

## Microcytic Anemia: Anemia of Chronic Diseases

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**The so-called anemia of chronic disease is very common, and therefore important to know. From this article, you will have all the relevant facts that you need in order to be well-prepared for your exams.**



### Definition of Anemia of Chronic Diseases

Anemia of chronic disease is **non-progressive anemia that occurs as part of chronic inflammatory, infectious, or neoplastic diseases**. It is usually rather mild, but its severity correlates with the severity of the underlying disease.

**Note:** Chronic inflammation causes sequestration of iron in bone marrow macrophages. This effect seems to be mediated by interleukin (IL)-1.

### Epidemiology of Anemia of Chronic Diseases

After **iron deficiency anemia**, the anemia of chronic disease, is the 2nd most common type of anemia, having a 20% chance of occurrence.

# Etiology and Pathogenesis of Anemia of Chronic Disease

Typically, an organism reacts to infections, inflammatory system diseases, and malignoma by increasing the release of inflammatory mediators. These not only have a local, but also a systemic effect. In this context, **cytokines** play a special role: when their systemic release is increased, this provokes an imbalance in the **homeostasis of iron** by influencing the physiological storage of iron in the macrophages of the bone marrow.

Also, the mediators trigger the production of **hepcidin** in the hepatocytes. Hecpidin inhibits iron uptake in the intestines and lowers the availability of iron for erythropoiesis. This results in **increased iron retention and insufficient iron output**.

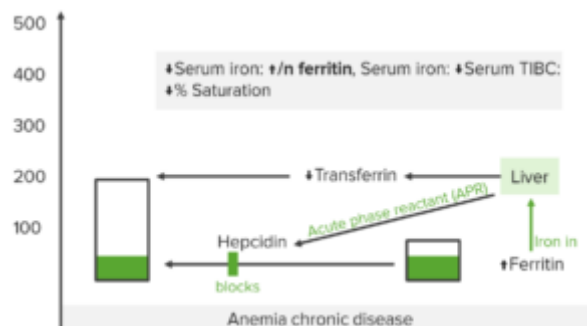
The consequence is a relative insufficiency in iron, which, from a pathophysiological perspective, leads to a defective composition in the **heme molecule**, and clinically manifests as anemia.

In addition to the imbalanced iron homeostasis, the increased release of cytokines also provokes the **suppression of erythropoietin production**. So, not only is there a relative insufficiency in iron, but also erythropoietin. Moreover, under the influence of the cytokines, the life-span of red blood cells (RBCs) is shortened by about 80–90 days.

**Some of the underlying diseases that may cause anemia of chronic disease are:**

- **Infectious:** [Pneumonia](#), [tuberculosis](#), osteomyelitis, [bacterial endocarditis](#), and pulmonary abscesses
- **Non-infectious:** [Systemic lupus erythematosus \(SLE\)](#), [Crohn's disease](#), [ulcerative colitis](#), vasculitides, [rheumatoid arthritis](#), and [sarcoidosis](#)
- **Malign diseases:** [Carcinoma](#), [lymphoma](#), sarcoma, and multiple myeloma

**Laboratory values:**



■ Image: Iron studies (labs) of anemia of chronic disease. By Lecturio

Mildly decreased hemoglobin (Hbg) (usually not < 9 mg/dL) and hematocrit (Hct).

- RBCs are usually normocytic to mildly microcytic.
- Red cell distribution width (RDW) is normal to slightly increased.
- Normal to increased serum ferritin (acute phase reactant, the main distinguishing feature between iron deficiency anemia and anemia of chronic disease).

# Clinical Presentation and Symptoms of Anemia of Chronic Disease



[Image](#): Main symptoms that may appear in anemia. By Mikael Häggström, License: Public Domain

Unspecific general symptoms like **fever** and **weight loss** in combination with other, typical signs of anemia like **fatigue, weakness, tachycardia**, or visual impairments, should be considered as possible indicators of anemia of chronic inflammation. Since anemia of inflammation is a consequence of an underlying disease, it is also important to look out for specific symptoms of the respective underlying disease.

## Diagnosis and Differential Diagnosis of Anemia of Chronic Disease

If the underlying disease is known and is accompanied by signs of anemia, suspecting anemia of chronic diseases is reasonable but has to be further verified.

Laboratory tests will initially show **hyporegenerative, normochromic, normocytic anemia**. Only further in the course of the disease, can it be narrowed down as **hypochromic, microcytic anemia**.

**Hematocrit, erythrocyte, and reticulocyte levels** are **reduced**. Hgb is also reduced, but the level usually does not fall below 9.0 g/dL. In contrast, **ferritin** will be **increased** since iron insufficiency is not absolute and is primarily a dysfunction of iron homeostasis. It is crucial to identify this circumstance because it is a way to exclude iron deficiency anemia as a differential diagnosis.

Furthermore, the **measurement of the inflammatory markers** is indicative. Patients with anemia of chronic inflammation have **increased blood sedimentation rate (BSR) and C-reactive protein (CRP)**. A **bone marrow examination** can detect normal or increased iron storage.

The causes of anemia can be diverse. Since different triggers, such as hemorrhages or hemolysis, could be present simultaneously during disease and since this could always change the clinical manifestation of an already diagnosed anemia, such a diagnosis will have to be reassessed regularly. It is a diagnosis of exclusion.

## Treatment of Anemia of Chronic Diseases

The 1st priority is to **treat the underlying disease**. Additionally, an erythropoietin substitution might be considered. Oral iron therapy is ineffective, and, due to the relative iron insufficiency which cannot be remedied by the oral intake of iron, it is contraindicated.

## Prognosis of Anemia of Chronic Diseases

If the underlying disease can be treated successfully, the anemia will also subside.

# References

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