

Blood Chem Iron-Deficiency Anemia Review

DEFINITIONS OF ANEMIA

1. A condition in which the number of red blood cells is below normal
2. A hemoglobin level below 12 g/dL in women or 13 g/dL in men
3. A decreased ability of red blood cells to provide adequate oxygen supplies to body tissues.
4. Any condition characterized by an abnormal decrease in the body's total red blood cell mass.
5. An abnormal reduction in red blood cells.

Anemia is a symptom, not a disease.

CAUSES OF ANEMIA

- Nutritional deficiency (iron, zinc, B12, folate)
- Increased demand for iron (pregnancy, growth spurt)
- Blood loss (menstruation, childbirth, surgery, injury)
- Disease (infections, autoimmune, IBD, cancer, bleeding)
- Hormone imbalance (hypothyroidism)
- Bone marrow function (leukemia, aplastic anemia)
- Chronic hemolysis
- Poisoning (lead and other heavy metals)
- Medications (aspirin, anticonvulsants)
- Genetics (inherited blood forming diseases)

The most common causes you'll see in general practice are nutritional deficiency, whether iron, B12, or folate; increased demand; blood loss; and disease.

Category	Conditions
Iron deficiency	Diet
	Increased demand (growth, pregnancy)
	Blood loss (menstruation, parasites, etc.)
Malabsorption	H. pylori
	Crohn's
	Hypochlorhydria
Vitamin and mineral deficiencies	B6 (alcohol)
	Vitamin A, B, C, E, K, zinc, copper
	B12
Premature hemolysis	Hemolytic anemias
	Enzyme deficiencies
	Autoimmune disease
Dysfunctional erythropoiesis	Kidney failure
	Bone marrow failure
	Thalassemia
	Cancer
	Sideroblastic anemia
Bleeding disorders	Von Willebrand's
	PNH
	Hemophilia

SIGNS AND SYMPTOMS OF ANEMIA

Fatigue - most common	Brittle or spoon nails
Weakness	Pica (desire to eat non-food items)
Twitching/flinching	Headache
Restless legs syndrome (RLS)	Dizziness
Pale skin, tongue, fingernails, palms	Shortness of breath
Loss of tongue papillae	Tachycardia
Hyposalivation	Chest pain
Thrush	Splenomegaly

ANEMIA MARKERS

Marker	Lab range (female)	Fx. range (female)	Lab range (male)	Fx. range (male)
RBC	3.77–5.28	4.4–4.9	4.14–5.8	4.4–4.9
HGB	11.1–15.9	13.5–14.5	12.6–17.7	14–15
HCT	34–44.6	37–44	37.5–51.0	40–48
MCV	79–97	85–92	79–97	85–92
MCH	26.6–33.0	27.7–32.0	26.6–33.0	27.7–32.0
MCHC	31.5–35.7	32–35	31.5–35.7	32–35
RDW	12.3–15.4	11.5–15.0	12.3–15.4	11.5–15.0

All of these markers are included on the CBC. A reminder that RBC, Hgb and Hct are often the last lab markers to drop in iron-deficiency anemia.

IRON-DEFICIENCY ANEMIA

Marker	Value
RBC	Low
HGB	Low
HCT	Low
MCV	Low
MCH	Low
MCHC	Low
RDW	High

POPULATIONS AT RISK FOR IRON-DEFICIENCY ANEMIA

- Young children
- Adult females; common causes are heavy menstruation and diet

- The elderly; common causes are GI malabsorption such as hypochlorhydria, H. pylori, and diet
- People with bleeding disorders
- People with GI malabsorption (IBD, celiac, SIBO, hypochlorhydria, etc.)
- Vegans and vegetarians

ADDITIONAL NOTES

1. Remember, in iron-deficiency anemia, you'd expect MCV, MCH, and MCHC to be low, whereas in B12 or folate-deficiency anemia, you'd expect those markers to be high.
 - a. In some cases where you have concurrent B12 or folate deficiency and iron-deficiency anemia, MCV, MCH, and MCHC will be normal because you have the B12 and folate deficiency pushing them up and the iron deficiency pushing them down.
2. Copper deficiency can cause iron-deficiency anemia, and high doses of zinc supplements can induce copper deficiency.
3. Low magnesium levels can also contribute in cases of iron-deficiency anemia
4. Hemoglobin A1c may not be accurate where anemia is present because A1c is a measurement of glycation of red blood cells.

Treatment of iron-deficiency anemia involves addressing the underlying cause. and this could include nutrient deficiency, GI pathology, metal toxicity, hypothyroidism, autoimmunity, inflammation, infection, etc.

Refer to the iron-deficiency presentation for detailed information on how to restore iron levels.

If the patient does have iron-deficiency anemia, I suggest increasing dietary copper intake, especially if background copper intake is low or there are other signs of deficiency.

Remember that some studies have shown that increasing copper intake alone without giving the patient iron can resolve iron-deficiency anemia in some cases because copper helps iron get into the cells.