IRON DEFICIENCY ANEMIA

WHAT IS IT?
Anemia is a condition in which the blood does not contain enough healthy red blood cells. Red blood cells use an iron-rich protein called hemoglobin to carry oxygen to and remove carbon dioxide (a waste product) from your body. Hemoglobin is also the substance responsible for the blood’s red color. Iron deficiency anemia develops over time if your body does not have enough iron to build hemoglobin.

WHAT CAUSES IT?
Iron deficiency anemia develops if you’re not taking in enough iron or if you’re losing too much iron. Common causes include:

- Blood Loss
  This is the most common cause of iron deficiency anemia in the US. It is more common in women because of their monthly menstrual periods. About 15-20 mg of iron is lost in every menstrual cycle. Women with heavier periods are at higher risk for anemia.

  Slow chronic blood loss, often from the gastrointestinal tract, can also lead to iron deficiency anemia. Causes include colon cancer, inflammatory bowel diseases, and stomach ulcers. Stomach ulcers can result from frequent use of alcohol or anti-inflammatory drugs (like ibuprofen or aspirin).

- Diet Low in Iron
  Your body regularly gets iron from the foods you eat. If you consume too little iron, your body can become iron deficient over time. Women who are pregnant require an increase in iron intake due to expansion of their blood volume.

  There are 2 main types of iron:
  - Heme iron is found only in meat, fish, and poultry. It is more than twice as efficiently absorbed as non-heme iron.
  - Non-heme iron is found in eggs, milk, dairy products, vegetables, and other plant foods. Vegetarian diets can provide enough iron if the right foods are eaten. For example, good non-meat sources of iron include spinach and other dark green leafy vegetables, certain types of beans, peas, dried fruits (apricots, raisins), nuts (peanuts, almonds) and seeds. Non-heme iron is also found in iron-fortified foods (cereals, pastas).

- Inability to Absorb Iron
  The small intestine absorbs iron and other nutrients from food. Factors that can decrease iron absorption include:
  - Intestinal disorders like Crohn’s disease or celiac disease. Also, if part of your small intestine has been surgically bypassed or removed, you may have difficulty absorbing enough iron for your body’s needs.
  - Regular use of prescription medicines that reduce acid in the stomach can interfere with iron absorption because stomach acid is needed to convert dietary iron into a form that the small intestines can absorb.

HOW MUCH IRON DO I NEED?
The recommended daily allowance for elemental iron is:
- 8 mg/day for adult men and post-menopausal women.
- 18 mg/day for menstruating women.
- 27 mg/day for pregnant women.

WHAT ARE THE SYMPTOMS?
Mild iron deficiency usually does not cause any symptoms. If symptoms develop, they may include:
- Fatigue, weakness, irritability
- Pale skin, gums, and nail beds
- Dizziness, headaches
- Shortness of breath, chest pain
- Rapid or irregular heartbeat
- Sore mouth or tongue; brittle nails
- Poor temperature regulation; cold hands and feet
- Craving for ice, starch, clay, or other substances
- Restless legs syndrome

HOW IS IT DIAGNOSED?
Blood tests measuring your red blood cells, hemoglobin levels, and iron levels help confirm the diagnosis. Other testing may be required to determine the underlying cause of the anemia.

WHAT IS THE TREATMENT?
Treatment depends on the cause and severity of iron deficiency. Usually by the time anemia develops, simply increasing iron-rich foods is not enough to correct the problem. Iron supplements are usually needed. It is important to follow up with your healthcare provider on a regular basis to monitor response to iron replacement.

If iron deficiency is severe, hospital treatment with blood transfusions and/or intravenous (IV) iron therapy may be necessary. In addition, further treatment for the underlying cause of iron deficiency anemia may be required.

IRON SUPPLEMENTS
There is no need to take iron supplements unless you have been diagnosed with iron deficiency anemia. Large doses of iron can lead to serious health problems!

There are several iron-containing products available over-the-counter.
- Ferrous sulfate is the least expensive and most effective iron supplement. Other forms of iron are listed on the next page.
- When comparing products, the amount of elemental iron each contains is crucial. The recommended daily dose for the treatment of iron deficiency in adults is 150-200 mg/day of elemental iron (ie. one 325 mg tablet of ferrous sulfate taken 3 times a day).
Some foods increase non-heme iron absorption, so take the following with your iron supplement:
- Vitamin C (e.g. orange juice), which almost doubles the absorption of iron
- Meat and fish

Some foods & medications decrease iron absorption, so avoid consuming the following for 1-2 hours before or 2-4 hours after taking your iron supplement:
- Antacids
- Antibiotics (such as tetracyclines and fluoroquinolones)
- Calcium supplements, dietary calcium (e.g. milk, cheese, yogurt)
- Tea, coffee
- Soy protein
- Fiber from oats, bran, and rye

**Side effects** of iron supplements can include stomach upset, nausea, and constipation. Iron supplements may also turn your stools black, which may be an alarming but harmless side effect.

To decrease side effects:
- Start with one tablet a day and slowly increase to one tablet 2-3 times a day as tolerated.
- Change to an iron preparation containing a smaller dose of elemental iron, like ferrous gluconate.
- Take your supplements with meals if needed; however, this can also reduce the amount of iron absorbed.
- Take a stool softener for constipation.

