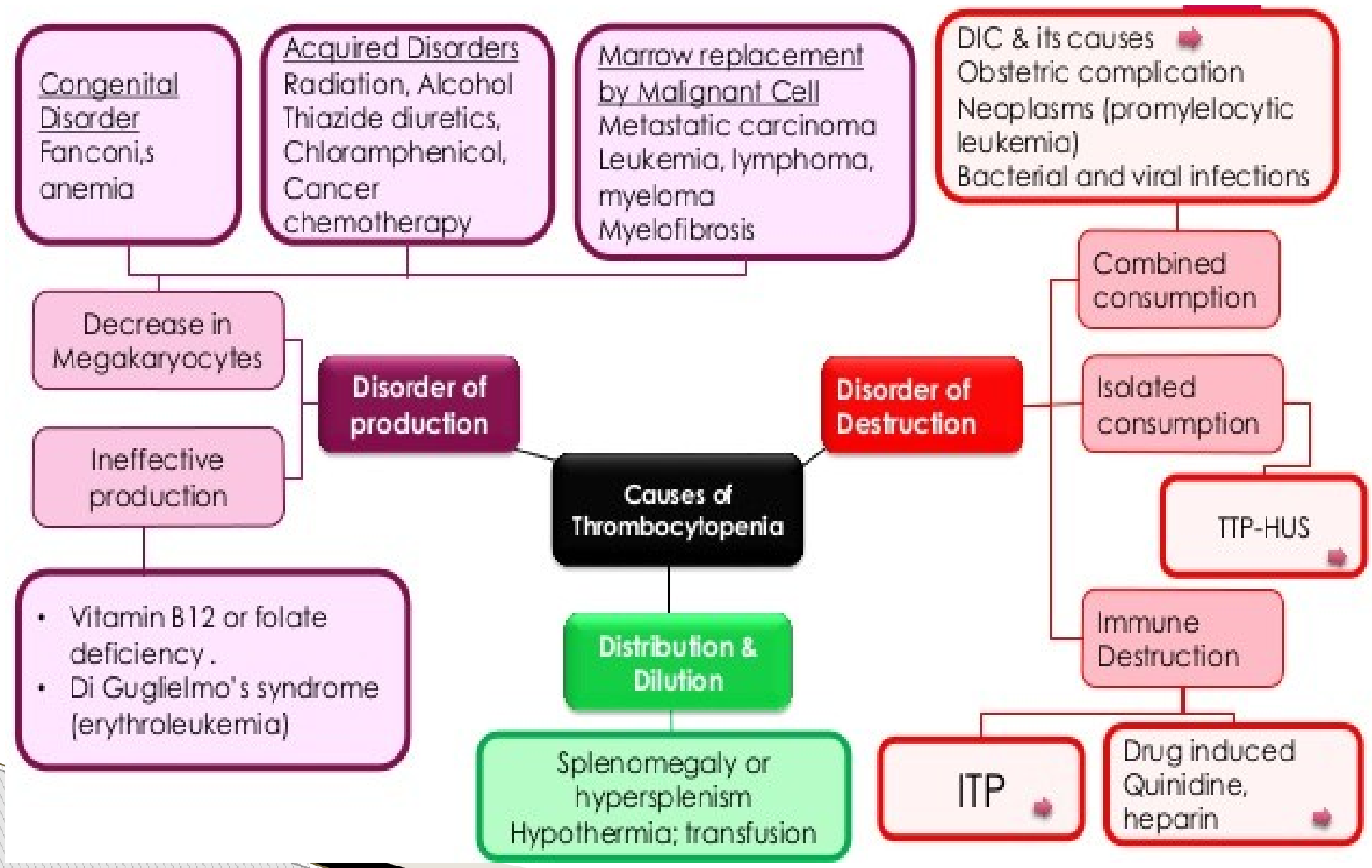
- Defined as a subnormal amount of platelets in the circulating blood.
- Normal platelet count: 150,000/uL to 450,000/uL . Thrombocytopenia is defined as a platelet count < 150,000/uL
- 1/3 of platelets are sequestered in the spleen.
- Platelet production is the function of the multinucleated megakaryocyte.

What is low platelet count?

- Platelet count below the lower limit of normal <150,000 /uL for adult.

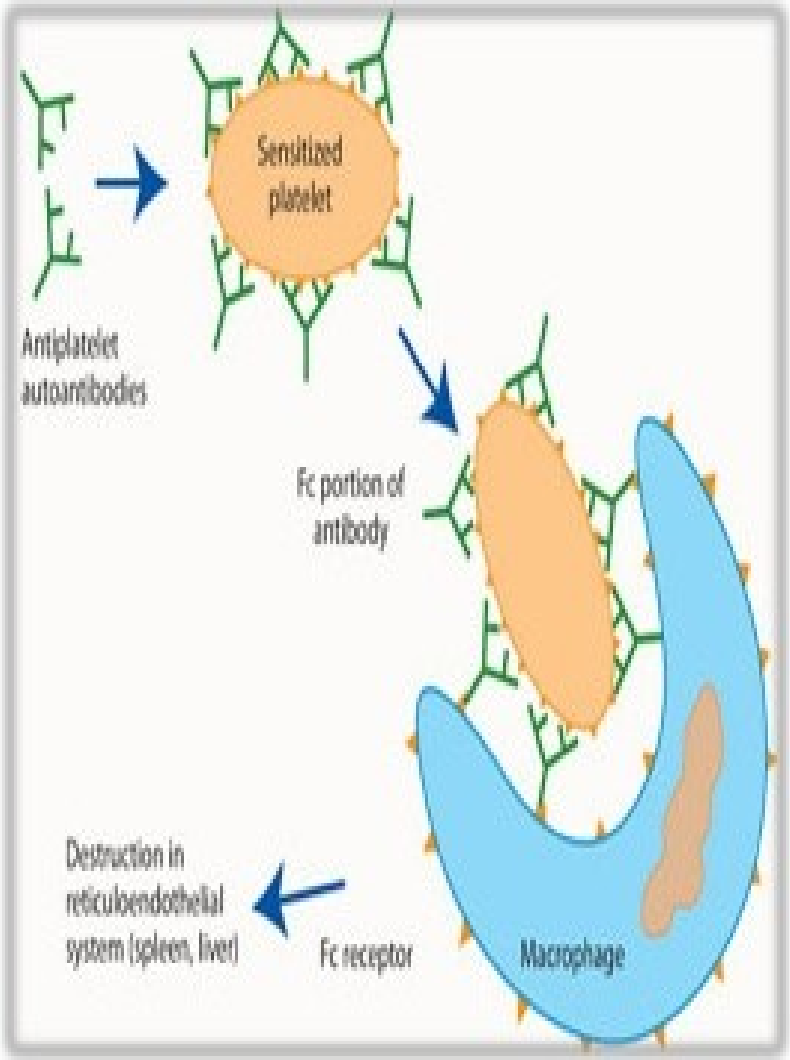
- Degree of thrombocytopenia can be further subdivided into:
- MILD (Platelet count 100,000 to 150,000 /uL)
- MODERATE (50,000 to 99,000 /uL) and
- SEVERE (<50,000 /uL) greater risk of bleeding but not absolute.


