

Why Managing Your Iron Level Is Crucial to Your Health

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✓ Fact Checked

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STORY AT-A-GLANCE

- › Iron is essential for life as it transports oxygen in your body, helps regulate cell growth, maintains brain function, metabolism and endocrine function and is involved in energy production and immune function
- › Having either too much or too little iron can have serious repercussions. While iron deficiency is commonly checked for, iron overload is a far more common problem, yet is often overlooked or ignored
- › Excess iron accelerates every major disease we know of, and causes the pathologies associated with liver and cardiovascular disease. Fortunately, treatment is easy and inexpensive: Simply donate your blood

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Iron is essential for human life, as it:¹

- Forms hemoglobin (a protein in red blood cells), which carries oxygen to all the cells in your body
- Is a key component of myoglobin, a protein that stores oxygen in muscle tissue
- Helps regulate cell growth and differentiation, including healthy brain development in children
- Helps maintain your metabolism² and endocrine function³

- Is involved in energy production and immune function⁴

Having either too much or too little iron can have serious health consequences and, while iron-deficiency anemia is commonly checked for, many doctors are still seriously misinformed about the dangers of iron overload, which is a far more common problem.

In fact, most men and postmenopausal women are at risk for iron overload due to inefficient iron excretion, since they do not bleed on a regular basis and blood loss is the primary way to lower excess iron, as the body has no active excretion mechanisms.

There's also an inherited disease, hemochromatosis, which causes your body to accumulate excessive and dangerously damaging levels of iron. If left untreated, it can damage your organs and contribute to cancer, heart disease, diabetes, neurodegenerative diseases and many other health problems.

The good news is iron overload is easy and inexpensive to treat. By monitoring your serum ferritin and/or GGT levels, avoiding iron supplements and donating blood on a regular basis, you can avoid serious health problems. In a podcast, Chris Masterjohn, Ph.D., delves into the biological imperatives of iron, the effects of low and high iron and how to address both of those issues. You can find that episode on [Masterjohn's website](#).⁵

Health Problems Associated With High and Low Iron

Having just the right amount of iron is important, as without it, your body cannot work properly, and with excess, iron causes a great deal of destructive harm within your body. Following is a list of conditions associated with either extreme:⁶

Diseases associated with low iron levels

Anemia

Diseases associated with iron overload

Anemia of chronic disease

Diseases associated with low iron levels

Diseases associated with iron overload

Fatigue

Insulin resistance, Type 2 diabetes and metabolic syndrome

Fibromyalgia

Premature aging

Inflammatory bowel disease

Atherosclerosis

Hypothyroidism

Anorexia

Depression / anxiety

Grave's disease

Attention deficit hyperactivity disorder

Heart arrhythmia

Parkinson's disease

Cancer

Neurodegenerative conditions

Sideroblastic anemia

Celiac disease

Nonalcoholic fatty liver disease (NAFLD). Excess dietary fructose is a primary initiator of NAFLD, but high iron is another culprit that triggers disease progression

Restless leg syndrome

Liver damage and liver disease. Each year there are roughly 36,000 deaths from liver diseases and about 6,000 liver transplants.

Most all of these cases are affected by excess iron, even in the absence of a hemochromatosis genotype⁷

Diseases associated with low iron levels	Diseases associated with iron overload
Hair loss	Still's disease
Muscle weakness, decline in motor skills	Hemochromatosis
Mental changes and memory loss	Hemophagocytic syndrome

What's an Ideal Iron Level?

