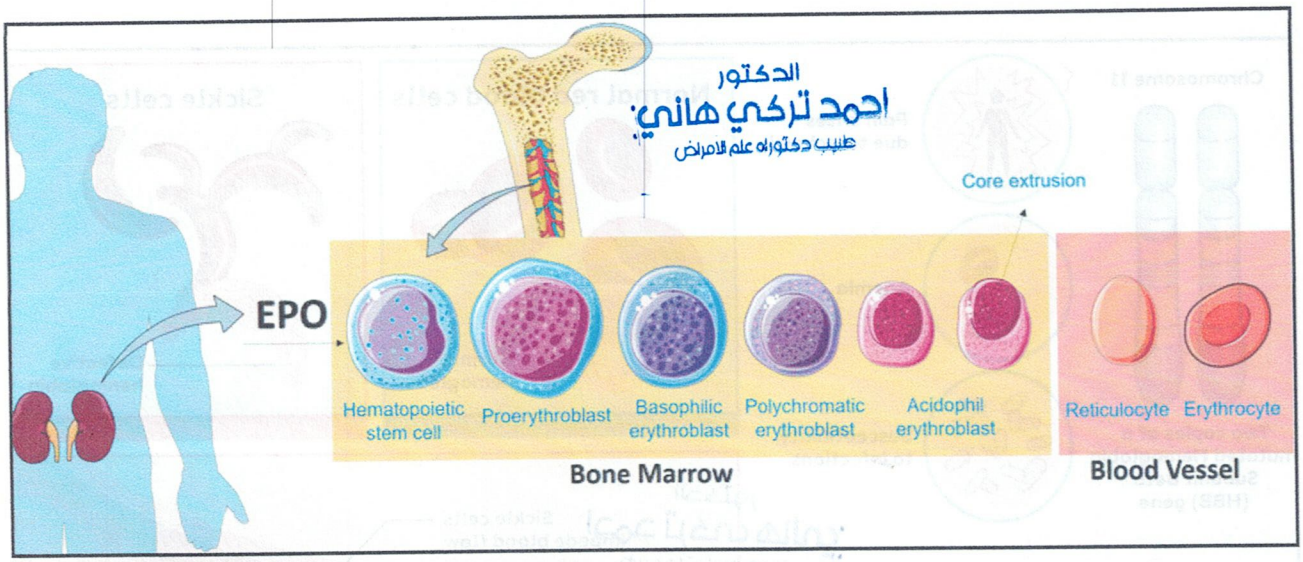
Part I: **Red Blood Cell (RBC) Disorders**

Red blood cell disorders generally fall into two categories: Anemia (too few RBCs/ low hemoglobin) and Polycythemia (too many RBCs).



1. ***Fundamentals of Erythropoiesis***

Production: Occurs in the red bone marrow, stimulated by Erythropoietin (EPO) produced by the kidneys in response to hypoxia.

Requirements: Iron, Vitamin B12, Folate, and Amino acids.

Lifespan: Approximately 120 days; cells are eventually cleared by the spleen and liver.

