

HEALTH NOTES by Evelyn Ames Sources of Heme and NonHeme Iron

Iron, an essential component of proteins involved in oxygen transport, is essential for the regulation of cell growth and differentiation. In the body, iron becomes part of hemoglobin, a molecule in the blood that transports oxygen from the lungs to all body tissues. Deficiency in iron limits oxygen delivery to cells which results in fatigue, poor work performance, and decreased immunity. <http://ods.od.nih.gov/factsheets/Iron-HealthProfessional/>. On the other hand, excess amounts of iron (hemochromatosis) can have deleterious effects. Hemochromatosis causes the body to absorb and store too much iron because the body has no natural way to rid itself of excess iron. Without treatment, organs such as the liver, heart, and pancreas can fail. <http://digestive.niddk.nih.gov/ddiseases/pubs/hemochromatosis/>. “Healthy people usually absorb about 10 percent of the iron contained in the food they eat, which meets normal dietary requirements. People with hemochromatosis absorb up to 30 percent of iron. Over time, they absorb and retain between five to 20 times more iron than the body needs” <http://digestive.niddk.nih.gov/ddiseases/pubs/hemochromatosis/>).

“Almost two-thirds of iron in the body is found in hemoglobin, the protein in red blood cells that carries oxygen to tissues. Smaller amounts of iron are found in myoglobin, a protein that helps supply oxygen to muscle, and in enzymes that assist biochemical reactions. Iron is also found in proteins that store iron for future needs and that transport iron in blood. Iron stores are regulated by intestinal iron absorption” (<http://ods.od.nih.gov/factsheets/Iron-HealthProfessional/>).

Heme and Nonheme forms of dietary iron: “Heme iron is derived from hemoglobin, the protein in red blood cells that delivers oxygen to cells. Heme iron is found in animal foods that originally contained hemoglobin, such as red meats, fish, and poultry. Iron in plant foods such as lentils and beans is arranged in a chemical structure called nonheme iron. This is the form of iron added to iron-enriched and iron-fortified foods. Heme iron is absorbed better than nonheme iron, but most dietary iron is nonheme iron” (<http://ods.od.nih.gov/factsheets/Iron-HealthProfessional/>). These NIH facts sheets include two tables (Table 1--heme and Table 2—nonheme) for major food sources. Note seafood such as halibut, oysters, tuna, and shrimp are sources of heme iron.

What affects absorption of iron?

- Storage levels of iron (greatest influence): “Iron absorption increases when body stores are low. When iron stores are high, absorption decreases to help protect against toxic effects of iron overload.
- Type of dietary iron consumed. “Absorption of heme iron from meat proteins is efficient. Absorption of heme iron ranges from 15% to 35%, and is not significantly affected by diet. In contrast, 2% to 20% of nonheme iron in plant foods such as rice, maize, black beans, soybeans and wheat is absorbed.”
- Meat proteins and vitamin C improve the absorption of nonheme iron.
- “Tannins (found in tea), calcium, polyphenols, and phytates (found in legumes and whole grains) can decrease absorption of nonheme iron.”
- Some proteins found in soybeans also inhibit nonheme iron absorption. It is important for vegetarians to include foods that enhance nonheme iron absorption. “Vegetarians who exclude all animal products from their diet may need almost twice as much dietary iron each day as non-vegetarians because of the lower intestinal absorption of nonheme iron in plant foods. Vegetarians should consider consuming nonheme iron sources together with a good source of vitamin C, such as citrus fruits, to improve the absorption of nonheme iron.”

Older adults at risk for iron deficiency anemia. Those with Celiac Disease and Crohn's Syndrome; people with renal failure, especially those undergoing routine dialysis; and people with gastrointestinal disorders who do not absorb iron normally. Iron supplementation is indicated when diet alone cannot restore deficient iron levels to normal within an acceptable timeframe. Supplemental iron is available in two forms: ferrous and ferric. Ferrous iron salts (ferrous fumarate, ferrous sulfate, and ferrous gluconate) are the best absorbed forms of iron supplements. Check cited sources to learn how intense exercise affects iron and iron toxicity.