**Iron Toxicity**

**When sodium/potassium ratio in an unwashed hair sample is less than 2.0:1.2.**

**Introduction**

We all know iron as an essential mineral, one that is often supplemented to make sure we are obtaining enough of this vital element. Less known is that iron can be toxic and that iron toxicity is not as rare as might be imagined.

In fact, iron toxicity is often overlooked in the fervor to correct anemia and fatigue by automatically giving iron pills. Because of the seriousness of iron toxicity and the folklore that everyone needs iron, it is important to address iron toxicity.

There are two primary types of iron toxicity, inherited or congenital and acquired iron toxicity. This paper focuses on acquired iron toxicity and its correction. However, it is important to say a few words about inherited hemochromatosis.

Recently, the First International Conference on Hemochromatosis was held at the New York Academy of Sciences. Dr. H. Ralph Schumacher, Jr. stated that many patients with iron poisoning are incorrectly diagnosed. For example, of 129 patients with arthritis-like symptoms due to iron toxicity, only 16 were correctly diagnosed.

The prevalence of inherited hemochromatosis, once thought to be 1 in 20,000 is actually between 3 and 6 in 1000. The gene frequency of hemochromatosis is actually higher than that of any other known genetic disorder

In addition to the inherited disorder, acquired iron toxicity is quite prevalent and occurs insidiously. Iron overload from a variety of sources can contribute to a wide range of diseases from heart failure and diabetes to thyroid and liver disease.

Those most susceptible to iron toxicity are men, and people exposed to high levels of iron in their food, water or occupations.

**Sources Of Iron**

Food Sources

Iron is well absorbed from animal products, especially meats. Excellent sources include shellfish, liver and other organ meats. Iron in egg yolks is not well absorbed, although having orange juice with your eggs will increase the absorption of iron from the egg yolk.

Iron is abundant in some vegetables, but is generally less well absorbed because of the presence of phytates, oxalates, tannin and other substances that interfere with iron absorption. Vegetables high in iron include green leafy vegetables such as kale, collard, mustard greens, Swiss chard and spinach.

In addition, legumes, beets, black cherries, and molasses are good sources. Dried fruits, seeds, nuts, yeast, wheat germ, whole-grain cereals and breads also contain significant amounts of iron. Beer and red wine contain iron, and alcohol ingested along with iron enhances iron absorption, which may result in iron-storage diseases.

Cookware

Foods cooked in iron cookware will pick up iron from the skillet or pan. Tomato products such as spaghetti sauce and apple butter, are most likely to leach iron from pots because of the acidic nature of these foods.

Iron Pipes

Some communities have iron water pipes. Iron can be leached from pipes, especially if the water is acidic. Iron pipes are also subject to rusting, allowing iron oxide flakes to be added to the water.

Drinking Water Supplies

Iron is a common water contaminant in certain areas of the country. Often the soil has a reddish color, and a brownish ring is present in bathtubs and on plumbing fixtures. Drinking water can be an important source of iron toxicity.

Occupational Exposure

Welders, sheet metal workers, machinists, plumbers, auto mechanics, steel workers and other workers exposed to iron and steel can absorb large quantities of iron through contact.

Food Supplements

Many commonly prescribed vitamin and mineral preparations contain large quantities of iron. Long-term consumption of these products, prescribed by a physician or self-prescribed, can cause iron overload. However, many iron supplements are poorly absorbed.

Bread, Cereals and Other White Flour Products

Federal law requires that white flour and refined cereal products labeled enriched must have 25 mg. iron added per pound of flour. The form of iron used, however, is not particularly well absorbed.

Other Sources

Repeated blood transfusions, and use of galvanized iron containers can be sources of iron. Hemolytic anemia and aplastic anemia can cause iron toxicity by enhancing iron absorption. Early acute hepatitis can contribute to iron toxicity by interfering with iron excretion.

