

Iron Supplementation with Food-Matrix Iron, Beet Root, and Botanicals

Co-authored by Donald R. Yance, RH (AHG), CN
and Suzanne E. Sky, L.Ac., MTOM

Iron Deficiency: Worldwide Prevalence

A well-rounded diet with a variety of vegetables, legumes, protein, oils, and grains generally offers sufficient nutrient intake for health. The essential trace mineral iron is found in a wide variety of foods including red meat, legumes, green leafy vegetables, broccoli, beets, apricots, and cherries. However, iron deficiency is one of the most common nutritional deficiencies worldwide.¹⁻⁶ Iron deficiency worldwide is reported in over two billion people and is the primary cause of iron-deficient anemia (in reports from 1990 to 2010).¹ In a NHANES (National Health and Nutrition Examination Survey) study done from 2003 to 2012, it was found that about 5.6% of those in the United States had anemia and another 1.5% were in the category of moderate to severe anemia.⁷

Those most at risk are children, women in all phases of reproductive life, and the elderly.^{2,5,7} Epidemiological studies find that the prevalence of anemia increases after the age of 60 and affects about 20% of those over age 85. However, since anemia is rare in healthy elderly people, this rise is not correlated with a normal aging process. Anemia is often associated with chronic inflammatory conditions including autoimmune disorders, cancer, chronic kidney disease, and chronic infection, especially in the elderly.^{1,8-10}

Symptoms include fatigue, weakness, dizziness, and cardiopulmonary symptoms. Although iron deficiency is a primary cause of anemia, there are causative factors and conditions that need to be ruled out in order to correctly determine a simple case of iron-deficiency anemia.⁷ Anemia is linked with increased risk for many disease conditions including cardiovascular and Alzheimer's. It contributes to neurological symptoms such as headaches, depression, and decreased concentration. Cognitive and neuromuscular functions may also be impaired.^{9,11} Anemia is common in those with congestive heart failure and in chronic kidney disease.^{7,16}

IRON: ESSENTIAL TO PHYSIOLOGICAL FUNCTION

Iron is perhaps best known for its role in oxygen transport as it facilitates the blood cells ability to carry oxygen throughout the body. Loss of oxygen transport adversely affects all cells

and tissues of the body.^{7,12} Iron is required for production of heme and is intrinsic in hemoglobin structure and function.⁴

Iron is essential in many physiological functions including respiratory, immune, metabolic, cellular, and cognitive.¹ As a structural component of many proteins and enzymes, it is found to enhance the actions of antioxidant enzymes.¹³

At the cellular level, iron affects DNA synthesis and cellular proliferation.¹ In the nervous system, iron is essential for brain function, myelin synthesis, neural metabolic processes, neurotransmitter production, and synaptic plasticity. This is one reason why iron deficiency during key early developmental phases is noted to contribute to retardation and impaired cognition.^{14,15} Thus, iron deficiency is also implicated in childhood learning and behavioral disorders.^{12,15}

ANEMIA AND GASTROINTESTINAL DISEASE

Many studies indicate that there is a high correlation between iron resistance and disorders of the GI tract.^{1,3,17,18} Studies and clinicians find a strong link between gastrointestinal disease and iron deficiency. This can occur as a result of abnormal internal blood loss or due to malabsorption.³ About 25% of those with unexplained iron-deficiency anemia are found to have autoimmune gastritis. About 50% are found to have active *Helicobacter pylori* infection and a small percent – around 5% – to have celiac disease. These factors all interfere with iron absorption.^{3,17}

Infection with *H. pylori* is associated with both iron deficiency and iron-deficient anemia. Since *H. pylori* competes with the human host for available iron, it can lead to decreased iron absorption in the host.

H. pylori also reduces the bioavailability of vitamin C. This is a contributing factor to the formation of stomach microerosions, which can cause internal bleeding with further loss of iron. Studies suggest that elimination of *H. pylori* infection helps restore normal iron absorption.^{1,2,17,18}

Iron-deficiency anemia is commonly found in those with celiac

disease. Studies suggest that a gluten-free diet and measures to clear celiac disease can restore the natural capacity for iron absorption in the gut and decrease or eliminate the need for iron supplementation for some.¹

IRON HOMEOSTASIS

Iron homeostasis, maintained through numerous regulatory pathways, is essential for health because either excess or deficiency of iron leads to serious consequences and formation of disease processes. The amount of total body iron depends on iron absorption factors since there are no physiological mechanisms that excrete excess iron from the system.^{4,12,17}

Excess iron overloads the system and contributes to oxidative stress through formation of oxidative radicals. It contributes to programmed cell death, and adversely affects cell signaling.^{14,19,20} Iron excess is toxic to the system, causing damage to the heart, liver, skin, pancreatic beta-cells, bones, joints, and the pituitary gland.¹²

At the cellular level, iron levels are regulated by iron regulatory proteins and iron-responsive elements. In the system as a whole, the peptide hormone hepcidin mediates iron homeostasis. Hepcidin is produced in the liver, primarily in response to iron or to inflammation. Other factors influence iron metabolism as well. During the inflammatory response, pro-inflammatory cytokines alter levels of the iron regulatory proteins.^{1,14}

The need for iron increases during specific phases of life. This occurs primarily during developmental phases such as childhood, puberty, menstrual phases, and pregnancy.¹ Iron deficiency can result from this increased need especially when there is insufficient dietary intake.¹

FOOD AND BOTANICALS FOR ANEMIA

In traditional cultures, iron deficiency has been treated primarily with food and botanicals that are now known to either be rich in iron or to help iron absorption. Such botanicals can offer an exemplary approach to enhancing iron absorption, while supplying bioavailable iron with no adverse effects such as constipation. In addition, several foods and botanicals that enhance iron levels are also known for their ability to moisten the gut and promote healthy bowel movements.