2. ***Anemia***: Classification by Morphology

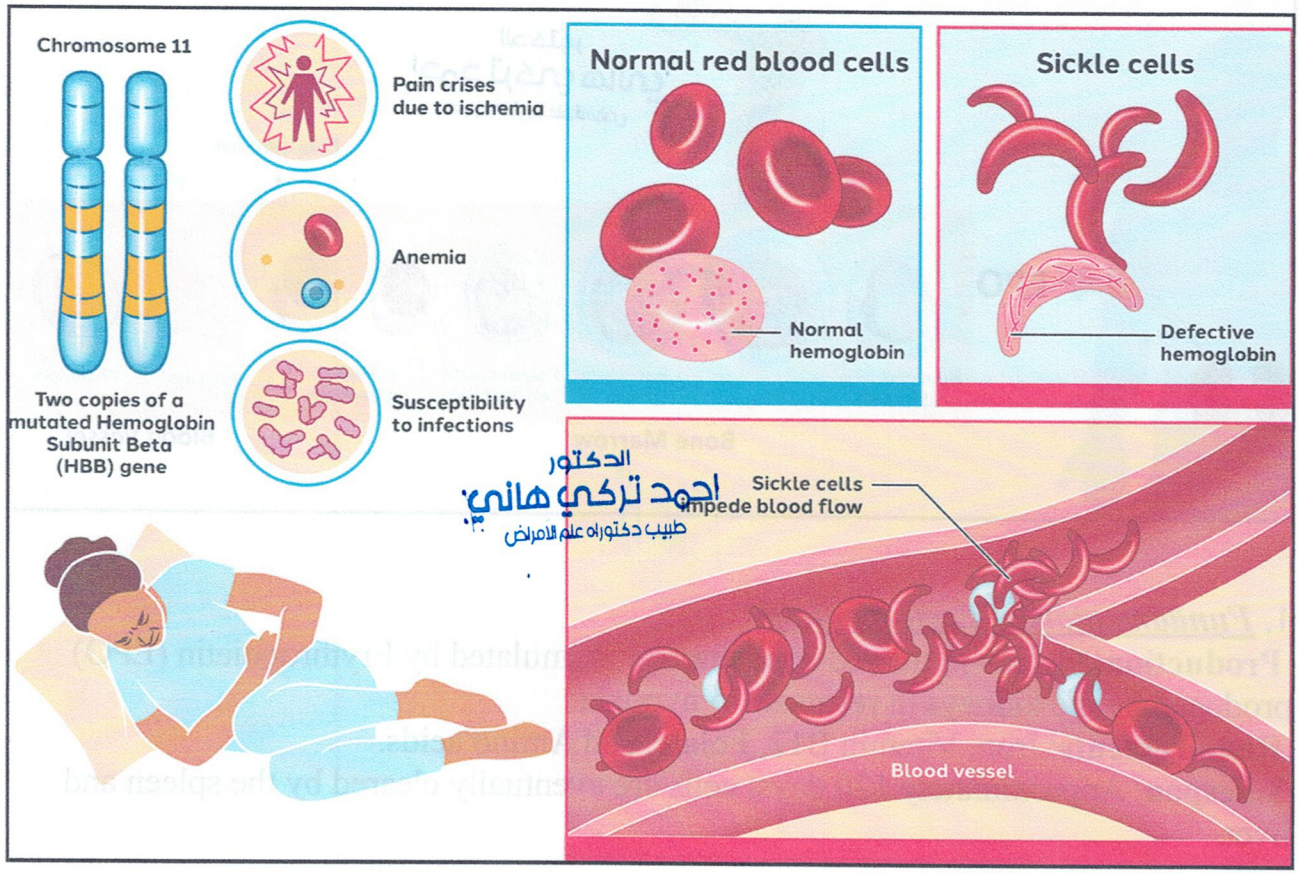
Anemia is defined as a decrease in the total amount of hemoglobin (Hb) or the number of RBCs. The most useful clinical classification is based on the Mean Corpuscular Volume (MCV).

Category	MCV Range	Common Causes
Microcytic	< 80 fL	Thalassemia, Iron deficiency, Chronic disease (some), Sideroblastic (TICS)
Normocytic	80–100 fL	Acute blood loss, Hemolysis, Chronic kidney disease, Aplastic anemia
Macrocytic	> 100 fL	B12/Folate deficiency (Megaloblastic), Alcoholism, Liver disease

3. ***Key RBC Disorders***

Iron Deficiency Anemia: Most common worldwide. Characterized by low ferritin and high Total Iron Binding Capacity (TIBC).

Sickle Cell Disease: A genetic mutation causing HbS to polymerize under low oxygen, leading to "sickled" cells that block capillaries (vaso-occlusive crisis).

