

Anemia of Chronic Kidney Disease

A plain-English guide for you and your family

WHAT IS HAPPENING

Normally, your kidneys do more than just clean your blood—they also make a hormone called erythropoietin that tells your bone marrow to make red blood cells. When kidney disease lasts a long time, the damaged kidneys cannot produce enough of this hormone. Without that signal, your bone marrow slows down red blood cell production, and you develop anemia, which means you don't have enough red cells to carry oxygen to your body. This is why people with kidney disease often feel tired and weak, even if they are eating well.

What you might feel

- Fatigue and weakness
- Shortness of breath with mild activity
- Pale skin and mucous membranes
- Dizziness or lightheadedness
- Cold hands and feet
- Chest pain or pressure
- Rapid or irregular heartbeat
- Confusion or difficulty concentrating

Call the doctor right away if...

- Hemoglobin below 7 g/dL with chest pain or shortness of breath suggests cardiac starved blood flow (ischemia) requiring urgent transfusion
- Black tarry stools or bright red blood in stool indicates active GI bleeding requiring endoscopy before anemia treatment
- Sudden drop in hemoglobin of 2 g/dL or more in 2 weeks suggests acute bleeding or red blood cell destruction (hemolysis) needing immediate workup
- New heart failure symptoms with anemia require urgent treatment as severe anemia can trigger cardiogenic shock

What the care team will do

- Monitor hemoglobin (oxygen-carrying protein in blood) and hematocrit (percentage of blood made up of red blood cells) levels regularly
- Assess for signs of tissue low oxygen (hypoxia) (low oxygen in body tissues) including fatigue, shortness of breath, chest pain, and confusion
- Administer erythropoiesis-stimulating agents (ESAs) such as epoetin alfa or darbepoetin alfa as prescribed
- Monitor and maintain adequate iron stores through serum ferritin (protein that stores iron) and transferrin saturation (TSAT) testing
- Educate patient about dietary protein and phosphorus balance while ensuring adequate nutrition
- Monitor blood pressure closely during ESA therapy
- Assess for bleeding risk and avoid unnecessary blood draws
- Coordinate care with nephrology and evaluate dialysis adequacy if patient is on renal replacement therapy

Medicines you may be given — and why

epoetin alfa

This is a manufactured copy of erythropoietin, the hormone healthy kidneys make to tell bone marrow to produce red blood cells. It binds to receptors (docking stations) on immature red blood cells in bone marrow. This signal turns on genes that make the cells multiply and mature into functional red blood cells that carry oxygen.

darbepoetin alfa

This is a modified version of erythropoietin with extra sugar molecules attached that make it last longer in the body. It works the same way as natural erythropoietin by stimulating bone marrow to make red blood cells. The longer half-life (time in body before breaking down) means it can be given less frequently than epoetin alfa, usually once weekly or every two weeks.

iron sucrose

This is iron surrounded by a sucrose (sugar) shell that protects it in the bloodstream. Macrophages (cleanup cells) in the liver and spleen take up the iron-sucrose complex and slowly release iron into the body's storage pool. From storage, iron moves to bone marrow where it is inserted into hemoglobin molecules being made inside developing red blood cells. Intravenous iron bypasses the gut absorption problems common in kidney disease.

ferric carboxymaltose

This is iron bound to a carbohydrate shell that is very stable in blood, allowing large doses to be given in a single infusion. The complex is taken up by macrophages and iron is released into storage pools over weeks. This formulation allows rapid repletion of iron stores without the frequent dosing required by older intravenous iron products. It works the same way as other IV iron once released into the body's iron pool.

roxadustat

This oral medication blocks enzymes that normally break down HIF (hypoxia-inducible factor), a protein that controls the body's response to low oxygen. When HIF accumulates, it turns on multiple genes including the erythropoietin gene in kidney cells and genes that improve iron absorption from the gut and iron release from storage. This mimics the body's natural adaptation to high altitude or low oxygen conditions.

packed red blood cell transfusion

This is not a medication but a biological product containing concentrated red blood cells from donors. Each unit immediately adds functional red blood cells to circulation, raising hemoglobin by approximately 1 g/dL per unit in average adult. Transfused cells survive 28-35 days in circulation before being removed by the spleen. This provides rapid correction of oxygen-carrying capacity in severe or symptomatic anemia while waiting for other treatments to work.

Where this information comes from

- Kidney Disease: Improving Global Outcomes (KDIGO) Anemia Work Group. KDIGO Clinical Practice Guideline for Anemia in Chronic Kidney Disease. Kidney International Supplements. 2012;2(4):279-335
- National Kidney Foundation. KDOQI Clinical Practice Guideline and Clinical Practice Recommendations for Anemia in Chronic Kidney Disease: 2007 Update of Hemoglobin Target. American Journal of Kidney Diseases. 2007;50(3):471-530
- American Society of Hematology 2023 Guidelines for Management of Anemia in Chronic Kidney Disease
- Centers for Disease Control and Prevention (CDC). Chronic Kidney Disease in the United States, 2023. National Chronic Kidney Disease Fact Sheet

Last reviewed: 2026-08-29