**Detection Of Iron Toxicity**

Detection of iron toxicity is often based on suspicion due to joint pain, amenorrhea, or sudden onset of shortness of breath. A liver biopsy or other organ biopsy will confirm hemochromatosis. Elevated serum ferritin above 1000 nv/ml is also used to diagnose iron toxicity.

**Hair Analysis**

Hair analysis can be helpful to detect iron toxicity. However, some skill in interpretation is necessary. High iron on a hair test may represent an iron loss due to protein catabolism and release of iron from cells. This is often the case when iron is elevated and the sodium/potassium ratio in an unwashed hair sample is less than 2.0:1.2

Also, an iron toxicity problem may not be revealed on the first tissue mineral analysis test. Iron that is stored in the liver or other body tissues may require several months to a year or more before it is mobilized from the tissues and revealed on the test.

**Metabolism Of Iron**

Absorption

Iron is poorly absorbed by the body. It is estimated that only about 10-15% of ingested iron is absorbed, although the percentage is higher if an iron deficiency is present.

Synergists

Iron absorption is enhanced by the amino acids histidine, lysine and vitamin C, vitamin E, citric acid, lactose, fructose, glucose, sucrose, and sorbitol.

Ingestion of acidic foods such as; alcohol and animal proteins, enhances iron absorption. States of anemia, B6 deficiency, iron deficiency and hypoxia also enhance iron absorption.

Antagonists

Manganese, copper, zinc, cobalt, nickel, chromium, calcium, magnesium, and cadmium compete with iron for absorption. Phosphates, egg proteins, long-chain fatty acids and phytates found in cereals interfere with iron absorption.

Old age, copper deficiency, achlorhydria, tea, oxalic acid, soy protein, antacids, and vegetarian diets are associated with reduced iron absorption.

Chelated iron supplements (citrate, lactate, fumarate, gluconate, succinate, and glycinate) are better absorbed than the commonly used iron sulfate. The iron often used to fortify flour and cereal products is very poorly absorbed.

Retention

About 75% of the iron in an adult is found in hemoglobin, myoglobin and iron-containing enzymes such as catalase and peroxidase enzymes. The other 25% is stored in the liver, spleen and bone marrow.

Excretion

Normally, 95-100% of iron is retained by the body. This is a common reason why iron toxicity occurs. Iron is normally excreted in the bile, but is reabsorbed in the intestines. The body does not seem to have specific excretory mechanisms for iron. Kidney involvement in iron excretion is negligible. Menstruation is the most common cause of iron loss.

**Metabolic Effects Of Iron Toxicity**

Deposition in Body Organs and Tissues

The detrimental effects of chronic iron toxicity are due in part to iron accumulation in various organs. These include the heart, liver, brain, pancreas, and joints.

Displacement of Vital Nutrients

Many of the symptoms of iron toxicity are due to displacement by iron of zinc, copper, manganese and other vital nutrients.

**Psychological Effects of Iron**

Iron toxicity is commonly associated with personality characteristics of a strong ego, rigidity, tenaciousness, hostility stubbornness and irritability. Lou Gehrig was known as "the iron man of baseball" because he set a record for the number of consecutive games played. He died at an early age of amyotrophic lateral sclerosis. Even when he was seriously ill, he continued to play baseball for the New York Yankees.

The iron personality may be due to the action of iron in increasing the adrenal hormone, aldosterone. Aldosterone serves to increase the sodium level, which in turn, is associated with increased volatility of temperament. Higher sodium levels also tend to lower calcium, magnesium, and zinc levels, which can increase irritability.

Iron also deposits in the amygdala, a portion of the brain associated with feelings of anger and hostility. Another possible mechanism is that iron toxicity has been associated with increased levels of plasma histamine and serotonin.

**Metabolic Dysfunctions Associated With Iron Toxicity**

Aging, Premature

Iron, in excess, can damage the liver and other organs leading to premature aging and death.