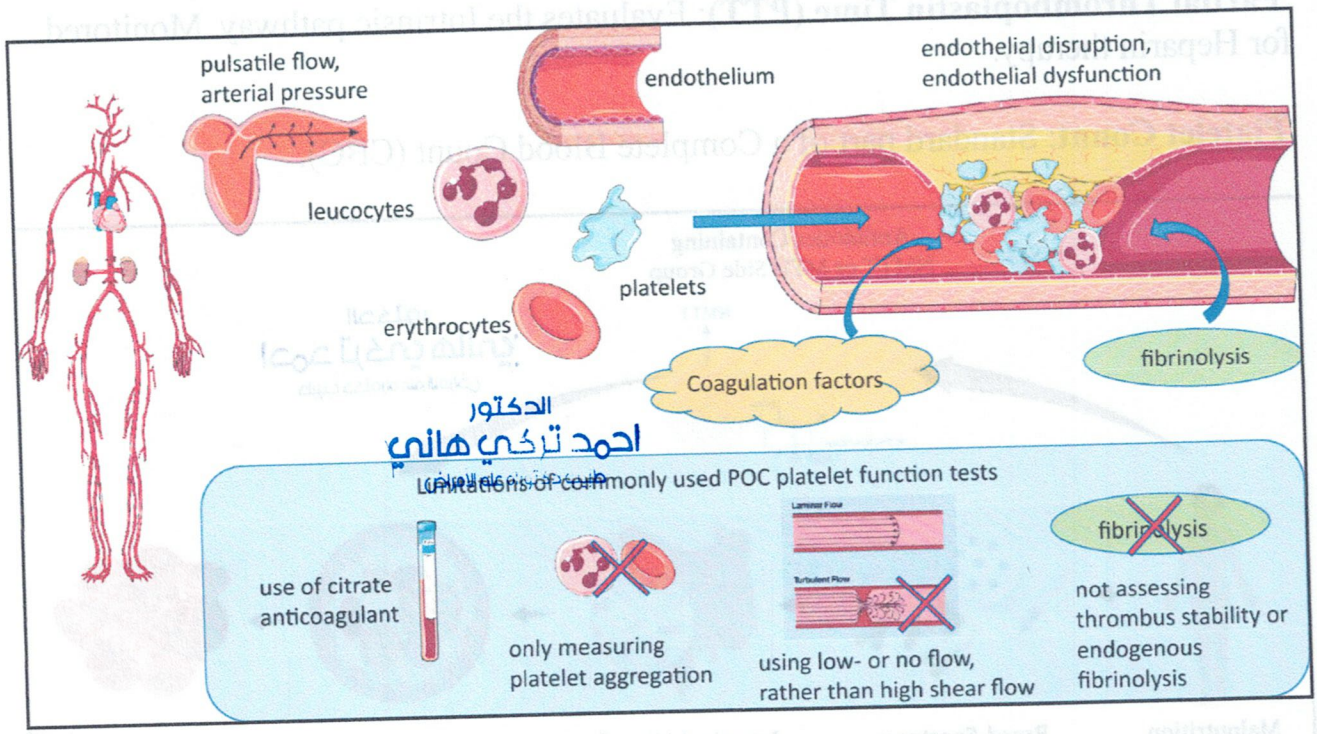


Thalassemia: Genetic defect in the synthesis of globin chains (alpha or beta), leading to ineffective erythropoiesis and hemolysis.

Hemolytic Anemias: Premature destruction of RBCs. Signs include Jaundice (high bilirubin), elevated LDH, and low haptoglobin.

Part II: Bleeding Disorders

Bleeding disorders result from defects in Hemostasis, the process that stops bleeding. Hemostasis occurs in two main phases: Primary (platelets) and Secondary (clotting factors).



1. ***Primary Hemostasis (Platelet Plug)***

Defects here typically cause mucocutaneous bleeding (petechiae, purpura, nosebleeds).

Thrombocytopenia: Low platelet count (e.g., ITP, TTP).

Platelet Dysfunction: Normal count, but "sticky" factor is missing (e.g., Aspirin use, Bernard-Soulier syndrome).

Von Willebrand Disease (vWD): The most common inherited bleeding disorder. vWF is needed for platelets to adhere to vessel walls.

2. ***Secondary Hemostasis (Coagulation Cascade)***

Defects here typically cause deep tissue bleeding (hemarthrosis/bleeding into joints, large hematomas).

Hemophilia A: Deficiency of Factor VIII.

Hemophilia B: Deficiency of Factor IX.