**Duration of treatment** depends on the cause of anemia.
- Iron supplements should be taken until the hemoglobin normalizes, which can take 6-8 weeks.
- Some clinicians recommend treating for at least 6 months after the hemoglobin has normalized to replenish iron stores.

**RECOMMENDED WEBSITES:**
- www.mayohealth.org
- www.familydoctor.org

### SUPPLEMENT TYPE

<table>
<thead>
<tr>
<th>SUPPLEMENT TYPE</th>
<th>MG TOTAL IRON (%)</th>
<th>ELEMENTAL IRON (MG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous Sulfate</td>
<td>325 mg</td>
<td>20%</td>
</tr>
<tr>
<td>Ferrous Fumarate</td>
<td>200 mg</td>
<td>33%</td>
</tr>
<tr>
<td>Ferrous Gluconate</td>
<td>325 mg</td>
<td>11%</td>
</tr>
</tbody>
</table>

**IRON RICH FOODS**


<table>
<thead>
<tr>
<th>Foods</th>
<th>Serving Size</th>
<th>Iron Content</th>
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<th>Serving Size</th>
<th>Iron Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready-to-Eat Cereal, 100% iron-fortified</td>
<td>¾ cup</td>
<td>18 mg</td>
<td>Turkey, dark meat</td>
<td>3.5 oz</td>
<td>2.3 mg</td>
</tr>
<tr>
<td>Oatmeal, instant, fortified, prepared with water</td>
<td>1 cup</td>
<td>10 mg</td>
<td>Refried beans, canned</td>
<td>½ cup</td>
<td>2.1 mg</td>
</tr>
<tr>
<td>Liver, calf</td>
<td>2 oz</td>
<td>9 mg</td>
<td>Pork or beef, cooked</td>
<td>2 oz</td>
<td>2 to 3 mg</td>
</tr>
<tr>
<td>Cream of Wheat</td>
<td>1 cup</td>
<td>8.1 mg</td>
<td>Tofu</td>
<td>3.5 oz</td>
<td>1.8 mg</td>
</tr>
<tr>
<td>White beans, canned</td>
<td>1 cup</td>
<td>7.8 mg</td>
<td>Whole wheat bread</td>
<td>2 slices</td>
<td>1.8 mg</td>
</tr>
<tr>
<td>Soybeans, boiled (Edamame)</td>
<td>1 cup</td>
<td>8.6 mg</td>
<td>Enriched white bread</td>
<td>2 slices</td>
<td>1.7 mg</td>
</tr>
<tr>
<td>Lentils, boiled</td>
<td>1 cup</td>
<td>6.6 mg</td>
<td>Cashews</td>
<td>1 oz (18 nuts)</td>
<td>1.7 mg</td>
</tr>
<tr>
<td>Liver, beef or chicken</td>
<td>2 oz</td>
<td>6 mg</td>
<td>Raisins</td>
<td>½ cup</td>
<td>1.4 mg</td>
</tr>
<tr>
<td>Prune juice</td>
<td>½ cup</td>
<td>5.1 mg</td>
<td>Tuna, cooked</td>
<td>3 oz</td>
<td>1.1 mg</td>
</tr>
<tr>
<td>Potato, baked with skin</td>
<td>1</td>
<td>4 mg</td>
<td>Broccoli, cooked</td>
<td>1 cup</td>
<td>1.1 mg</td>
</tr>
<tr>
<td>Liverwurst</td>
<td>2 oz</td>
<td>3.6 mg</td>
<td>Pistachios</td>
<td>1 oz (47 nuts)</td>
<td>1.1 mg</td>
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<tr>
<td>Black or pinto beans, cooked</td>
<td>1 cup</td>
<td>3.6 mg</td>
<td>Sunflower seeds, dry roasted</td>
<td>1 oz</td>
<td>1.08 mg</td>
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<tr>
<td>Kidney beans, canned</td>
<td>1 cup</td>
<td>3.2 mg</td>
<td>Almonds</td>
<td>1 oz (24 nuts)</td>
<td>1.05 mg</td>
</tr>
<tr>
<td>Cheese pizza</td>
<td>2 slices</td>
<td>3 mg</td>
<td>Chicken breast, roasted</td>
<td>3.5 oz</td>
<td>1.04 mg</td>
</tr>
<tr>
<td>Chickpeas, canned</td>
<td>1 cup</td>
<td>2.9 mg</td>
<td>Apricots, dried</td>
<td>10 halves</td>
<td>0.9 mg</td>
</tr>
<tr>
<td>Hamburger, lean</td>
<td>3.5 oz</td>
<td>2.7 mg</td>
<td>Halibut, cooked</td>
<td>3 oz</td>
<td>0.9 mg</td>
</tr>
<tr>
<td>Spinach, raw</td>
<td>3.5 oz</td>
<td>2.7 mg</td>
<td>Popcorn</td>
<td>1 oz</td>
<td>0.86 mg</td>
</tr>
<tr>
<td>Green peas, frozen</td>
<td>1 cup</td>
<td>2.4 mg</td>
<td>Egg, cooked</td>
<td>1 large</td>
<td>0.8 to 0.9 mg</td>
</tr>
<tr>
<td>Pumpkin seeds, roasted</td>
<td>1 oz</td>
<td>2.3 mg</td>
<td>Peanuts, roasted without skins</td>
<td>1 oz (28 nuts)</td>
<td>0.6 mg</td>
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</tbody>
</table>