1
- decreased platelet production in the bone marrow
2
- sequestration of platelets in the spleen
(splenomegaly)
Thrombocytopenia pathophysiology
3
- peripheral platelet destruction by antibodies or
- consumption in thrombi
4
- dilution from fluid resuscitation or
- massive transfusion


Congenital Disarder
Fanconi,s anemia
Acquired Disarders
Radiation, Alcohol
Thiazide diuretics,
Chloramphenicol,
Cancer chemotherapy
Marrow replacement by Malignant Cell
Metastatic carcinoma
Leukemia, lymphoma, myeloma
Myelofibrosis
DIC & its causes
Obstetric complication
Neoplasms (promylelocytic leukemia)
Bacterial and viral infections
Decrease in Megakaryocytes
Ineffective production
Disorder of production
Causes of Thrombocytopenia
Disorder of Destruction
Combined consumption
Isolated consumption
TTP-HUS
Immune Destruction
ITP
Drug induced Quinidine, heparin
Distribution & Dilution
Splenomegaly or hypersplenism
Hypothermia; transfusion
• Vitamin B12 or folate deficiency .
• Di Guglielmo's syndrome (erythroleukemia)

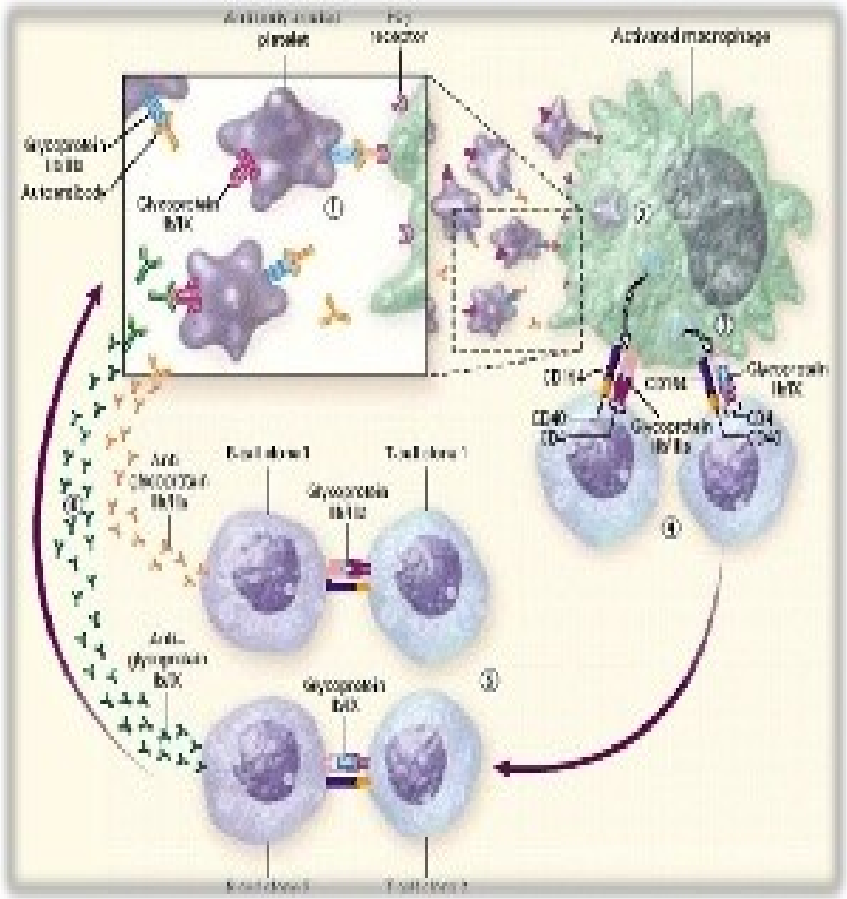
CONDITIONS ASSOCIATED WITH THROMBOCYTOPENIA

Immune thrombocytopenia



Immune Thrombocytopenia Purpura

- The autoantibodies are directed against GPIIb/IIIa (fibrinogen receptor) and the complex GPIb/IX (von Willebrand factor receptor).
- Antibody-coated platelets are subsequently removed by the spleen.
- platelet production may also be impaired (megakaryocyte injury by the autoantibodies).
- common viral or bacterial infection OR failure of T-regulatory cells.

