CONDITION

Anemia of chronic disease

Learn how chronic inflammation can cause anemia, including common symptoms, blood test findings, treatment options, and when to seek urgent care.

WHAT IT IS
Anemia linked to long-term inflammation

BODY SYSTEM
Blood

MAIN SYMPTOMS
Tiredness, weakness, shortness of breath, dizziness

WHAT CAUSES IT
Long-term inflammation

HOW IT IS DIAGNOSED
Blood test pattern and ruling out other causes

MAIN TREATMENT
Treatment of the underlying condition

CAN IT BE CURED?
Sometimes, when underlying condition is treated

IS IT AN EMERGENCY?
Sometimes, with chest pain or severe breathing difficulty

LONG-TERM OUTLOOK
Often mild or moderate, depending on the underlying illness

Overview

Anemia of chronic disease is a type of anemia linked to long-term inflammation. It is also called anemia of inflammation . It can occur with chronic infections, autoimmune and inflammatory diseases, cancer, kidney disease, and other conditions that keep the immune system active.

Anemia means that the blood does not have enough healthy red blood cells or hemoglobin. Hemoglobin is the protein in red blood cells that carries oxygen throughout the body. When hemoglobin is low, the body's tissues may receive less oxygen.

During inflammation, the immune system changes how the body stores and uses iron. Much of this effect is controlled by hepcidin , a hormone made by the liver. Higher hepcidin levels reduce iron absorption from the intestine and trap stored iron inside certain cells. Iron may be present in the body but less available for making red blood cells.

Inflammation can also shorten the life of red blood cells and reduce the bone marrow's response to erythropoietin, a hormone that signals the marrow to produce red blood cells. In chronic kidney disease, reduced erythropoietin production can add to these effects.

This anemia is often mild or moderate and develops gradually. However, its severity depends on the underlying illness, whether other causes of anemia are present, and the person's overall health. Anemia of chronic disease can occur at the same time as iron-deficiency anemia, bleeding, vitamin deficiency, or another blood disorder. Distinguishing among these conditions matters because their treatments are different.

Symptoms

Mild anemia may not cause noticeable symptoms, especially when it develops slowly. Symptoms can also overlap with those of the underlying condition.

Possible symptoms include:

Symptoms do not always match the hemoglobin level. A person with heart or lung disease may feel the effects of anemia more strongly. Someone whose anemia develops slowly may have few symptoms despite a low result.

Chest pain, severe trouble breathing, fainting, confusion, or a rapid heartbeat with weakness can indicate that the body is not getting enough oxygen or that another serious problem is present. These symptoms require urgent medical assessment. Call emergency services for severe or sudden symptoms rather than waiting for a routine appointment.

- Tiredness, weakness, or reduced stamina
- Shortness of breath during activity
- Dizziness or lightheadedness
- Headache
- Trouble concentrating
- A fast or noticeable heartbeat
- Pale skin, though this may be difficult to recognize in some skin tones
- Greater difficulty completing usual work, exercise, or household tasks

Causes and risk factors

Anemia of chronic disease develops because inflammation interferes with several steps in red

blood cell production. It is not caused by one specific disease.

Conditions associated with this type of anemia include:

Chronic kidney disease deserves special attention. Healthy kidneys make erythropoietin, which tells the bone marrow to produce red blood cells. Damaged kidneys may make less of this hormone. People with kidney disease may also have inflammation, iron loss, or iron that is not readily available to the bone marrow. Their anemia can therefore have several causes at once.

The longer and more active the underlying condition is, the more likely it is to affect red blood cell production. However, the severity of anemia does not always reflect the severity of the disease.

Other problems can occur alongside anemia of chronic disease. These include blood loss from the digestive tract or heavy menstrual bleeding, low iron intake, poor iron absorption, vitamin B12 or folate deficiency, medication effects, or disorders of the bone marrow. Assuming that all anemia comes from inflammation could delay treatment of one of these additional causes.

- Autoimmune or inflammatory diseases, such as rheumatoid arthritis or inflammatory bowel disease
- Long-lasting infections, including some bacterial, fungal, or viral infections
- Cancer, especially when it causes ongoing inflammation
- Chronic kidney disease
- Chronic inflammatory conditions affecting organs such as the lungs or heart
- Severe or prolonged illness, including illness requiring hospital care

Diagnosis

Diagnosis begins with a medical history, physical examination, and blood tests. A clinician may ask about symptoms, chronic medical conditions, infections, menstrual or other bleeding, diet, medicines, family history, and previous blood test results.

A complete blood count , or CBC, measures hemoglobin, hematocrit, and the number and size of red blood cells. In anemia of chronic disease, red blood cells are often normal in size. This is called normocytic anemia . Over time, they may become smaller than usual, which is called microcytic anemia . Cell size alone cannot confirm the cause.