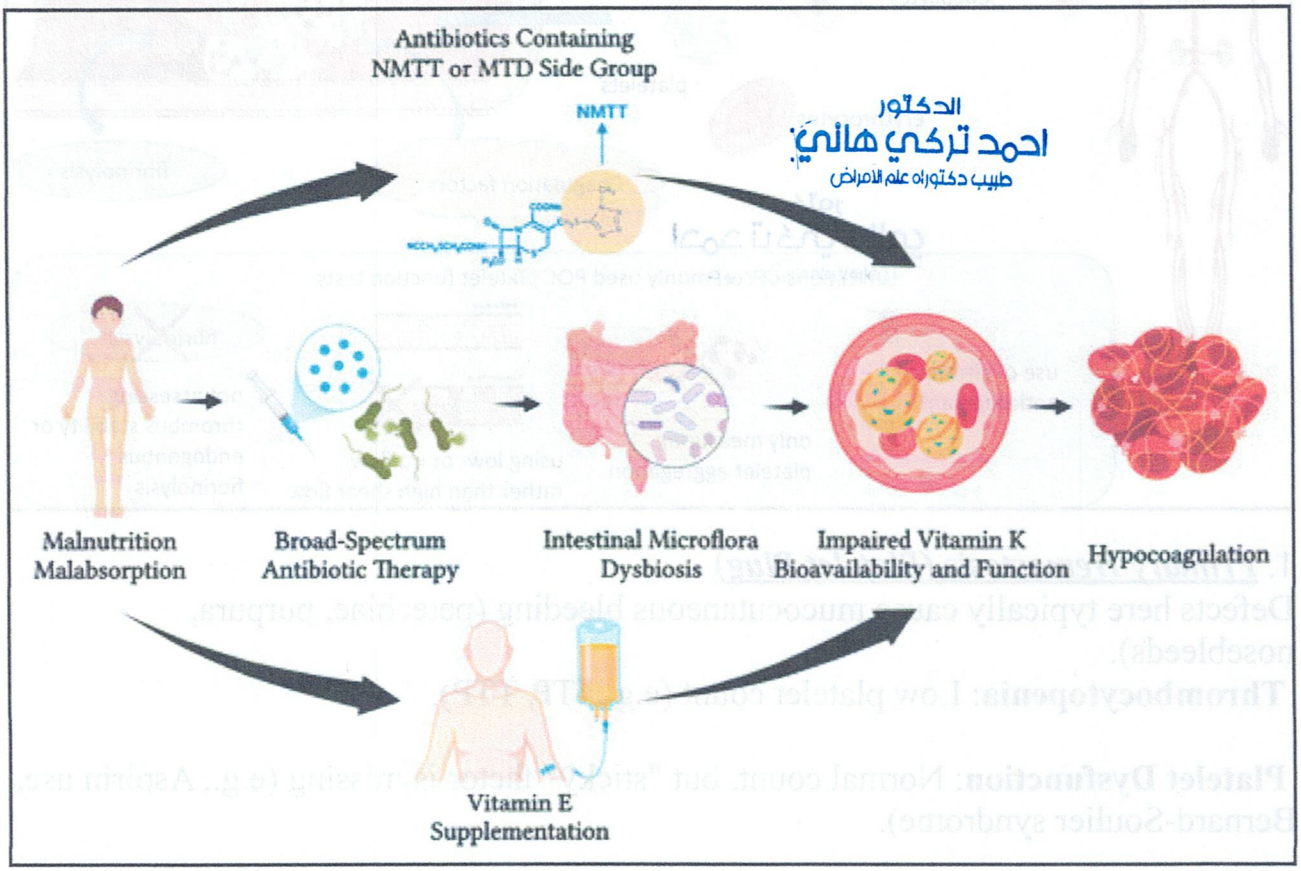
Vitamin K Deficiency: Affects Factors II, VII, IX, and X. Common in malabsorption or long-term antibiotic use.

3. ***Laboratory Evaluation***

Prothrombin Time (PT): Evaluates the Extrinsic pathway (Factor VII). Monitored for Warfarin therapy.

Partial Thromboplastin Time (PTT): Evaluates the Intrinsic pathway. Monitored for Heparin therapy.

Platelet Count: Standard part of a Complete Blood Count (CBC).



Vitamin k deficiency

Summary Comparison

Feature	Platelet Disorders	Coagulation Factor Disorders
Bleeding Site	Skin, Mucosa (epistaxis, gums)	Deep tissue (Joints, Muscles)
Physical Findings	Petechiae, Purpura	Hemarthrosis, Hematoma
Response to Injury	Immediate bleeding	Delayed bleeding
Examples	vWD, ITP, Aspirin	Hemophilia, Liver disease