The Fear of Iron

By Gene Bruno, MS, MHS, Contributing Editor

Conflicting results about iron and heart disease may have scared off many consumers who are likely to be in need of supplementing with this key mineral.

The early 1990s saw reports that researchers found a correlation between ferritin (a protein that stores iron) and coronary heart disease (CHD). As a result, the media published articles stating that men should stop taking iron supplements since it might lead to heart attacks. Thus began the fear of iron.

When you set the fear aside, however, it is enlightening to look at the complete body of research on this subject. First, population studies of iron nutritional status and cardiovascular disease (CVD) in humans have yielded conflicting results. Second, good evidence to support the existence of strong associations between a number of different measures of iron status and CHD was not found in a review of 12 observational studies including 7,800 cases of CHD.[1] Furthermore, while serum ferritin concentration is the measure of iron status thought to best reflect iron stores, the same review found no difference in the risk of CHD between individuals with serum ferritin concentrations in the five prospective studies that measured serum ferritin.

So what is the basis for the hubbub about iron and CHD? Two large prospective studies found increased dietary heme iron (i.e., iron from meat sources), but not total dietary iron, to be associated with increased risk of heart attack.[2,3] The significance of this is that when iron stores are high (i.e., when the body has plenty of iron), the body is able to effectively inhibit more non-heme iron from being absorbed. However, it is not able to effectively inhibit the absorption of heme iron, which suggests iron from animal sources may play a more important role than total iron intake in CHD risk.[4] To review:

- No data suggest non-heme iron supplements in any way contribute toward CHD.
- No data suggest non-heme iron from dietary sources (e.g., kidney beans, blackstrap molasses, baked beans, spinach, etc.[5]) contributes to CHD.
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- Data suggest heme iron from dietary sources may increase the risk of CHD.

Based upon the current research, avoiding non-heme iron from supplements is not likely to reduce CHD risk. However, reducing red meat intake may reduce your risk of CHD—but I'll bet you already knew that.

Iron & Good Health

Let's next examine the overall wisdom of trying to avoid iron. Consider that iron deficiency is the most common nutrient deficiency in the United States and the world.[6] Most of the symptoms of iron deficiency are a result of the associated anemia, and may include fatigue, rapid heart rate,

palpitations and rapid breathing during exertion. Iron deficiency impairs athletic performance and physical work capacity.[7] The ability to maintain a normal body temperature on exposure to cold is also impaired in iron-deficient individuals. Severe iron deficiency anemia may result in brittle and spoon-shaped nails, sores at the corners of the mouth, taste bud atrophy, and a sore tongue. Pica, a behavioral disturbance characterized by the consumption of non-food items, may be a symptom and a cause of iron deficiency.[8]

People at greatest risk for an iron deficiency include infants and children between the ages of 6 months and 4 years, adolescents and pregnant women.[9] Also, individuals with chronic blood loss (especially menstruating women),[10] celiac disease (celiac sprue),[11] H. pylori infection (e.g., ulcers),[12] those who have had gastric bypass surgery,[13] and vegetarians[14] are all at greater risk for iron deficiency. Finally, individuals who engage in regular intense exercise may have a 30-percent greater requirement for iron.[15]

So, who is not at risk for an iron deficiency? Basically, adult men and postmenopausal women who do not fall into one of the above categories are not likely to experience iron deficiency.

In addition to deficiency concerns, there is a body of research demonstrating specific benefits associated with iron supplementation.

- Anemia (iron deficiency): Not surprisingly, the use of iron supplements is effective for the treatment and prevention of iron deficiency anemia in adults and children.[16,17,18,19]
- ACE inhibitor-associated cough: Supplementation with iron has been shown to inhibit coughing associated with angiotensin converting enzyme (ACE) inhibitors.[20]
- Cognitive function: Supplementation with iron has been shown to improve cognitive function in iron-deficient children and adolescents, improving verbal learning and memory in non-anemic iron-deficient adolescent girls.[21] It may also reverse developmental and learning deficits in iron-deficient children.[22]
- Attention deficit-hyperactivity disorder (ADHD): Supplementation with iron has been shown to improve some measures of attention deficit-hyperactivity disorder (ADHD) in children with iron deficiency after one to three months of treatment.[23,24]
- Heart failure: Up to 20 percent of heart failure patients have iron deficiency.[25] Supplementation with iron has been shown to significantly improve heart failure symptoms, walking distance and measures of quality of life.[26]
- Fatigue: Supplementation with iron has been shown to improve unexplained fatigue in non-anemic women, with borderline or low serum ferritin concentrations.[27]

Ultimately, most children, adolescents and adult women would benefit from taking a supplement that includes iron. In general, adult men of any age and postmenopausal woman, probably don't need a supplement with iron as long as they consume a diet with foods that provide iron (high iron foods: beef, liver and lamb; medium iron foods: pork, ham, chicken, fish and beans). For adolescents, adult women and those engaging in regular intense exercise, 18 mg/d of non-heme iron is recommended; for children, 10 mg/d of iron is a good amount.

