

Iron and Health

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The Role of Iron in the Body

Iron is an essential mineral that has many important functions in the body. These functions include helping to carry oxygen through the blood to various body tissues and making energy from the transported oxygen. Iron is a key component of hemoglobin in the blood and myoglobin in muscles, both transporters of oxygen. In addition to transporting oxygen to help the body burn fuel for energy, iron is involved in creating enzymes and immune cells.¹ Our body can store iron, but stores may get low if not enough iron is consumed through food. Dietary forms of iron include heme iron from animal foods and non-heme iron from plant foods.

Two Types of Iron

Iron from food comes in two forms. The food source, the ease of absorption, the method of storage, and the possible health risks differ between heme iron and non-heme iron.

HEME IRON	NON-HEME IRON
Found in animal sources	Found in plants ²
Absorbed at a high rate	Absorbed at a lower rate
Excess stored in the body	Stored in the body at only the levels the body needs ^{3,4}
Excess linked to health risks ⁵	Excess not linked to health risks

Signs of Too Much or Too Little Iron

Deficiency

Low iron levels can decrease the body's ability to make red blood cells, which deliver oxygen to tissues. This is called iron deficiency anemia.

Causes of iron deficiency include blood loss, poor dietary intake, poor intestinal absorption, and certain medical conditions. Blood loss can occur for a variety of reasons including internal bleeding (gastrointestinal or urinary tract), frequent blood donations, heavy menstrual periods, injury, or surgery. A diet that is low in iron and/or high in foods that prevent iron absorption may also cause low blood iron levels. Certain medical conditions can also lead to poor

absorption of iron, including gastrointestinal diseases like irritable bowel syndrome and Crohn's disease, as well as a history of gastric bypass surgery. Other medical conditions like chronic kidney failure and chronic inflammation can cause iron deficiency.⁵

Excessive milk drinking is another important cause of iron deficiency, especially in the pediatric population. Dairy milk not only inhibits iron absorption but can also replace iron-rich foods in the diet. Since cow's milk is naturally low in iron, infants or young children who depend on milk as one of their primary sources of nutrition may not get enough iron for healthy growth and development. In addition, about 40% of otherwise healthy infants suffer from gastrointestinal bleeding related to milk drinking, causing further loss of blood and iron. Lastly, components of milk, including calcium and casein, block the absorption of iron in the intestinal tract.⁶

Symptoms of iron deficiency may include:⁷

- Weakness
- Fatigue
- Dizziness
- Headache
- Glossitis (inflamed tongue)
- Exercise intolerance
- Decreased appetite
- Abnormal cravings (such as ice)
- Pale skin
- Shortness of breath
- Leg cramps

Overload

Since the body does not have an efficient way to get rid of excess iron, absorption in the intestines is tightly regulated. The gut will increase iron absorption when the body is low on iron and decrease absorption when the body has sufficient levels. However, this is true only for non-heme iron (from plant sources).⁸ Heme iron is absorbed regardless of blood iron levels. In this way, a person eating high amounts of heme iron is at risk for iron overload.⁹ Some patients also suffer from hemochromatosis, a rare genetic condition that causes the body to absorb too much iron.

High iron in the blood, either from eating foods with heme iron or having hemochromatosis, can lead to excess iron storage in organs. Over time, this excess can harm the liver, pancreas, and heart. High iron levels are linked to heart disease, high cholesterol, high blood pressure, colon cancer, diabetes, and increased abdominal fat.^{10,11}



Your recommended daily iron intake may be higher if you are:

- Pregnant
- An athlete
- Vegan or vegetarian
- Growing, such as during childhood and adolescence

Plant-Based Sources of Iron

- Legumes: lentils, soybeans, white beans, kidney beans, black beans, peas, chickpeas, black-eyed peas, lima beans, tofu, tempeh
- Nuts and seeds: pumpkin seeds, tahini, sunflower seeds, hemp seeds, flaxseed, cashews, pistachios, almonds
- Whole grains: quinoa, fortified cereals, enriched breads, bulgur, millet, brown rice, oatmeal
- Vegetables: dark leafy greens (kale, collard greens, swiss chard), broccoli, cooked tomatoes, sweet potatoes
- Fruit: dried apricots, figs, raisins, blackstrap molasses, prunes

