

## Hemoglobin

**Also known as:** Hgb; Hb

**Formal name:** Hemoglobin

**Related tests:** Complete blood count

### How is it used?

The hemoglobin test is an integral part of your health evaluation. The test is used to:

- measure the severity of anemia or polycythemia,
- monitor the response to treatment of anemia or polycythemia, and
- help make decisions about blood transfusions if the anemia is severe.

The American Academy of Pediatrics (AAP) recommends **screening for** anemia between the ages of 9 to 12 months with additional **screening** between the ages of 1 and 5 years **for** patients at risk. The **screening** may be universal or selective depending on the prevalence of iron deficiency **anemia** in the population. Improved infant rearing practices—including wider availability, acceptance, and use of iron-**fortified formulas**; iron **fortification** of foods; and increased awareness of the importance of dietary iron supplementation especially early in life—have led to significant decline in the incidence of **anemia** in the first year of life. However, incidence of iron deficiency and ensuing **anemia in children** between 1 and 2 years continues to be significant and an important issue.

## Iron deficiency anemia - children

### Definition

Anemia is a condition in which the body does not have enough healthy red blood cells. Red blood cells bring oxygen to body tissues.

There are many types of anemia. **Iron deficiency anemia** is a decrease in the number of red blood cells in the blood due to a lack of iron.

This article focuses on **iron deficiency anemia** in children.

### Alternative Names

Anemia - iron deficiency - children

### Causes

**Iron deficiency anemia** is the most common form of anemia. You get iron through certain foods, and your body also reuses iron from old red blood cells.

Iron deficiency (too little iron) may be caused by:

- An iron-poor diet (this is the most common cause)
- Body not being able to absorb iron very well, even though you're eating enough iron
- Long-term, slow blood loss -- usually through menstrual periods or bleeding in the digestive tract
- Rapid growth (in the first year of life and in adolescence), when more iron is needed

Babies are born with iron stored in their bodies. Because they grow rapidly, infants and children need to absorb an average of 1 mg of iron per day.

Since children only absorb about 10% of the iron they eat, most children need to receive 8-10 mg of iron per day. Breastfed babies need less, because iron is absorbed 3 times better when it is in breast milk.

Cow's milk is a common cause of iron deficiency. It contains less iron than many other foods and also makes it more difficult for the body to absorb iron from other foods. Cow's milk also can cause the intestines to lose small amounts of blood.

The risk of developing **iron deficiency anemia** is increased in:

- Infants younger than 12 months who drink cow's milk rather than breast milk or iron-fortified formula
- Young children who drink a lot of cow's milk rather than eating foods that supply the body with more iron

**Iron deficiency anemia** most commonly affects babies 9 - 24 months old. All babies should have a screening test for iron deficiency at this age. Babies born prematurely may need to be tested earlier.

Iron deficiency in children also can be related to lead poisoning.

### **Symptoms**

- Blue-tinged or very pale whites of eyes
- Blood in the stools
- Brittle nails
- Decreased appetite (especially in children)
- Fatigue
- Headache

- Irritability
- Pale skin color (pallor)
- Shortness of breath
- Sore tongue
- Unusual food cravings (called pica)
- Weakness

Note: There may be no symptoms if anemia is mild.

### **Exams and Tests**

The health care provider will perform a physical exam. A blood sample is taken and sent to a laboratory for examination. Iron-deficient red blood cells appear small and pale when looked at under a microscope.

Specific tests that may be done include:

- Hematocrit/Hemoglobin
- Serum ferritin reveals the amount of iron stored in your body
- Serum iron shows how much iron is in your blood
- Total iron binding capacity (TIBC) to measure the ability of a protein called transferrin to carry iron in the blood

A measurement called iron saturation often can give a good assessment of whether you have enough iron in your body.

### **Treatment**

Treatment involves iron supplements (ferrous sulfate), which are taken by mouth. The iron is best absorbed on an empty stomach, but many people need to take the supplements with food to avoid stomach upset.

If you cannot tolerate iron supplements by mouth, iron may be given by injection into a muscle or through a vein (IV).

Milk and antacids can interfere with iron absorption and should not be taken at the same time as iron supplements.

Iron-rich foods include raisins, meats (especially liver), fish, poultry, egg yolks, legumes (peas and beans), and whole-grain bread.

### **Outlook (Prognosis)**

With treatment, the outcome is likely to be good. In most cases, the blood counts will return to normal in 2 months. It is essential to determine the cause of the iron deficiency. If it is being caused by blood loss other than monthly menstruation, further investigation will be needed.

You should continue taking iron supplements for another 6 to 12 months after blood counts return to normal, or as your health care provider recommends. This will help the body rebuild its iron storage.

Iron supplementation improves learning, memory, and cognitive test performance in adolescents who have low levels of iron. Iron supplementation also improves the performance of athletes with anemia and iron deficiency.

### **Possible Complications**

**Iron deficiency anemia** can affect school performance. Low iron levels are an important cause of decreased attention span, reduced alertness, and learning difficulties, both in young children and adolescents.

Excess amounts of lead may be absorbed by people with iron deficiency.

### **Prevention**

The American Academy of Pediatrics (AAP) recommends that all infants be fed breast milk or iron-fortified formula for at least 12 months. The AAP does NOT recommend giving cow's milk to children under 1 year old.

Diet is the most important way to prevent and treat iron deficiency.

Good sources of iron include:

- Apricots
- Kale and other greens
- Oatmeal
- Prunes
- Raisins
- Spinach
- Tuna

Better sources of iron include:

- Chicken and other meats
- Dried beans and lentils
- Eggs

- Fish
- Molasses
- Peanut butter
- Soybeans
- Turkey

The best sources of iron include:

- Baby formula with iron
- Breast milk (the iron is very easily used by the child)
- Infant cereals and other iron-fortified cereals
- Liver
- Prune juice

## References

Glader B. Iron-deficiency anemia. In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF, eds. *Nelson Textbook of Pediatrics*. 18th ed. Philadelphia, Pa: Saunders Elsevier; 2007: chap 455.

Heird WC. The feeding of infants and children. In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF, eds. *Nelson Textbook of Pediatrics*. 18th Ed. Philadelphia, Pa: Saunders Elsevier; 2007: chap 42.

O'Connor NR. Infant formula. *Am Fam Physician*. 2009;79:565-570.

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