Anger

Anger may be due to increased sodium levels, or accumulation of iron in the amygdala of the brain.

Arthritis

Iron can accumulate in the synovial membrane of joints. Iron also interferes with zinc and copper metabolism, which are needed to maintain the integrity of the joint surfaces.

Birth Defects

Birth defects may be due to iron-induced zinc deficiency.

Bleeding Gums

Iron can deplete vitamin C, leading to bleeding gums and periodontal disease. Iron toxicity can also prolong blood clotting time.

Cancer

Iron toxicity can cause liver damage, which may result in malignancy. Iron toxicity is also associated with excessive protein catabolism; a condition associated with development of malignancy.

Cardiomyopathies

Iron has an affinity for cardiac tissue and in excess, causes damage to the heart muscle.

Cirrhosis of the Liver

Iron is normally stored in the liver, and excess iron accumulation results in liver damage.

Constipation

Iron, in excess, is a frequent cause of constipation.

Diabetes

Excessive iron antagonizes chromium needed for insulin transport. Iron, in excess, also by causing a zinc deficiency, results in diabetes. Zinc is needed for insulin production. Iron buildup in the pancreas results in pancreatic damage.

Diarrhea

Intestinal irritation due to iron supplements can cause diarrhea.

Dizziness

Dizziness may be due to manganese deficiency caused by excessive tissue iron. Manganese is required for inner ear function that controls the sense of balance.

Fatigue

Iron accumulation in the liver and other tissues can result in extreme fatigue. Iron-induced diabetes can also be a cause of fatigue. Depletion of essential trace elements such as zinc, copper and manganese can impair energy production resulting in fatigue.

Grayish-Hued Skin

Extreme iron toxicity results in grayish-hued skin.

Headaches

Iron accumulation, by raising blood pressure in the cerebral arteries, can cause headaches.

Heart Failure

Iron accumulation in heart tissue can damage the heart muscle leading to heart failure.

Hemochromatosis (iron deposits in organs)

Excess iron is deposited in the liver, pancreas, brain, heart, joints and other body tissues leading to impairment of organ function.

Hepatitis

By damaging the liver, iron toxicity can contribute to hepatitis and other liver disorders.

Hostility

Excessive iron may be associated with hostility by raising sodium and lowering magnesium and calcium levels. Iron also is deposited in the amygdala of the brain; a center associated with hostility and anger.

Hyperactivity

Iron raises sodium and lowers calcium, magnesium and zinc levels. Deficiency of these sedative minerals commonly leads to hyperactivity.

Hypertension

By raising sodium, iron can contribute to water retention, leading to an abnormal increase in blood pressure. Also, iron toxicity can lower calcium, magnesium and zinc levels. This results in increased vascular tone, which in turn can result in hypertension.

Infections

Bacteria require iron to proliferate or multiply. Excessive tissue iron also lowers copper, a mineral that serves to inhibit bacterial infection.

Insomnia

Insomnia may be due to iron's ability to lower calcium, magnesium, and zinc, hence increasing nervousness and irritability.

Liver Disease

One of the principal storage sites for iron is the liver. Excessive iron can result in damage to the liver (see: also cirrhosis of the liver).

Mental Problems

Irritability, hostility, anger, nervousness, and schizophrenia are commonly associated with iron toxicity.

Metallic Taste in Mouth

Liver toxicity and elimination of iron through saliva may cause a metallic taste in the mouth.

Myasthenia Gravis

Excessive tissue iron, by lowering manganese levels, can, by interfering with neurotransmitters, result in damage to muscle tissue. This may result in conditions such as myasthenia gravis.

Nausea

Damage to the liver and pancreas, due to iron deposition, can produce nausea.

Nevi

Damage to the blood vessels may occur as a result of a vitamin C, zinc, or copper deficiency, secondary to iron toxicity.

Nervousness and Irritability

Iron raises sodium, which can lower calcium, magnesium and zinc levels. This frequently leads to nervousness and irritability.