Iron Supplementation from Food-matrix Iron, Beet Root, and Botanicals



Naturized® Iron

Food-grown nutrients are ideal because of their innate compatibility with human biochemistry and physiology. Food-grown iron is delivered in a food matrix of the probiotic *Lactobacillus bulgaricus*. *Lactobacillus bulgaricus* has been used for centuries in the traditional art of making yogurt. Some *Lactobacillus* strains are found to enhance iron absorption.^{21,22}

Naturally rich in vitamins and minerals, *L. bulgaricus* provides an ideal nutrient matrix, delivering nutrients that are recognized by the body as a nutritious food complex. Food-grown nutrients are released from the matrix during digestion through the gut.²³ This facilitates their absorption, bioavailability, and bioactivity.



Beet Root (*Beta vulgaris*)

Nutrient-rich vegetables play an important role in wellness and health care. Beet root is highly regarded as a functional food that promotes health and has a long history of medicinal use. The ancient physicians Hippocrates, Galen, Avicenna, and Paracelsus used beets to treat gastrointestinal conditions and anemia.^{24,25} In modern times, a study with adolescent girls found significant improvement in hemoglobin levels in those drinking freshly-prepared beet juice for 20 days.²⁶

Beet root is rich in fiber, sugars, nutrients, and phenolic compounds. This includes folic acid, carotenoids, betalains, ascorbic acid, iron, zinc, and other minerals.^{25,26} Betanine is the primary compound that gives beets their unique red color. Studies note that several compounds in beets, especially the betalain pigments, demonstrate significant antioxidant and anti-inflammatory activity both *in vitro* and *in vivo*.²⁷



Yellow Dock Root (*Rumex crispus*)

Yellow Dock has been used for centuries by traditional herbalists as a blood-nourishing tonic. Yellow Dock is a highly-revered herb traditionally used to enhance iron assimilation and build healthy blood to treat anemia. It is commonly used in combination with other botanicals to build blood and raise hemoglobin levels in the treatment of iron-deficiency anemia.

Early American physicians valued Yellow Dock in chronic and serious infections due to its *alterative* actions in cleansing the blood. It is noted to work on the blood, lymph, and glandular systems to move any stagnation.^{28,29}



Dong Quai (*Angelica sinensis*)

Dong Quai, one of the most esteemed herbs in the Chinese *materia medica*, is especially revered as a blood-nourishing tonic and restorative herb for women. For millennia, it has been combined with other herbs in medicinal formulations or cooked in soups to enrich blood and nourish health. It is paired with Rehmannia root in the famous *Four Substances Formula (Si Wu Tang)*, which is the exemplar formula in Chinese medicine to nourish blood, primarily used for women throughout their reproductive cycle.³⁰ Because of its moistening qualities, Dong Quai is also used to treat constipation both in the elderly and in those of any age where constipation is due to blood deficiency.³¹

High in coumarins and flavonoids, Dong Quai also contains volatile oils, vitamin A, carotenoids, vitamins B12, E, and phytosterols (including beta-sitosterol) along with minerals.³² Known for its hematopoietic, antioxidant, and immunomodulatory properties, Dong Quai is also neuroprotective.³² Ferrulic acid, an organic acid component in Dong Quai, is found to exert antioxidant and anti-inflammatory influence. It has the ability to improve microcirculation and help prevent platelet aggregation.³³

Animal studies find that a Dong Quai polysaccharide-iron complex significantly improved iron-deficiency anemia.³⁴ An extract of Dong Quai polysaccharides is found to inhibit inflammatory hepicidin, to mobilize iron from the liver and spleen, and to increase serum iron levels. The polysaccharides are also found to decrease inflammation and inhibit production of IL-6 and TNF (tumor necrosis factor), both of which can inhibit erythropoiesis.³⁵



Rehmannia Root, Cured (*Rehmannia glutinosa*)

Rehmannia root, highly valued in Chinese medicine as a female tonic for thousands of years, is a main ingredient in many famous traditional women's formulas. Rehmannia is one of the earliest known herbs in East Asia.³⁶ Rehmannia and Dong Quai are two main ingredients in the famous *Four Substances Formula (Si Wu Tang)*, noted to nourish the blood and support overall health. Rehmannia is included in many other formulas to enhance vitality, nourish blood, and for its restorative influence.^{32,37}

Rehmannia root is rich in saccharides (including polysaccharides and oligosaccharides), flavonoids, and contains over 20 amino acids. Mineral-rich, it contains over 20 microelements including iron, zinc, manganese, and chromium. It contains iridoid compounds including catalpol



and dihydrocatalpol along with glycosides, flavonoids, amino acids, inorganic ions, and microelements.^{36,38}

Modern studies find that *Rehmannia* exerts influence on multiple systems including the blood, endocrine, immune, cardiovascular, and nervous systems. It is shown to exert inhibitory influence on the central nervous system and is thought to alleviate the action of glucocorticoids on the HPA (hypothalamic pituitary adrenal) axis.³⁸ Studies show that *Rehmannia* formulas influence hematopoiesis and benefit heart, liver, kidney, and immune function in animals.^{39,40}

For more information on any of the ingredients listed here, including extensive research or individual monographs compiled by Donnie Yance, please email info@naturaedu.com.

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