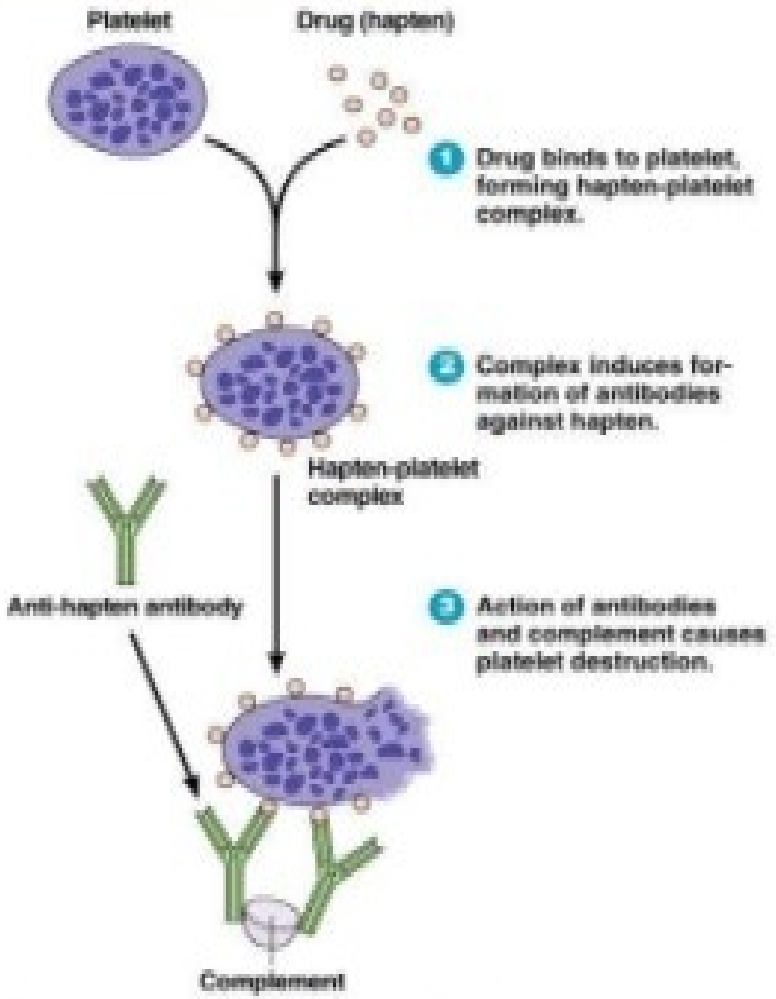


ITP possible treatment

- Treatment guidelines recommend that patients receive treatment if they have any of the following:
  - Significant bleeding risk.
  - <20 x 109/L platelets and moderate bleeding.
  - <10 x 10 9/L platelets with no bleeding symptoms.
- Corticosteroids are effective treatments for 50-80% of individuals with either acute or chronic ITP.
- Intravenous immunoglobulin (IVIG) contains the pooled immunoglobulin G (IgG) immunoglobulins from the plasma.
- Splenectomy may be a last resort treatment for chronic ITP sufferers if their platelet counts are below 30 x 109/ L or if symptoms warrant it.

Drug Induced Thrombocytopenia

- Thrombocytopenia develops within hours of drug exposure if the patient has been previously exposed to the drug.
- Within one to two weeks of daily exposure.
- Resolves within five to seven days of drug discontinuation.



Disseminated Intravascular Coagulation

- A syndrome which complicates a range of illness.
- Characterized by systemic activation of coagulation resulting in the generation of fibrin clots that cause organ failure and consumption of platelets and coagulation factors resulting in bleeding.

Disseminated intravascular coagulation (DIC)

Pathophysiology

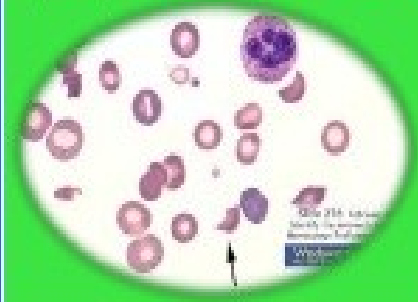
- Hyper-activated coagulation system.
- Hyper-activated fibrin-lytic system, or both simultaneously.
- Coagulation factors and plts consumed as soon as they are made.
- Secondary to an underlying disease or condition. Ex; sepsis, placenta abruption, snake bites, toxin, trauma, graft vs. host disease, and burns.

Clinical Finding

- Patients are at risk of bleeding and thrombosis.

Laboratory Finding

- Thrombocytopenia
- Prolonged PT, APTT, thrombin time.
- Decreased fibrinogen.
- Elevated D-dimers.
- Schistocytes on the peripheral blood smear.



Treatment of DIC

- Treatment of the underlying disorder .
- Transfusion support of Red Blood Cells or Fresh Frozen Plasma (FFP) to replace coagulation factors.

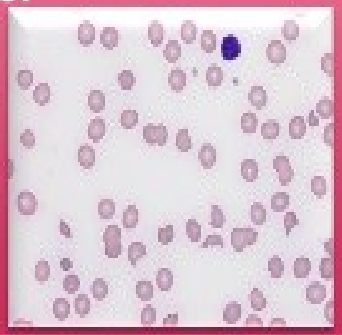
Thrombotic thrombocytopenic purpura, Hemolytic Uremic Syndrome

- Acute syndromes with abnormalities in multi organ system with microangiopathic hemolytic anemia and thrombocytopenia.
- HUS is thought by some to be the same condition as TTP because both disorders have the same underlying pathology.
- HUS is more often associated with renal failure (diarrhea/Shiga toxin-producing E coli)
- TTP with neurological manifestations.

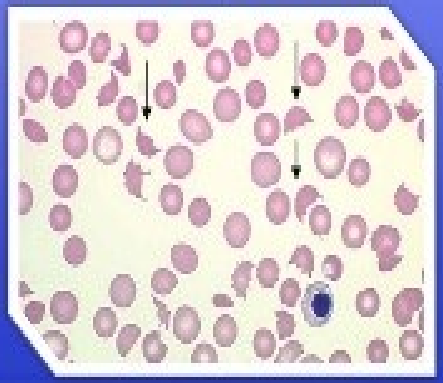
TTP-HUS

LABORATORY FINDING

- Thrombocytopenia (<20 x 109/L)
- TTP< HUS.



- Schistocytes in blood film
  - Microangiopathic hemolytic anemia



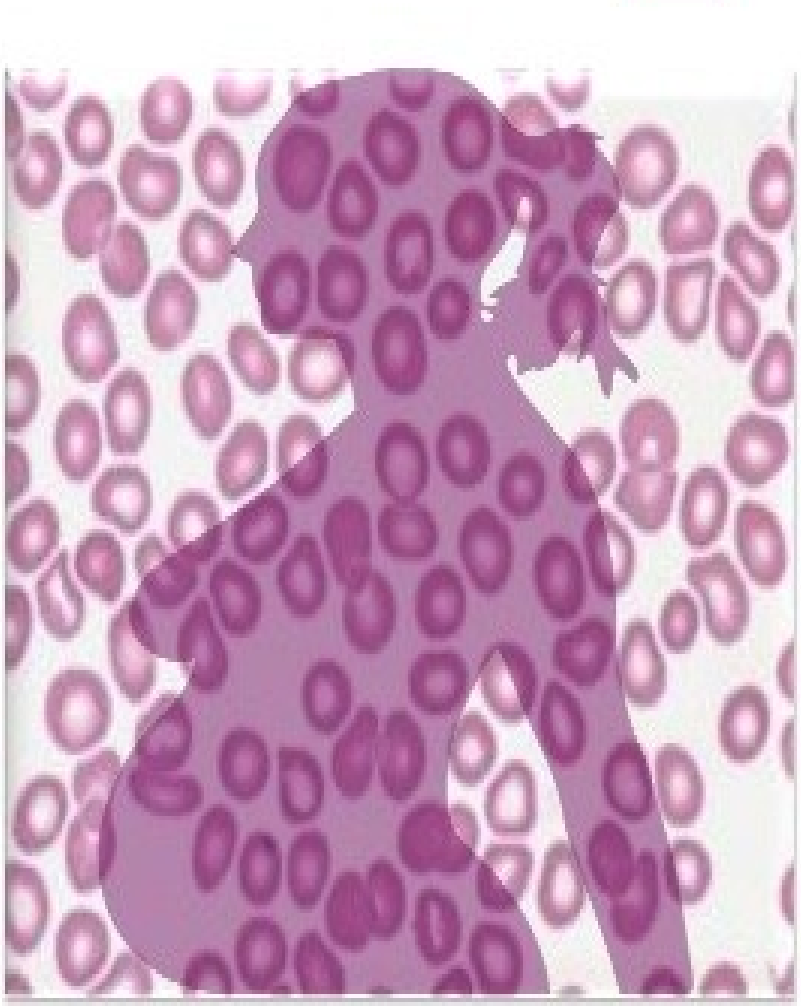
- ↑ LDH
- ↑ Serum bilirubin
- ↑ Reticulocyte counts

- Normal Prothrombin time (PT).
- Normal activated partial thromboplastin time (aPTT).