Parkinson's Disease

Iron may contribute to neuromuscular diseases by lowering copper, zinc, and manganese levels.

Rheumatoid Arthritis

It is common for excess iron to be deposited in the synovial membranes of the joints, resulting in arthritis. Rigidity is associated with iron toxicity. (See also arthritis)

Schizophrenia

Iron-induced schizophrenia may be due to the depletion of zinc from certain areas of the brain.

Scurvy

Iron is known to destroy vitamin C, which in turn, results in scurvy.

Sickle-Cell Anemia

There is evidence that iron toxicity may be associated with development of sickle-cell anemia.

Stubbornness

Stubbornness is part of the iron personality and is perhaps due to an increase in the rate of metabolism and the loss of minerals such as zinc and copper.

Strabismus (rapid eye movements)

Rapid eye movements have been noted with iron toxicity.

**Vitamin and Mineral Deficiencies**

Excess iron can deplete vitamin B6 and vitamin C. In addition, iron toxicity can also cause a deficiency of manganese, zinc and copper.

**Effects Of Iron On Other Minerals And Vitamins**

Calcium and Magnesium

Iron toxicity, by raising tissue sodium levels, can cause an increase in the oxidation rate and a lowering of tissue calcium and magnesium levels.

Sodium

Iron tends to raise tissue sodium levels.

Manganese

Iron competes with manganese for absorption and iron displaces manganese in the liver and in body tissues. Excessive iron ingestion can contribute to a manganese deficiency.

Copper

Iron competes with copper for absorption, and displaces copper from the liver.

Zinc

Iron competes for absorption with zinc.

Chromium

Iron can displace chromium in body tissues.

Vitamin C and B6

Iron toxicity can lower the levels of these vitamins.

**Effects Of Other Nutrients On Iron**

Manganese, copper, zinc, cobalt, cadmium and nickel compete with iron for absorption.

Copper and manganese can replace iron in the liver and other body tissues.

Lead interferes with heme synthesis.

Vitamin C enhances iron absorption.

Vitamin B6 deficiency causes enhanced iron absorption.

**Detoxification Of Excessive Iron**

Several methods are used for congenital hemochromatosis. Phlebotomy, or bleeding, is still used. Desferroxamine-B is a chelating agent that is occasionally used to enhance urinary excretion of iron.

For acquired iron toxicity, we have devised a very effective nutritional protocol using a combination of approaches. All the following measures should be done together for optimum results:

* Inhibition of iron absorption is achieved by reducing vitamin C intake and avoiding iron-containing food supplements, iron cookware and other sources of iron.
* Antagonists such as manganese, copper, zinc, and B6 are given to reduce iron absorption and assist in the removal of iron from the liver and other organs.
* Reducing protein catabolism is important in many cases. Breakdown of proteins results in a release of iron from damaged cells. Protein catabolism has to be reversed by providing nutrients that enhance energy production and balance the sodium/potassium ratio on the hair analysis.
* Increase energy levels by balancing critical mineral ratios, so that energy is available to detoxify iron.
* These mineral ratios are brought into balance by altering the diet and by individualizing supplement programs, which are designed specifically to favorably influence mineral ratios.
* Enhancing the production of ferritin and ceruloplasmin is helpful in mobilizing iron. These iron-binding blood proteins are produced in the liver and require copper and zinc for their manufacture. Adrenal gland activity must also be restored to enhance ceruloplasmin production.

All of these methods should be used together in an integrated program for best results.

**Iron Detoxification Healing Reactions**

An interesting observation is; when iron is removed from body tissues, often a person becomes aware of underlying feelings of anger. In addition, often dreams involving violence or hostility also occur during detoxification of iron.

These reactions are temporary and soon pass. However, they indicate the subtle relationship between emotions and the excessive accumulation of toxic metals in various body tissue reservoirs.

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