A reticulocyte count may also be checked. Reticulocytes are young red blood cells. A low or inappropriately normal count can suggest that the bone marrow is not producing enough new

cells for the degree of anemia.

Iron studies help show how the body is handling iron. Common tests include:

Anemia of chronic disease commonly causes low serum iron and low transferrin saturation. Ferritin may be normal or high because iron is stored rather than made available, and because ferritin itself rises during inflammation. By contrast, iron-deficiency anemia often causes low ferritin. Interpretation can be difficult when inflammation and true iron deficiency occur together.

Clinicians may order C-reactive protein or erythrocyte sedimentation rate to look for inflammation. Kidney function, liver tests, thyroid tests, vitamin B12, folate, and tests for blood loss may be appropriate depending on the situation. A blood smear allows the shape and appearance of blood cells to be examined under a microscope.

There is no single test that proves anemia of chronic disease in every person. Diagnosis usually depends on the overall pattern and on ruling out other causes. If the cause remains unclear, the anemia is worsening, or other blood cell counts are abnormal, referral to a hematologist may be needed. A hematologist is a doctor who specializes in blood disorders. Bone marrow testing is not routine, but it may be considered when another marrow disorder is suspected.

- Serum iron , which measures iron circulating in the blood
- Ferritin , which usually reflects stored iron but can rise during inflammation
- Transferrin or total iron-binding capacity , which reflects the blood's ability to transport iron
- Transferrin saturation , which estimates how much iron is attached to its transport protein

Treatment and management

The main treatment is to manage the condition causing the inflammation. Effective treatment of an infection, autoimmune disease, cancer, or another chronic illness may allow hemoglobin to improve. Recovery may take time because the body must produce new red blood cells.

Iron supplements are not automatically helpful. In anemia of chronic disease, the body may already have iron but be unable to use it efficiently. Taking iron without evaluation may provide little benefit and may cause side effects. It can also make it harder to recognize the true reason for anemia.

Iron may be appropriate when testing shows iron deficiency or when a person has both iron deficiency and inflammation. Depending on the clinical setting, iron may be taken by mouth or given into a vein. The choice depends on the cause of the deficiency, absorption, response to

previous treatment, kidney function, ongoing blood loss, and other health factors. A clinician should guide this decision and monitor the response.

Some people with chronic kidney disease receive medicines called erythropoiesis-stimulating agents , or ESAs. These medicines act like erythropoietin and encourage the bone marrow to make red blood cells. ESAs are also used in selected people receiving chemotherapy. They are not appropriate for every type of anemia and have important risks, including blood clots and cardiovascular complications. Decisions about their use depend on the treatment setting, symptoms, hemoglobin level, iron status, and individual goals.

A red blood cell transfusion may be used when anemia is severe, causes significant symptoms, or requires rapid correction. Transfusions can improve oxygen delivery quickly, but their effects are temporary and they carry risks. They are not a routine treatment for stable, mild anemia.

Nutrition supports general health but usually cannot correct anemia caused mainly by inflammation. A balanced diet that includes adequate iron, vitamin B12, folate, and protein may help prevent additional deficiencies. People should not stop medicines or begin high-dose supplements because of an abnormal blood count without speaking with a healthcare professional.

Complications

Persistent anemia can reduce energy, physical function, and quality of life. It may make recovery from illness harder and can add to shortness of breath or exercise limits caused by heart or lung disease.

When anemia is severe, the heart must work harder to deliver oxygen. This may worsen existing heart disease or contribute to a fast heartbeat, chest discomfort, or heart failure symptoms. The risk depends on how low the hemoglobin is, how quickly it fell, and the person's other medical conditions.

Complications may also come from an unrecognized cause. For example, chronic bleeding, kidney disease, nutritional deficiency, or a bone marrow disorder may require treatment that differs from treatment for inflammation alone.

Follow up

Follow-up usually includes repeat blood counts and review of the underlying condition. The timing depends on the severity of anemia, symptoms, treatment changes, and whether

hemoglobin is stable.

Clinicians may repeat iron studies or other tests if anemia worsens or does not improve as expected. People receiving iron, an ESA, chemotherapy, dialysis, or treatment for active inflammatory disease may need more structured monitoring.

Arrange routine follow-up if fatigue, reduced exercise tolerance, dizziness, or other possible anemia symptoms are persistent or worsening. Contact a healthcare professional sooner if there is new bleeding, black or bloody stool, unusually heavy menstrual bleeding, unexplained bruising, fever, weight loss, or a major change in health.

Seek urgent care for significant shortness of breath, a very fast heartbeat, worsening weakness, or near-fainting. Call emergency services for chest pain, severe difficulty breathing, fainting, confusion, or other sudden and severe symptoms.

Sources

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