Heparin-induced thrombocytopenia

- A small percentage of patients exposed to heparin **(<5 percent)** may develop heparin-induced thrombocytopenia (HIT).
- New onset thrombocytopenia in a patient exposed to heparin within the **prior 5 to 10 days.**
- platelet count **drop >50** percent of baseline.
- necrotic skin lesions at sites of heparin injection; and acute systemic reactions after intravenous heparin administration.

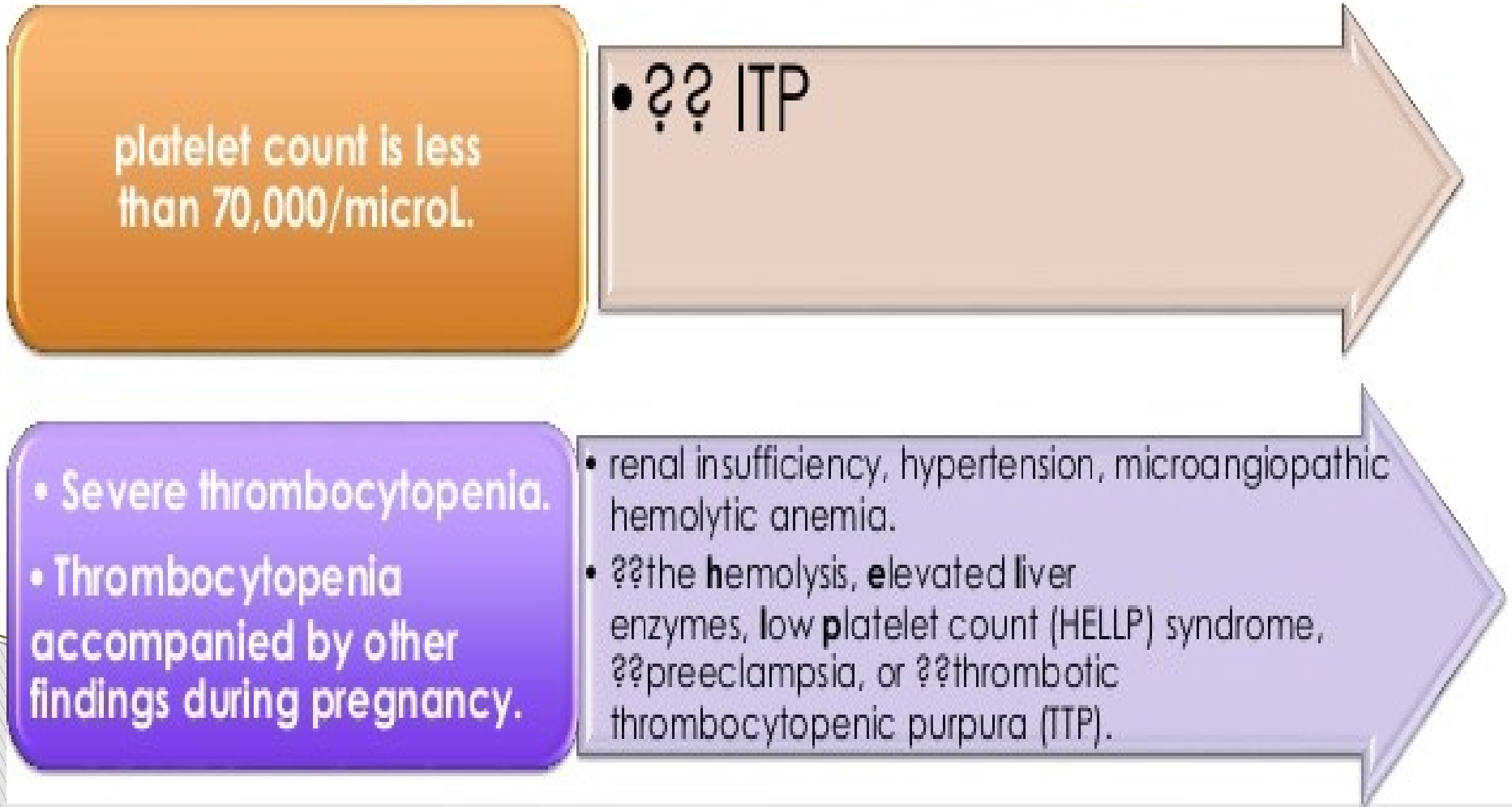
Thrombocytopenia in pregnancy



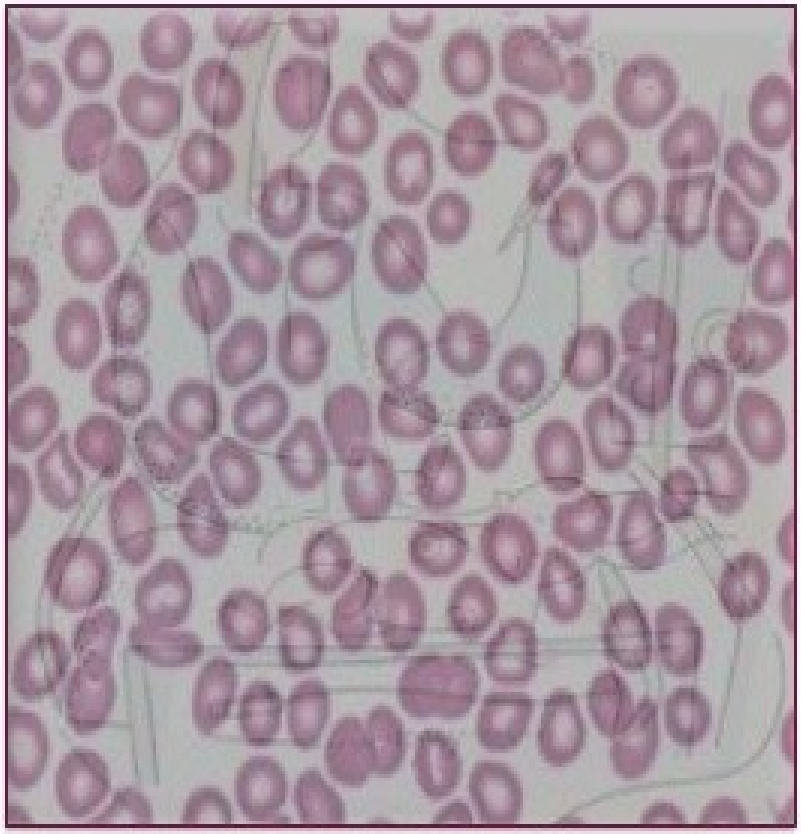
Incidental thrombocytopenia during pregnancy, (Gestational thrombocytopenia)