Gene Bruno is the dean of academics and a professor at Huntington College of Health Sciences (HCHS). HCHS is an accredited distance-learning institution offering undergraduate and graduate degrees, as well as diploma program in nutrition. HCHS.edu, (800) 290-4226.

References

1. Danesh J, Appleby P. “Coronary heart disease and iron status: meta-analyses of prospective studies.” Circulation. 1999;99(7):852-854.
2. Ascherio A et al. “Dietary iron intake and risk of coronary disease among men.” Circulation. 1994;89(3):969-974.
3. Klipstein-Grobusch K et al. “Dietary iron and risk of myocardial infarction in the Rotterdam Study.” Am J Epidemiol. 1999;149(5):421-428.
4. de Valk B, Marx JJ. “Iron, atherosclerosis, and ischemic heart disease.” Arch Intern Med. 1999;159(14):1542-1548.
5. USDA National Nutrient Database for Standard Reference, Release 21;2008.
6. Yip R, Dallman PR. “Iron.” In: Ziegler EE, Filer LJ, eds. Present Knowledge in Nutrition. 7th ed. Washington D.C.: ILSI Press; 1996:277-292.
7. Beard JL. “Iron biology in immune function, muscle metabolism and neuronal functioning.” J Nutr. 2001;131(2S-2):568S-579S.
8. Lee GR. “Disorders of iron metabolism and heme synthesis.” In: Lee GR, Foerster J, Paraskevas F, Greer JP, Rogers GM, eds. Wintrobe's Clinical Hematology. 10th ed. Baltimore: Williams and Wilkins; 1999:979-1070.
9. Brody T. Nutritional Biochemistry. 2nd ed. San Diego: Academic Press; 1999.
10. Fairbanks VF. “Iron in Medicine and Nutrition.” In: Shils M, Olson JA, Shike M, Ross AC, eds. Modern Nutrition in Health and Disease. 9th ed. Baltimore: Williams & Wilkins; 1999:223-239.
11. Dewar DH, Ciclitira PJ. “Clinical features and diagnosis of celiac disease.” Gastroenterol. 2005;128(4 Suppl 1):S19-24.
12. Sherman PM, Macarthur C. “Current controversies associated with Helicobacter pylori infection in the pediatric population.” Front Biosci. 2001;6:E187-192.
13. Bloomberg RD et al. “Nutritional deficiencies following bariatric surgery: what have we learned?” Obes Surg. 2005;15(2):145-154.
14. Food and Nutrition Board, Institute of Medicine. Iron. Dietary reference intakes for vitamin A, vitamin K, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc. Washington D.C.: National Academy Press; 2001:290-393.
15. Ibid.
16. Brolin RE, Gorman JH, Gorman RC, et al. Prophylactic iron supplementation after Roux-en-Y gastric bypass: a prospective, double-blind, randomized study. Arch Surg 1998;133:740-4.
17. Food and Nutrition Board, Institute of Medicine. Op cit.

18. Baker RD, Greer FR; Committee on Nutrition. “Diagnosis and prevention of iron deficiency and iron-deficiency anemia in infants and young children (0-3 years of age).” Pediatrics. 2010;126:1040-50.
19. Killip S, Bennett JM, Chambers MD. “Iron deficiency anemia.” Am Fam Physician. 2007;75:671-8.
20. Lee SC et al. “Iron supplementation inhibits cough associated with ACE inhibitors.” Hypertension. 2001;38:166-170.
21. Bruner AB et al. “Randomized study of cognitive effects of iron supplementation in non- anaemic iron-deficient adolescent girls.” Lancet. 1996;348:992-6.
22. Soewondo S. “The effect of iron deficiency and mental stimulation on Indonesian children's cognitive performance and development.” Kobe J Med Sci. 1995;41:1-17.
23. Sever Y et al. “Iron treatment in children with attention deficit hyperactivity disorder. A preliminary report.” Neuropsychobiology. 1997;35:178-80.
24. Konofal E et al. “Effects of iron supplementation on attention deficit hyperactivity disorder in children.” Pediatr Neurol. 2008;38:20-6.
25. “Iron replacement in heart failure.” Pharmacist's Letter / Prescriber's Letter. 2010;26(1):260177.
26. Anker SD et al. “Ferric carboxymaltose in patients with heart failure and iron deficiency.” N Engl J Med 2009;361:2436-48.
27. Verdon F et al. “Iron supplementation for unexplained fatigue in non-anaemic women: double blind randomised placebo controlled trial.” BMJ. 2003;326:1124.