Tips To Increase Iron Absorption

Some nutrients, like vitamin C, help the body absorb iron, while others reduce absorption. Pairing non-heme iron sources with foods such as citrus fruits, berries, kiwi, bell peppers, and broccoli will boost absorption. When eating iron-rich foods, avoid foods rich in calcium, oxalates, tannins, polyphenols, and phytates, which all limit absorption. This means having coffee, tea, and cocoa separate from iron-rich meals to prevent them from inhibiting iron absorption. Avoiding dairy products can help improve iron absorption as well as overall health. Lastly, eggs contain a protein called phosvitin that binds with iron in the digestive tract and prevents it from being absorbed. Consuming just one hardboiled egg was found to reduce iron absorption by as much as 28%.¹⁴

There is even evidence to suggest that high blood levels of iron may lead to the development of breast cancer.¹²

How Much Iron Do I Need?

Daily iron needs differ based on factors like age, gender, pregnancy, lactation, activity level, and diet. Current recommended dietary allowances for iron are listed in the table below:¹³

Age	Male	Female	Pregnancy	Lactation
Birth to 6 months	0.27 mg*	0.27 mg*		
7-12 months	11 mg	11 mg		
1-3 years	7 mg	7 mg		
4-8 years	10 mg	10 mg		
9-13 years	8 mg	8 mg		
14-18 years	11 mg	15 mg	27 mg	10 mg
19-50 years	8 mg	18 mg	27 mg	9 mg
51+ years	8 mg	8 mg		

*Adequate Intake⁷

When To Supplement

Supplements should be considered only if recommended by a doctor. Anemia, or low red blood cell count, can result from a diet that does not include enough iron or other nutrients like vitamin B12 or folate. While it is best to increase intake through food, if your iron levels are too low, your doctor may start you on an iron supplement. Work with your provider to determine how much and for how long you need to take a supplement. Iron supplementation should otherwise be avoided to prevent health risks.

Iron-Rich Recipes!

Lentil and Split Pea Soup With Fennel and Orange

Makes 6 servings



Thanks to the split peas and lentils, this recipe is loaded with fiber! Serve with whole-grain toast or crackers.

- 2 tablespoons water
- 1½ cups diced onion
- 2 cups or 1 large bulb chopped fennel bulb
- 1 cup chopped parsnip
- 1 cup chopped carrots
- 1 teaspoon ground ginger
- 1 teaspoon paprika
- 1 teaspoon dried oregano
- 1 teaspoon dried rosemary
- 1 teaspoon fennel seed
- 1¼ teaspoons sea salt
- 1 cup dried yellow split peas, rinsed and drained
- 1 cup dried red lentils, rinsed and drained
- 5 cups water
- 2 dried bay leaves
- ½ cup freshly squeezed orange juice

In a large soup pot over medium heat, combine 2 tablespoons water, onion, chopped fennel, parsnip, carrots, ginger, paprika, oregano, rosemary, fennel seed, and salt and stir to combine.

Cover and cook for 8 to 10 minutes, until onions soften; stir occasionally and add an extra splash of water if sticking.

Add the split peas and lentils to the pot along with the 5 cups water and the bay leaves.

Stir to combine. Increase the heat and bring to a boil.

Reduce the heat to low, cover, and simmer for 50 to 60 minutes (or a little longer), until the split peas and lentils are completely softened.

Remove and discard the bay leaves.

Stir in the orange juice and season with additional salt and pepper if desired.