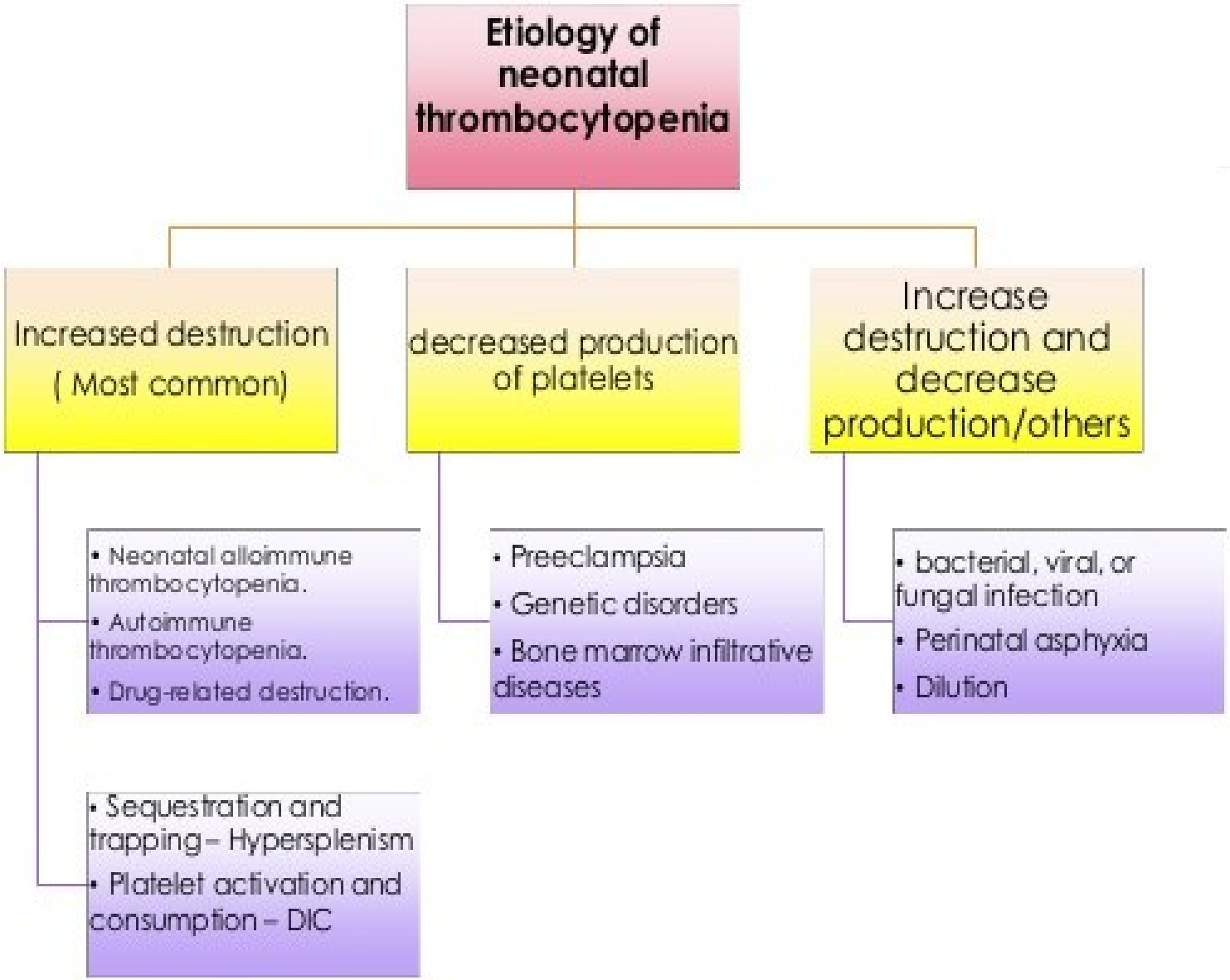
- Approximately **5 percent** develop incidental thrombocytopenia.
- **Defined by the following five criteria:**
  - Mild and asymptomatic thrombocytopenia. Platelet counts are typically >70,000/microL, with approximately two-thirds between 130,000 and 150,000/microL.
  - No past history of thrombocytopenia (except possibly during a previous pregnancy).
  - Occurrence during late gestation.
  - No association with fetal thrombocytopenia.
  - Spontaneous resolution after delivery.

When to concern thrombocytopenia in pregnant woman?



