Iron Deficiency Anemia

Iron deficiency anemia accounts for more than half of anemia cases worldwide. It is typically caused by malnutrition (decreased ingestion of meat, eggs, iron-fortified foods and leafy greens), as well as malabsorption (IBD, parasitism, celiac disease). Hemorrhage is another reason for this type of anemia, which may be caused by heavy menstruation, parasitism, malignancy or ulceration. This is a microcytic, hypochromic anemia which is caused by decreased heme synthesis. Labs typically show decreased reticulocytes, and decreased ferritin, which is an iron-storing protein. There is also an increased red cell distribution width, which helps distinguish iron deficiency anemia from thalassemia.



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Causes

Malnutrition/Malabsorption
Nutritional-plate-mallet/Intestine-mallet
Globally, the most common cause of iron deficiency anemia is malnutrition or malabsorption. Lack of access to regular consumption of iron-rich meat, eggs, nuts, legumes and leafy-greens over a period of time contributes to developing iron deficiency anemia. Malabsorption due to parasitism, celiac disease or inflammatory bowel disease also contributes to decreased iron absorption. Finally, certain bariatric surgeries reducing gastric surface area and gastric acid production may cause iron deficiency anemia.

Hemorrhage
Hemorrhage-hammer
Hemorrhage can contribute to iron deficient anemia if prolonged, uncontrolled and interfering with erythrocyte production and concentration of heme synthesis. Stored iron in the blood functionally lost with bleeding, and failure to replace this iron increases the risk of developing iron deficiency anemia. Menorrhagia (increased blood loss during menstruation), colorectal cancers disrupting vascularity and ulcers of the epigastrium and duodenum are common sources of hemorrhage. Intestinal parasites interfering with the function and/or absorption of iron may also contribute to hemorrhage.

Signs

Microcytic, Hypochromic Anemia
Small-cells with Hippo-chrome and Anemone
Iron deficiency anemia is a microcytic, hypochromic anemia. The mean corpuscular volume is less than 80 (MCV <80) and cellular concentration presents with central pallor.

Decreased Heme Synthesis
Down-arrow He-man
As the body's stores of iron are depleted and not replaced, a complete blood count (CBC) results in a decreased RBC count. A lack of stored or dietary replaced iron contributes to lack of heme-synthesis during formation of RBCs (or erythrocytes).

Labs

Decreased Reticulocytes
Down-arrow Rattle with Baby-cell
Reticulocytes are immature blood cells, a small component of the blood developing and maturing in the bone marrow. The reticulocyte count is decreased in iron deficient anemia as hematopoiesis is interrupted.

Decreased Ferritin
Down-arrow Ferret-tin
Ferritin is an iron-storing protein in the body’s cells, synthesized by the liver. For lab purposes, it is an important indicator for how much stored iron is present. Thus, in iron deficient anemia, ferritin levels are decreased.

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Increased Red Cell Distribution Width (RDW)

Up-arrow Red Cell Projectile Width

The red cell distribution width (RDW) measures the variation of blood cell volume in an obtained sample. Varying sizes of blood cells is a hallmark of iron deficiency anemia and helps distinguish between this disease and thalassemia (as both are hypochromic and microcytic).

Poikilocytosis

Pokiball-side-toe cell

Blood smears in these patients show a variation in blood cell shape (poikilocytosis).

Anisocytosis

N-ice-side-toe cell

Patients with iron deficiency anemia show blood cells of differing sizes (anisocytosis).

Increased Central Pallor

Up-arrow Pail with Central Pallor

Red blood cells in iron deficiency anemia show pallor on the inside of cells.

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