Microcytic Anemia: Iron Deficiency Anemia (Ferropenic)

In practice, anemia often appears in the blood count, accompanying many acute and chronic diseases. Clarification is definitely recommended because already a lowered hemoglobin value alone can be the first important hint for an undetected underlying disease.

Definition of Iron Deficiency Anemia

Iron deficiency is the most common cause of anemia worldwide. An iron deficiency anemia, like the name of the disease, already tells, is anemia caused by substantially decreased iron reservoirs.

You can read more on hemolytic anemia here.

Distribution of iron in the body, normal iron studies
There are 4-5 gm of iron in the body. There is no mechanism for regulating the excretion of iron. Iron can be toxic in excess and so the absorption of iron is controlled.
Haem biosynthesis within the immature red cell

Haem

Etiology and Epidemiology of the Iron Deficiency Anemia

The production of erythrocytes and hemoglobin is largely dependent on the availability of erythropoietin (epo) and iron.

The most frequent reasons for critically lowered iron values are chronic bleeding – either through increased menstrual bleeding (hypermenorrhea) or pathological bleeding caused by a gastric ulcer, pregnancy without sufficient substitution of iron or a parasitic infestation (parasitic disease).

Rarer possible causes for an iron deficiency anemia are disruption of the resorption or...
malnutrition.

With the dissemination of 35 %, the iron-deficiency anemia represents the most common cause for anemia. Roughly 5-10 % of menstruating women suffer from iron deficiency anemia. Men are much more rarely affected by anemia.

**Note:** Chronic blood loss, depleting iron stores (GI bleeding — ulcer, diverticulosis, colon cancer; GYN bleeding — menorrhagia)!

### Symptoms of Iron Deficiency Anemia

An iron deficiency anemia has the same symptoms than any other anemia:

- Tachycardia
- Fatigue
- Weakness
- Lack of concentration
- Diminished strength

Further clinical symptoms are dry skin, possible headache and hair loss.

**Nail dystrophy, glossitis** (Hunter-Glossitis) and **atrophies** in the area of the mouth (angular cheilitis), throat and the esophagus, are typical symptoms for the **Plummer-Vinson syndrome**. A particular symptom is pronounced sensitivity to cold.
Diagnostics and Differential Diagnosis of Iron Deficiency Anemia

A complete blood count is important for adequately diagnosing iron deficiency anemia. Normally, a hypochromasia is displayed in the laboratory diagnostics in combination with a microcytosis and a reduced value of serum ferritin (< 15 µg/l). The hematocrit is lowered.

Depending on the severity of the anemia, the number of erythrocytes can also be reduced. For further clarification, it is necessary to measure the reactive increased value of transferrin, as well as the concentration of hemoglobin of the reticulocytes (lowered, < 28 pg).
The diagnostics of iron-deficiency anemia is not always easy. For instance, a folate deficiency occurring simultaneously can compensate the microcytosis and, therefore, falsify an important laboratory parameter for the iron deficiency anemia.

It is important to consider that because of counterproductive diagnostics, a possible disease may not be diagnosed, leading to the anemia and the actual cause being overlooked. Officially, not applying the required therapy only counts as malpractice, but for the patient, this can have serious consequences in reality.

In case the result is uncertain, it is important to take thalassemia into consideration.

**Note:** Laboratory values are decreased Hgb, Hct, RBC count; decreased MCV, MCHC; increased RDW; decreased ferritin, serum iron, and transferrin saturation; increased TIBC!

**Therapy of Iron Deficiency Anemia**

In case the finding of an iron deficiency anemia is definite and the diagnostics for a different underlying disease (like, for instance, a duodenal ulcer or a colon carcinoma) turn out to be negative, the primary therapeutic target is a correcting the negative iron balance through the substitution of iron.

**The following rules should be kept in mind:**

1. If possible, iron should be **applied orally**. Only in case of a strong incompatibility and special indication, the iron should be substituted parenteral.
2. The recommended **daily dose is between 50 and 150 mg**. Resorption is highest on an empty stomach. In case this is not tolerated by the patient, the iron should be taken during meals.
3. A rule of thumb for the application duration of the substitution of iron is that, after
normalization of the value of hemoglobin, monitor the progress! The substitution of iron should be resumed for the same period of time it took for the hemoglobin value to normalize. Normally, the patient should substitute iron for several months. In case the duration of the substitution is too short, it leads, in all likelihood, to empty iron reservoirs, ultimately leading to anemia.

4. In case the value of hemoglobin does not increase during the regular follow-up, both the therapy and the diagnosis should be checked. Other causes which have not been taken in account so far should be researched.

Side Effects of the Therapy of Iron Deficiency Anemia

The most common side effects are stomach problems with nausea and obstipation, but also diarrhea. Often, the stool turns darker or black, which is harmless as long as there are no other symptoms.

Course and Follow-up of Iron Deficiency Anemia

Only a few days after the initial substitution of iron, the increasing erythropoiesis becomes obvious in the blood smear through reticulocytosis. As a result of the substitution, the expected increase of the hemoglobin is roughly around 0.1 g/dl per day. In case this is not confirmed by the follow-up, there is either a continued loss of iron or the substitution of iron itself is defective or incorrect.

To exclude the latter, the compliance of the patient should be checked. If checked and there are no hints for defective compliance, the diagnosis or the choice of therapy (enteral/parenteral) should be questioned.

Note: The causes for an iron deficiency anemia are hypermenorrhea, pathological, mostly intestinal bleedings, and disorder of absorption as well as malnutrition. Important symptoms are B-symptoms like fatigue and weakness, as well as the typical symptoms of the Plummer-Vinson’s-syndrome. A specific sign is a sensitivity to cold. In case of an iron deficiency anemia, the treatment of the cause has the highest priority. The therapy of the iron deficiency anemia is a combination of treating the underlying disease, as well as a substitution of iron.

References