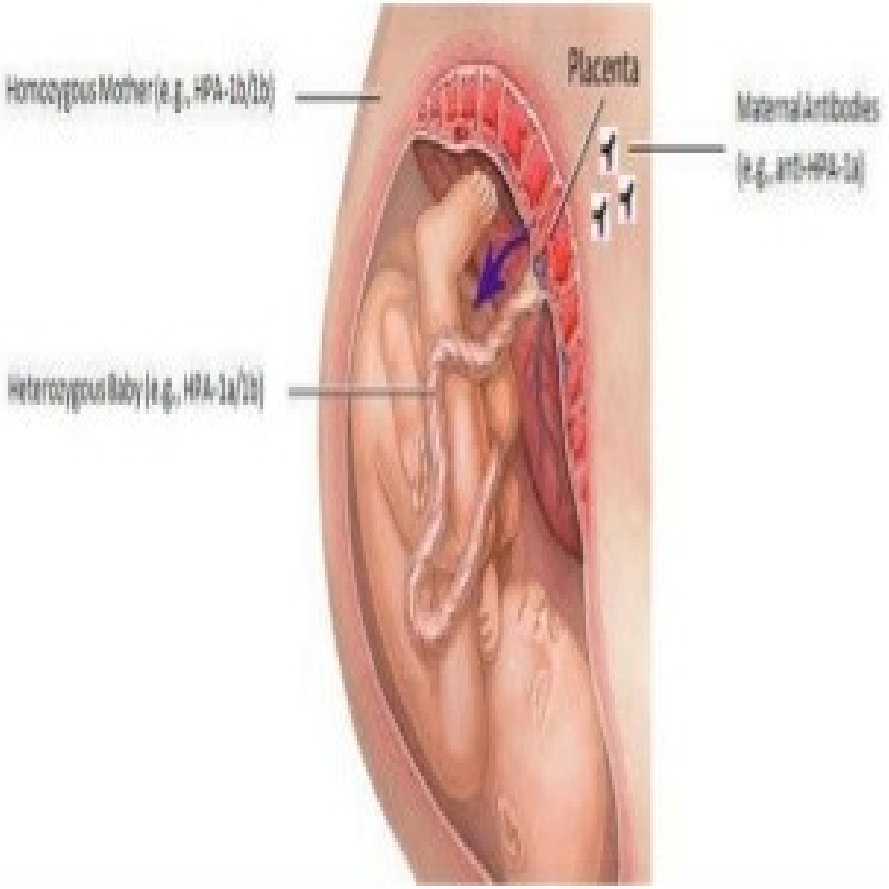
Thrombocytopenia In Neonates

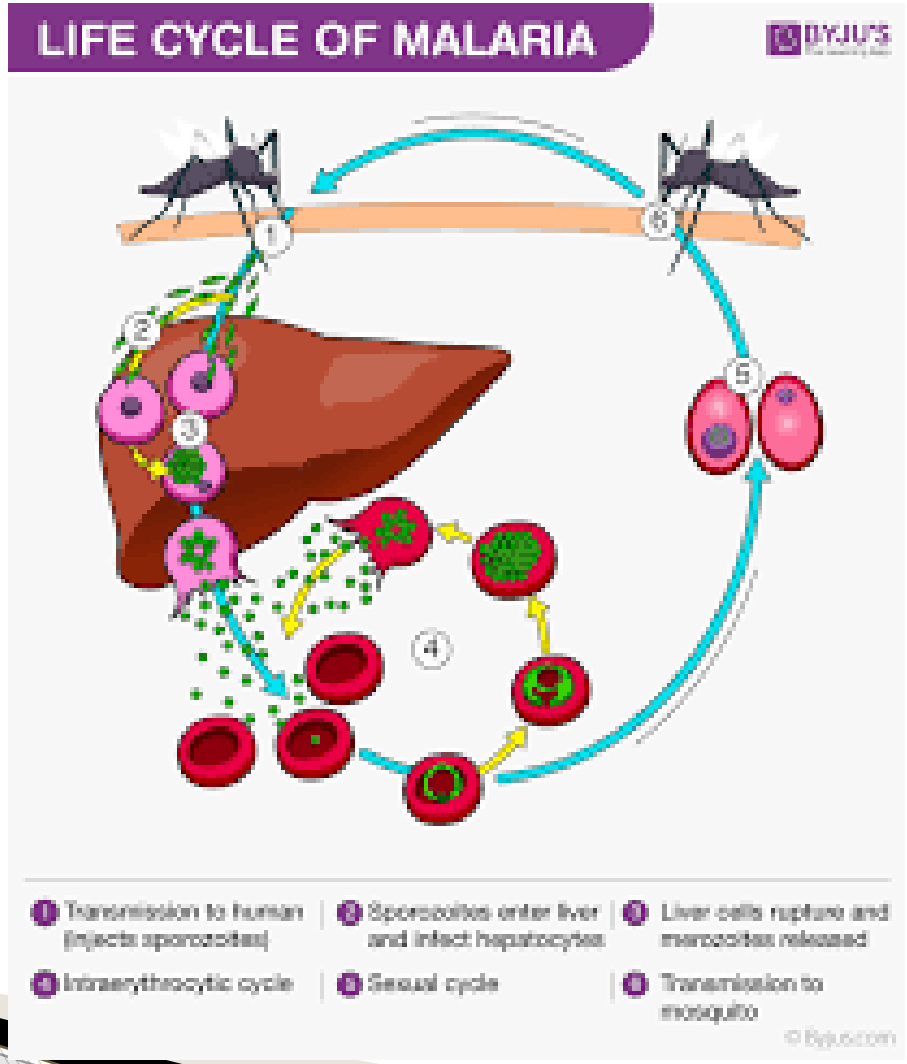



Etiology of neonatal thrombocytopenia
Increased destruction (Most common)
decreased production of platelets
Increase destruction and decrease production/others
• Neonatal alloimmune thrombocytopenia.
• Autoimmune thrombocytopenia.
• Drug-related destruction.
• Sequestration and trapping – Hypersplenism
• Platelet activation and consumption – DIC
• Preeclampsia
• Genetic disorders
• Bone marrow infiltrative diseases
• bacterial, viral, or fungal infection
• Perinatal asphyxia
• Dilution

Neonatal Allo-immune Thrombocytopenia

- when fetal platelets contain an antigen inherited from the father that the mother lacks.
- The mother forms IgG (immunoglobulin G) class antiplatelet antibodies against the "foreign" antigen.
- IgG cross the placenta and destroy fetal platelets that express the paternal antigen.
- **Incidence** — 1 in 1000 to 10,000 births.




LIFE CYCLE OF MALARIA
BYJU'S
1 Transmission to human (injects sporozoites)
2 Sporozoites enter liver and infect hepatocytes
3 Liver cells rupture and merozoites released
4 Intraerythrocytic cycle
5 Sexual cycle
6 Transmission to mosquito
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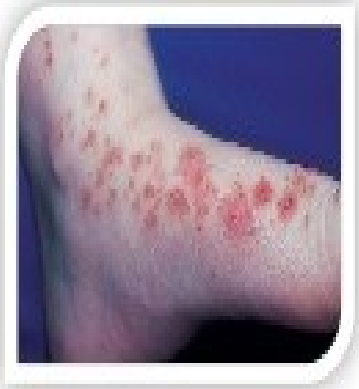
Dengue fever

- Dengue fever is a mosquito-borne tropical disease caused by the dengue virus.
- Symptoms typically begin 3-14 days after infection.
- Symptoms may include a high fever, headache, vomiting, muscle and joint pains, and a characteristic skin rash.
- Recovery generally takes 2-7 days.

