

Anemia of Chronic Disease

A plain-English guide for you and your family

WHAT IS HAPPENING

Normally, iron moves through your body in a cycle. Old red blood cells break down in your spleen (an organ that filters blood) and release their iron. You absorb iron from food in your intestine. A protein called transferrin carries that iron through your blood to your bone marrow (the spongy tissue inside your bones where blood cells are made). A liver hormone called hepcidin acts like a gate—it controls how much iron leaves storage sites and enters the bloodstream. When you have a chronic illness that causes long-term inflammation—such as rheumatoid arthritis (swollen, painful joints), inflammatory bowel disease (ongoing gut inflammation), cancer, chronic kidney disease, or a lingering infection—your immune system releases messenger proteins called cytokines (especially one named IL-6). These cytokines tell your liver to make more hepcidin. High hepcidin slams the gate shut: iron gets trapped inside immune cells and liver storage, so transferrin in your blood runs low on iron. At the same time, your kidneys make less erythropoietin (the hormone that tells bone marrow to speed up red blood cell production). The result is that your bone marrow cannot get enough iron or enough signal to make red cells, so production slows over weeks to months. You develop anemia (low red blood cell count) slowly. Blood tests show a paradox: serum iron is low (not enough floating in blood), ferritin is normal or high (storage bins are full but locked), TIBC (a measure of how hungry your body is for iron) is low (your body thinks iron is dangerous), and transferrin saturation (the percent of transferrin actually carrying iron) is low. Your body is hoarding iron to starve bacteria and cancer cells, but that same defense starves your own blood-making machinery. Every lab finding and every symptom trace back to one upstream break: chronic inflammation raises hepcidin and suppresses erythropoietin.

What you might feel

- Fatigue and tiring quickly during activities that used to feel easy (like climbing stairs or walking a few blocks)
- Pale skin, pale inside the eyelids, or pale nail beds
- Shortness of breath when you move around or exercise
- Fast heartbeat (your heart pounds or races, especially when you are active)

- Feeling dizzy or lightheaded, especially when you stand up quickly
- Headache (usually a dull, steady ache)
- Cold hands and feet
- Your underlying disease feels worse (for example, more joint pain if you have rheumatoid arthritis, or more trouble breathing if you have kidney disease)
- New chest pain or much worse shortness of breath (especially at rest) if you already have heart disease or heart failure
- Fainting (syncope)

Call the doctor right away if...

- Hemoglobin below 7–8 g/dL, or a drop of more than 2 g/dL in one week (suggests sudden bleeding inside the body or red cells breaking apart on top of the chronic anemia)
- New chest pain, severe shortness of breath while resting, or fainting in a person with anemia who also has heart disease (sign the heart is not getting enough oxygen and may be failing)
- Fever, losing weight without trying, drenching night sweats, or swollen lymph nodes along with anemia (raises worry for cancer, tuberculosis, or HIV hiding underneath)
- Hemoglobin keeps falling even after treating the main disease, or does not improve with erythropoietin shots and iron pills (suggests hidden bleeding, red cells being destroyed, or bone marrow taken over by cancer or damaged by medicine)
- Signs of too much iron in the body—ferritin above 1,000 ng/mL, liver swelling, or skin turning bronze—in someone getting many blood transfusions (iron overload can poison the liver, heart, and pancreas)

What the care team will do

- Check hemoglobin and hematocrit (the percentage of blood that is red cells) on admission and compare to recent results to detect sudden drops of 2 grams per deciliter or more
- Monitor vital signs every 4 hours, watching for heart rate above 100 beats per minute, respiratory rate above 20 breaths per minute, or systolic blood pressure below 90 millimeters of mercury
- Assess for chest pain, severe shortness of breath at rest, or confusion every shift and report immediately if present
- Place the patient on fall precautions: bed alarm on, call light in reach, non-skid socks, and assist with all walking and transfers

- Administer prescribed disease-specific treatments on time: give methotrexate or biologic injections for autoimmune diseases, antibiotics for infections, chemotherapy for cancer, or erythropoiesis-stimulating agent injections for kidney disease
- Give oral iron (ferrous sulfate 325 milligrams once daily) or IV iron as ordered, and teach the patient that iron works slowly and may cause dark stools or constipation
- Plan nursing care and daily activities in short blocks with rest periods in between, and cluster tasks like bathing, vital signs, and medication administration to avoid exhausting the patient
- Educate the patient and family that correcting this anemia takes weeks to months because it requires controlling the underlying disease first, not just taking iron pills

Medicines you may be given — and why

Disease-modifying antirheumatic drugs (DMARDs)

DMARDs quiet down the overactive immune system that is attacking the joints in rheumatoid arthritis. When inflammation drops, the body makes less hepcidin (a liver protein that locks iron inside storage cells). With less hepcidin blocking the exits, iron can leave storage and travel to the bone marrow where new red blood cells are built. Common DMARDs include methotrexate, sulfasalazine, and hydroxychloroquine.

Oral iron supplementation (ferrous sulfate, ferrous gluconate, ferrous fumarate)

Iron pills give the body extra iron to fill the gap when blood tests show true iron deficiency (transferrin saturation below 20 percent or ferritin below 30 ng/mL). The small intestine absorbs iron into the bloodstream, transferrin carries it to the bone marrow, and the marrow uses it to build hemoglobin—the oxygen-carrying protein inside red blood cells. Each pill delivers 65 mg of elemental iron (the usable form).

Intravenous (IV) iron (iron sucrose, ferric carboxymaltose, iron dextran)

IV iron delivers a large dose of iron directly into the bloodstream, bypassing the small intestine where hepcidin blocks absorption. Macrophages (clean-up immune cells) in the liver and spleen grab the IV iron particles, break them down, and release iron into the blood. Transferrin carries the iron to the bone marrow to build hemoglobin. IV iron is used when oral iron fails (either the gut cannot absorb it or side effects are intolerable) or when rapid correction is needed (such as before surgery).

Erythropoiesis-stimulating agents (ESAs): epoetin alfa, darbepoetin alfa

ESAs are lab-made copies of erythropoietin, a hormone the kidneys normally make to tell the bone marrow to produce red blood cells. In chronic kidney disease, damaged kidneys make too

little erythropoietin, so red blood cell production drops. ESAs are injected under the skin or into a vein to replace the missing hormone. They are also used in cancer patients on chemotherapy when hemoglobin falls below 10 g/dL and symptoms (fatigue, shortness of breath) interfere with daily life. ESAs work only if the body has enough iron; iron stores must be checked and refilled first.

Packed red blood cell (PRBC) transfusion

A transfusion delivers healthy red blood cells from a donor directly into the patient's vein, instantly raising the oxygen-carrying capacity of the blood. Each unit of packed red blood cells raises hemoglobin by about 1 g/dL in an average adult. Transfusion is reserved for severe anemia (hemoglobin below 7 g/dL) with symptoms such as chest pain, trouble breathing, dizziness, or confusion, or for active bleeding when the body cannot wait weeks for medications to work. The donor blood is tested for blood type (A, B, AB, O) and Rh factor (positive or negative) and screened for infections (HIV, hepatitis B and C, syphilis).

Where this information comes from

- KDIGO 2012 Clinical Practice Guideline for Anemia in Chronic Kidney Disease
- American Society of Hematology (ASH) guidelines on anemia management
- FDA Safety Communication on Erythropoiesis-Stimulating Agents
- AABB (American Association of Blood Banks) Clinical Practice Guidelines on Red Blood Cell Transfusion 2016

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