Per serving (½ of recipe): Calories: 274; Fat: 1.1 g; Saturated Fat: 0.2 g; Calories from Fat: 4%; Cholesterol: 0 mg; Protein: 17 g; Carbohydrate: 53 g; Sugar: 7 g; Fiber: 19 g; Sodium: 531 mg; Calcium: 101 mg; Iron: 5.1 mg; Vitamin C: 24 mg; Beta-Carotene: 2,564 mcg; Vitamin E: 1.1 mg

Source: *The Cheese Trap*, by Neal Barnard, MD; recipe by Dreena Burton, chef, founder of DreenaBurton.com

Chickpea Salad With Orange Miso Dressing

Makes 2 servings



Salad dressings can be low in fat, cost pennies, and still be as flavorful and simple as store-bought dressings.

- 12 cherry tomatoes, halved
- 4 green onions, sliced
- ½ cup dry quinoa
- 1½ cups low-sodium garbanzo beans (chickpeas), cooked or canned and rinsed
- 3 tablespoons fresh cilantro
- ¼ cup fresh orange juice (juice of 2 oranges)
- ¼ cup seasoned rice vinegar
- 2 teaspoons white or yellow miso
- 1 tablespoon maple syrup or agave nectar
- 1 clove garlic, grated or minced
- 1 teaspoon ginger, grated or minced
- 2 teaspoons black sesame seeds

Combine the tomatoes, onions, cooked quinoa, garbanzo beans, and fresh cilantro in a large bowl.

In a small bowl, thoroughly whisk the orange juice, rice vinegar, miso, maple syrup or agave nectar, garlic, ginger, and sesame seeds to make the dressing.

Pour the dressing into the larger bowl and toss all of the salad ingredients together.

Chef's Note: To make quinoa, place 1 part quinoa to 2 parts water (for example: 1 cup quinoa to 2 cups water) in a 1½-quart saucepan and bring to a boil. Reduce to a simmer, cover, and cook until all the water is absorbed (about 15 minutes). You will know that the quinoa is done when all the grains have turned from white to transparent, and the spiral-like germ has separated. Wait for it to cool to add to the recipe. You could also substitute 1 cup of frozen, thawed quinoa for a precooked option.

Per serving (½ of recipe): Calories: 435; Fat: 9 g; Saturated Fat: 1 g; Calories from Fat: 17%; Cholesterol: 0 mg; Protein: 18 g; Carbohydrate: 74 g; Sugar: 20 g; Fiber: 14 g; Sodium: 242 mg; Calcium: 134 mg; Iron: 4.5 mg; Vitamin C: 36 mg; Beta-Carotene: 812 mcg; Vitamin E: 2.2 mg

Source: Written by Jason Wyrick and adapted by Celine Steen

Breakfast Tofu Scramble

Makes 4 servings



Extra-firm tofu, when crumbled, has a scrambled egg texture and, when paired with turmeric, a bit of an egg-like flavor, without any added cholesterol.

14–16 ounces tofu, extra firm (light or low-fat when possible)

1 clove garlic, minced

½ cup onion, diced

½ cup green pepper, diced

½ cup red pepper, diced

¾ cup mushrooms, chopped

¼ teaspoon turmeric powder

1 teaspoon cumin powder

¾ teaspoon black pepper

1 teaspoon salt

Add ¼ cup water to large saute pan. Once heated, add onion.

When the aroma releases from the onion and it starts to become translucent, add garlic.

Cook for 2 minutes, add peppers and mushrooms, and add ¼ cup water if vegetables are sticking to the pan. Cook for about 4 minutes or until vegetables are tender.

Crumble tofu with hands and add to pan along with turmeric, mixing well. Add cumin powder, pepper, and salt and cook for another 4 to 6 minutes until everything is cooked through.

Serve with whole-grain toast or on a warm corn tortilla.

Per serving (¼ of recipe): Calories: 139; Fat: 9 g; Saturated Fat: 8 g; Calories from Fat: 46%; Cholesterol: 0 mg; Protein: 15 g; Carbohydrate: 7 g; Sugar: 3 g; Fiber: 2 g; Sodium: 597 mg; Calcium: 414 mg; Iron: 4 mg; Vitamin C: 34 mg; Beta-Carotene: 275 mcg; Vitamin E: 0.3 mg

Source: [21-Day Vegan Kickstart](#)

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