



Anemia

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Anemia: is a condition featuring insufficient healthy red blood cells or hemoglobin to carry oxygen, causing fatigue, pale skin, and shortness of breath. Common causes include iron/vitamin deficiencies, blood loss, chronic diseases, and genetic factors. Treatments involve iron supplements, dietary changes, or addressing underlying illnesses.



Types of Anemia?

- ❖ **Iron Deficiency Anemia:** Most common type, caused by insufficient iron for hemoglobin production.
- ❖ **Vitamin Deficiency Anemia:** Lack of vitamin B-12 or folate, necessary for red blood cell production.
- ❖ **Aplastic Anemia:** Rare, life-threatening condition where the body stops producing enough new blood cells.
- ❖ **Hemolytic Anemias:** Red blood cells are destroyed faster than they can be replaced.
- ❖ **Sickle Cell Anemia:** Inherited disorder causing abnormal, crescent-shaped red blood cells.
- ❖ **Anemia of Chronic Disease:** Associated with conditions like cancer, HIV/AIDS, or kidney disease

Anemia's Three Main Pathways

Blood Loss

Acute or chronic bleeding reduces circulating RBC mass.

↓ RBC Production

Nutritional, marrow, or hormonal problems impair new RBC formation.

↑ RBC Destruction

Hemolysis shortens RBC lifespan, outpacing production.



Cause 1 – Blood Loss: The Silent Drain



Chronic or acute bleeding is a major cause of iron-deficiency anemia.

Heavy menstrual bleeding: frequent tampon/pad changes or large clots warrant evaluation. •

Gastrointestinal blood loss: ulcers, gastritis, polyps, inflammatory bowel disease, or malignancy. •

Trauma & surgery: acute hemorrhage can cause rapid anemia. •

Frequent blood donation: may deplete iron over time. •

⚠ Unexplained iron deficiency in adults should prompt GI evaluation to rule out occult bleeding.

Cause 2 – ↓ Red Blood Cell Production: Nutritional & Marrow Factors

Iron Deficiency

Most common global cause – iron is essential to make hemoglobin.

Vitamin B12 & Folate

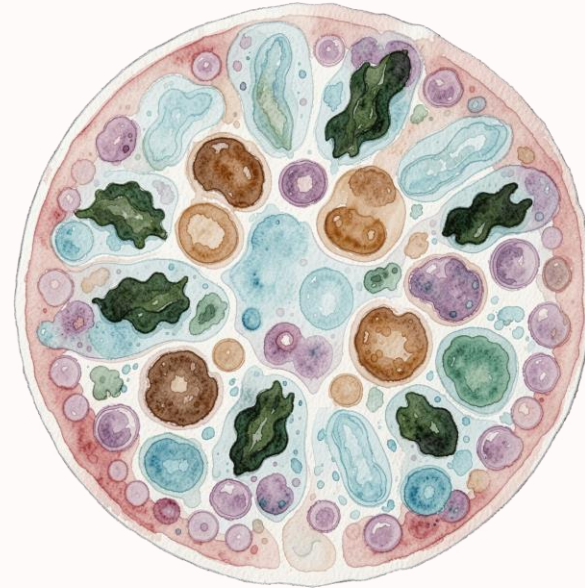
Needed for DNA synthesis in RBC precursors; deficiency causes large, dysfunctional RBCs.

Inherited Disorders

Thalassemia and other genetic defects impair hemoglobin production.

Bone Marrow Problems

Marrow infiltration, aplasia, or malignancy reduces RBC output.



Cause 3 – ↑ Red Blood Cell Destruction: Hemolysis



When RBCs are destroyed faster than they're produced, anemia develops despite normal marrow function.

- **Genetic:** Sickle cell disease causes misshapen RBCs that hemolyze.
- **Infectious:** Malaria invades and destroys RBCs.
- **Autoimmune:** Antibodies target RBCs (autoimmune hemolytic anemia).
- **Mechanical:** Prosthetic heart valves or microangiopathic processes shear RBCs.

- Key labs: elevated bilirubin, high LDH, low haptoglobin, and increased reticulocyte count indicate hemolysis.

Common Causes:

- ❑ **Dietary Deficiency:** Lack of iron, vitamin B-12, or folate.
- ❑ **Blood Loss:** Caused by ulcers, heavy menstruation, or cancer.
- ❑ **Malabsorption:** Intestinal conditions (e.g., Celiac, Crohn's) that prevent nutrient absorption.
- ❑ **Pregnancy:** Increased iron needs can lead to deficiencies if not supplemented.
- ❑ **Chronic Diseases:** Kidney disease, rheumatoid arthritis, or infection.

Key Risk Factors



- **Age:** Older adults have higher risk from chronic disease and nutritional deficits.
- **Pregnancy:** Increased iron demand can precipitate deficiency.
- **Dietary patterns:** Low intake of iron, B12 (animal products), or folate (leafy greens) raises risk.
- **Chronic disease:** Kidney disease, cancer, and inflammatory disorders impair RBC production.

Types by Cell Size – A Practical Classification



Microcytic

Small RBCs – commonly iron deficiency or thalassemia.

Macrocytic

Large RBCs – typically B12 or folate deficiency, or certain medications.

Normocytic

Normal-sized RBCs – often due to acute blood loss or chronic disease.

Mean corpuscular volume (MCV) on CBC helps narrow causes and guides further testing.

- **Symptoms**

- Fatigue and general weakness.
- Pale or yellowish skin.
- Shortness of breath.
- Dizziness or lightheadedness.
- Cold hands and feet.
- Irregular heartbeat or chest pain.



Anemia Diet and Nutrition

- ❑ **A nutrient-rich** diet can help treat and prevent nutritional anemia:
- ❑ **Iron-Rich Foods:** Leafy green vegetables (kale, spinach), red meat, beans, lentils, and fortified cereals.
- ❑ **Vitamin C:** Foods like citrus fruits and broccoli improve iron absorption.
- ❑ **Vitamin B-12 & Folate:** Found in dairy, eggs, fish, and fortified foods.
- ❑ **Avoid:** Excessive coffee/tea with meals, which can hinder iron absorption.

➤ **Treatment**

- **Iron Supplements:** For iron deficiency, often needing to be taken for several months.
- **Vitamin Supplements:** Vitamin B-12 injections or tablets, and folic acid supplements.
- **Blood Transfusions:** For severe cases to quickly boost red blood cell levels.
- **Medications:** To manage autoimmune causes or stimulate blood cell production.
- **Addressing Underlying Disease:** Treating infections or bleeding issues



Thank
you