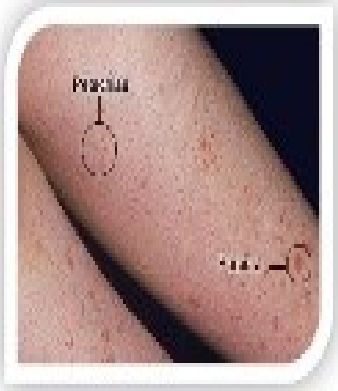
Symptoms seen in Thrombocytopenia

If a platelet count is less than 30 x 109/L

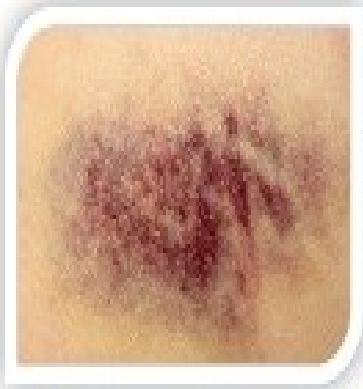
Epistaxis



Purpura



Petechiae



bruising

Bleeding into the central nervous system may occur

If a platelet count is less than 10 x 109/L

Do all thrombocytopenic patients have symptoms?

asymptomatic,
isolated thrombocytopenia
?? (ITP)

Symptoms varies depend on severity
??autoimmune disorders,
??nutrient deficiencies,
thrombotic microangiopathies,

acutely ill, hospitalized patients
platelet consumption,
??bone marrow suppression
from sepsis/infection, or DIT

When to worry about bleeding?

- Patients with severe thrombocytopenia.
- Prior bleeding at a similar platelet count and the presence of wet purpura (mucosal membranes).
- **The following may be used as guides, but should not substitute for clinical judgment based on individual patient and disease factors:**
  - Surgical bleeding generally with platelet counts **<50,000/microL** (<100,000/microL for some high-risk procedures such as neurosurgery or major cardiac or orthopedic surgery).
  - Severe spontaneous bleeding is most likely with platelet counts **<10,000/microL**.

Initial questions in thrombocytopenia evaluation

When a patient presents with unexpected thrombocytopenia, we want to know:

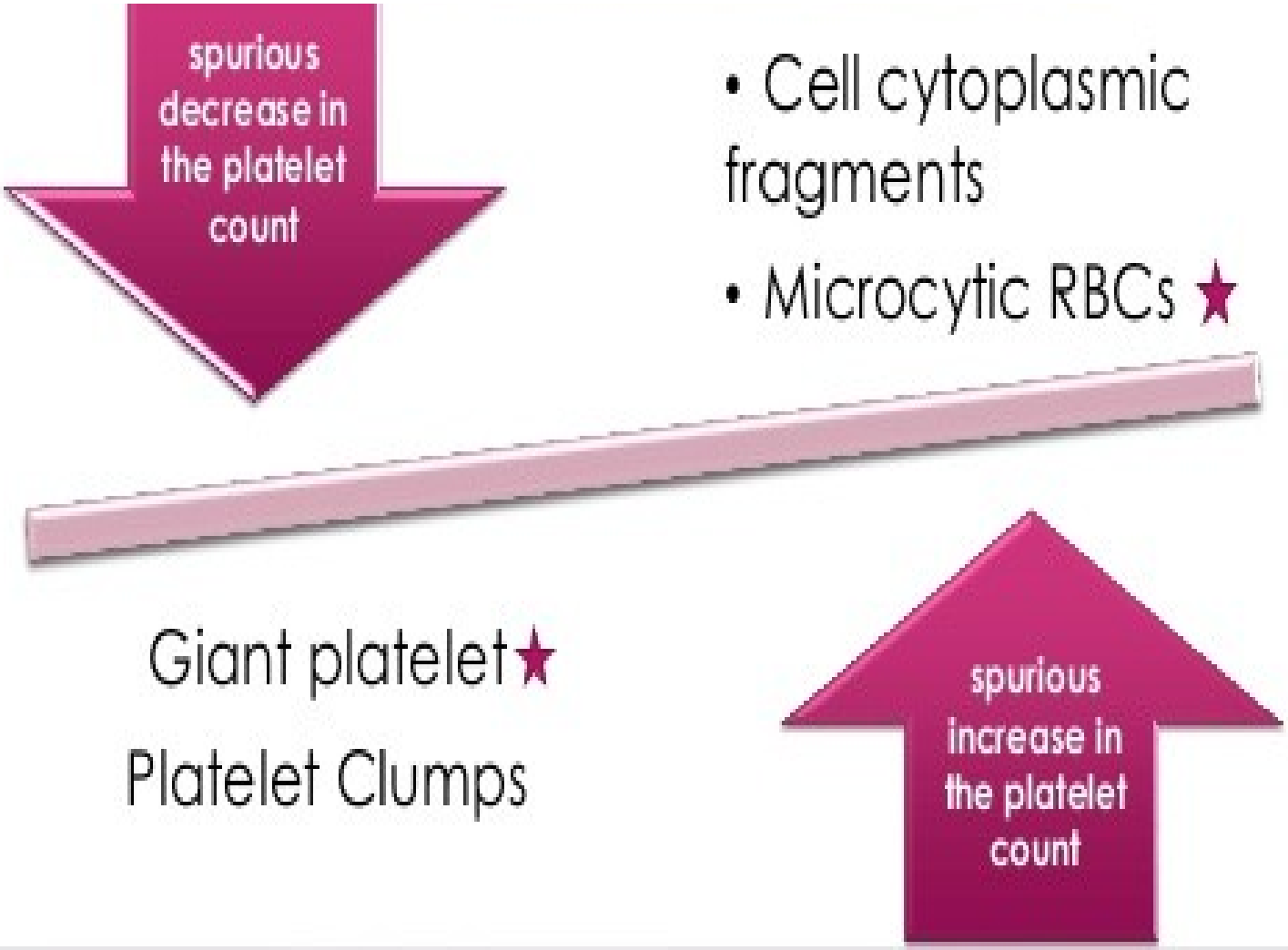
- Is the thrombocytopenia real?
- Is the thrombocytopenia new?
- Are there other hematologic abnormalities?


What Dose PTCP Stands for?
Pseudo-thrombocytopenia

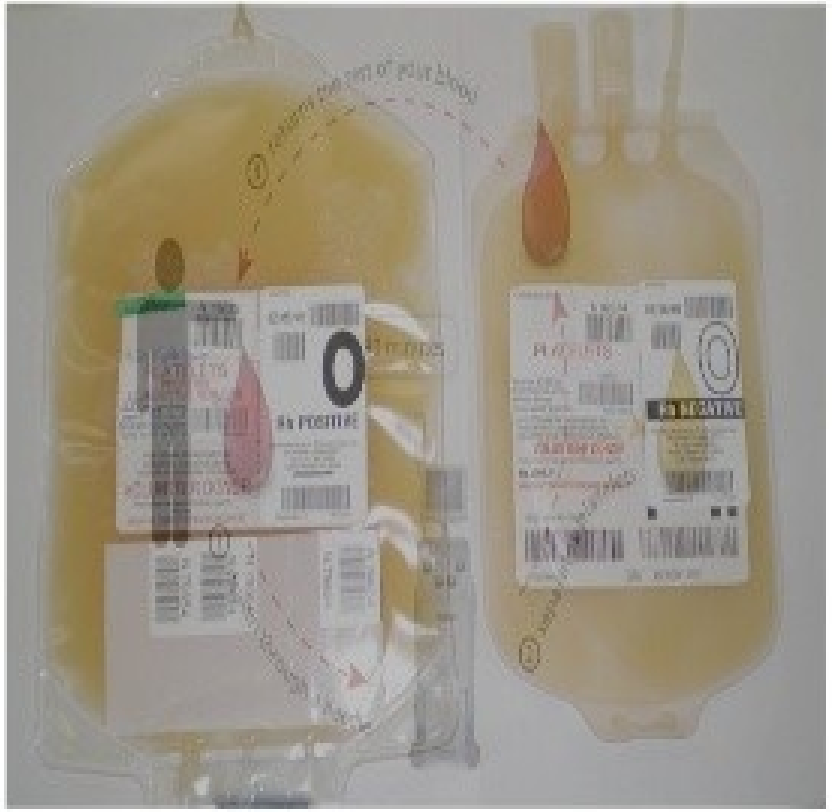
Pre-analytical variable leading to false thrombocytopenia

- While taking the blood sample, EDTA tube should be inverted 5-10 times for proper mixing of the anticoagulant and the blood.
- If the tube is not mixed, small fibrin clots may form, causing a false decrease in platelet count.

Analytical variable leading to false Thrombocytopenia



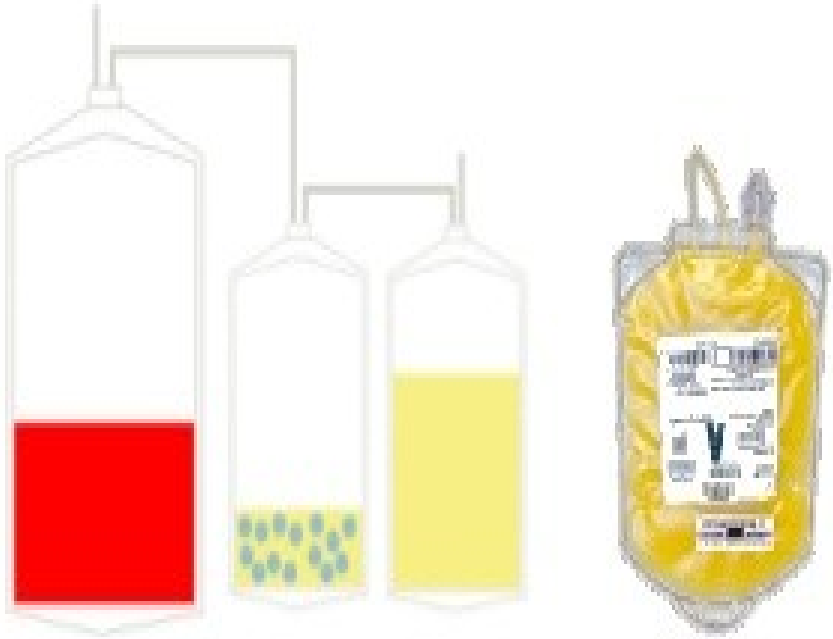
Platelets Collection & Transfusion



PLATELETS COLLECTION

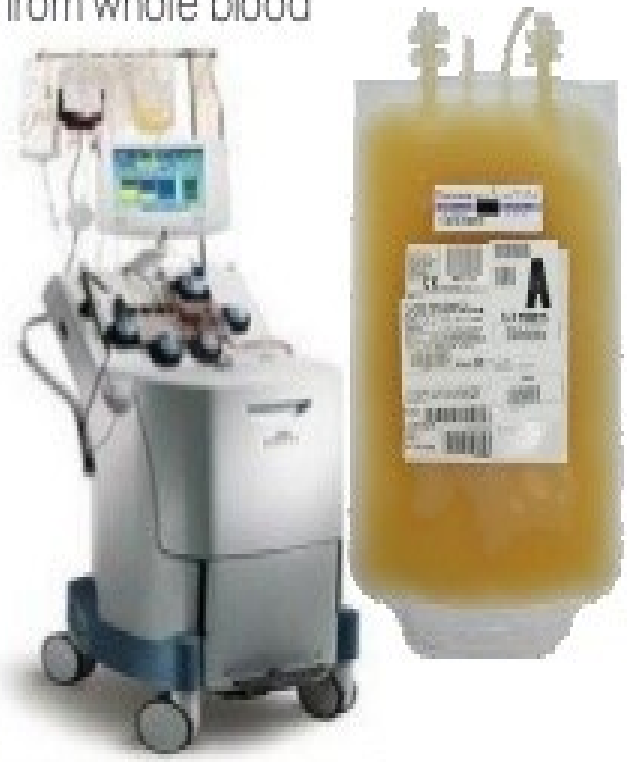
Isolation from donated blood

- One unit of platelets contain 7 x 10^{10} platelets.



Apheresis from a donor

- equivalent of six or more units of platelets from whole blood



INDICATION OF PLATELETS TRANSFUSION

- Actively bleeding patient.
- Preparation for an invasive procedure.
- Prevention of spontaneous bleeding.

PLATELETS COUNT INCREMENT

- Following a platelet transfusion, the platelet count should rise, with a peak at 10 minutes to one hour and a gradual decline over 72 hours.
- Six units of pooled platelets or one apheresis unit should increase the platelet count by approximately **30,000/microL** in an adult of average size.
- Platelets express **ABO antigens** on their surface, as well as **HLA class I antigens.** They do not express **Rh** or **HLA class II antigens.**
- ABO and HLA compatible platelets appear to cause a greater platelet count increment in the recipient.

TAKE HOME MESSAGE

- **Thrombocytopenia** is the drop in platelet count below the lower limit of normal (<150,000/uL)
- **Thrombocytopenia** can be mild, moderate or severe depending on the platelet count.
- **Thrombocytopenia** results from decrease of platelet production, increase platelets destruction, sequestration of platelets in spleen or dilution.
- Identification of the **cause of thrombocytopenia** is highly important to avoid the undesirable consequences (Bleeding or Thrombosis)
- **Pseudo-thrombocytopenia** should be recognized to avoid unnecessary diagnostic testing and clinical concern.
- **Platelet transfusion** is used for prophylactic or therapeutic purposes.
- Transfusion of **single adult dose of platelets(six** units/one apheresis unit) should increase platelet count by 30,000/Ul.


Thank
You