The serum ferritin test measures your stored iron. For adults, I strongly recommend getting a serum ferritin test on an annual basis as a screen to confirm you're neither too high nor too low. When it comes to iron overload, I believe it can be every bit as dangerous to your health as vitamin D deficiency. Currently, there are five different iron level tests, including serum ferritin, that your doctor might order. They are:⁸

- **Serum Iron (SI)** – This tests for iron contained in plasma bound by transferrin. Ranges may vary, but most males have around 65 to 176 $\mu\text{g/d}$, while and females range between 50 and 170 $\mu\text{g/dL}$.
- **Total Iron Binding Capacity (TIBC) and Transferrin Saturation % (TS%)** – This tests for the potential capacity of transferrin molecules to bind with serum iron. Numbers for both men and women range between 240 and 450 $\mu\text{g/dL}$, although they also can vary from lab to lab.
- **Serum Ferritin (SF)** – Normal ranges are 15 to 200 ng/ml for women and 20 to 300 ng/ml for men. But, as with many other lab tests, the "normal" ranges for serum ferritin are far from ideal.⁹ In some labs, a level of 200 to 300 nanograms per milliliter (ng/mL) falls within the normal range for women and men respectively, which is FAR too high for optimal health.

In reality, you're virtually guaranteed to develop disease at those levels. An ideal level for adult men and non-menstruating women is somewhere between 20 and 40

ng/mL. You do not want to be below 20 ng/mL or above 60 ng/mL.

- **Gamma Glutamyl transferase (GGT)** – This test measures liver enzymes, which I discuss in the next section.
- **Hemoglobin (Hgb)** – This measures a protein in red blood cells. Although this test isn't good to measure iron overload or deficiency, the ranges for men are 13.8 to 17.2 and 12.1 to 15.1 for females.

Maintaining a healthy iron level is also important during pregnancy. It's a balance you should carefully address with your obstetrician, as having either too much iron or too little can influence pregnancy outcomes.^{10,11} Iron overload during pregnancy is also linked to a higher risk of developing Type 2 diabetes.¹²

GGT Test for Free Iron

One of the more valuable tests is the gamma-glutamyl transpeptidase (GGT) test. As mentioned, GGT measures liver enzymes. Not only will this tell you if you have liver damage, it can also be used as a screening marker for excess free iron and is a great indicator of your sudden cardiac death risk.

For women, a healthy GGT level is around 9 units per liter (U/L) whereas the high ends of "normal" are generally 40 to 45 U/L. For men, 16 U/L is ideal, while the normal lab range can go as high as 65 to 70 U/L.¹³

According to Gerry Koenig, former chairman of the Iron Disorders Institute and the Hemochromatosis Foundation,¹⁴ women with a GGT above 30 U/L have a higher risk of cancer and autoimmune disease. In the video above, Koenig discusses this and other health hazards associated with iron overload.

What Causes Excess Iron Buildup?

There are four types of excess iron buildup, aka, hereditary hemochromatosis: Types 1 and 4 begin in late adulthood (ages 40 and beyond); Type 2 begins in childhood; Type 3 is an intermediate condition that begins after childhood but before age 30.¹⁵

Additionally, there is neonatal hemochromatosis, which develops in a baby in the womb, and secondary hemochromatosis, which is not inherited and which may develop as a result of chronic liver disease or multiple blood transfusions.¹⁶ Two of the most common causes of these conditions are:

1. Having one or both genes for hemochromatosis (indicating mild or severe form). About 1 in 250¹⁷ to 300¹⁸ or an estimated 11 million people in the U.S. have the single gene for hemochromatosis.¹⁹ However, more than 90 million Americans have an iron disorder of some sort.²⁰

Approximately 1 million people have the double-gene variant, considered the genotype most predictive of liver disease complications. However, this only becomes a serious problem if significant iron overload occurs before a diagnosis is achieved and proper treatment can be administered

2. Inadequate iron elimination. Along with men older than 40, post-menopausal women are at increased risk due to the fact they do not have monthly blood loss, which is one of the best and most efficient ways to rid your body of excess iron

Another common cause of excess iron is the regular consumption of alcohol, which will increase the absorption of any iron in your diet. For instance, if you drink wine with your steak, you will likely absorb more iron than you need. Other possible causes of high iron levels include:

- Cooking in iron pots or pans. Cooking acidic foods in these types of pots or pans will cause even higher levels of iron absorption
- Eating processed foods fortified with iron
- Drinking well water that is high in iron. The key here is to make sure you have some type of iron precipitator and/or a reverse osmosis water filter

- Taking multivitamins and mineral supplements, as both of these frequently have iron in them

Why Excess Iron Is so Dangerous

Your body creates energy by passing the electrons from carbs and fat to oxygen through the electron transport chain in your mitochondria to produce adenosine triphosphate (ATP). Ninety-five percent of the time, the oxygen is converted to water. But 0.5 to 5% of the time, reactive oxygen species (ROS) are created.

Iron can react with hydrogen peroxide in the inner mitochondrial membrane. This is a normal part of cellular aerobic respiration. But when you have excessive iron, it catalyzes the formation of excessive hydroxyl free radicals from the peroxide, which decimate your mitochondrial DNA, mitochondrial electron transport proteins and cellular membranes.

This is how iron overload accelerates every major disease we know of, and how it causes the pathologies associated with liver and cardiovascular disease. Unfortunately, few doctors understand the molecular biology of this reaction, which is why iron overload is so frequently overlooked.

If you eat unhealthy levels of net carbs (total carbs minus fiber) the situation is further exacerbated, as burning carbs as your primary fuel can add another 30 to 40% more ROS on top of the hydroxyl free radicals generated by the presence of high iron.

Unfortunately, most people reading this are burning carbs as their primary fuel. If you struggle with any kind of chronic health problem and have high iron and eat a standard American diet that is high in net carbs, normalizing your iron level (explained below) and implementing a ketogenic diet as described in my book, "[Fat for Fuel](#)," can go a long way toward improving your health.

Taking extra antioxidants to suppress ROS generated by high iron alone or in combination with a high-sugar diet is inadvisable, as ROS also act as important

signaling molecules. They're not all bad. They cause harm only when produced in excess.

Your best bet is to lower the production of ROS rather than squelching them after the fact. One of the easiest and most effective ways to do that is to eat a diet high in healthy fats, adequate in protein and low in net carbs. Eating healthy fats can make a bigger difference than you might think, especially if you have high iron.

How to Address Iron Overload

If your iron level is high, the easiest and most effective solution is to donate your blood. If you're an adult male, you'll want to donate blood three to four times a year once your levels are normal. If your ferritin levels are over 200 ng/mL, a more aggressive phlebotomy schedule is recommended.

It is also wise to have a percentage transferrin saturation done. Ideally, this value should be between 30 and 40%. If it is higher, and you have an elevated ferritin level, then I am sad to tell you, but you have iron overload that is hurting your mitochondria. This needs to be addressed if you want to lower your risk for chronic diseases like heart disease and cancer.

As noted by Masterjohn in the video above, trying to control high iron through your diet by avoiding iron-rich foods can have a number of detrimental effects, as you will also forgo many valuable nutrients. Ideally, you will want to donate your blood twice or three times a year until your lab values normalize. If you are unable to donate your blood, you can get your doctor to write a prescription for a therapeutic phlebotomy to have this done.

When you donate blood, they typically remove a pint of blood (about 500 cc), which can be a challenge for many as it is about 10% of their blood supply. Most people tolerate this process much better when they do smaller donations more frequently. So, if you or someone you know can draw blood, removing 2 ounces every week or 8 ounces a month would be a wiser strategy.

A recent study²¹ in *Frontiers in Molecular Neuroscience* notes that iron-restricted diets "affect brain ferritin levels, dopamine metabolism and cellular prion proteins in a region-specific manner" – effects that highlight the importance of adequate iron for general brain health and for the prevention of neurological diseases.

That said, if your iron is high, you may want to avoid combining foods high in vitamin C with foods high in iron, as the vitamin C increases iron absorption. On the other hand, calcium will bind to iron, limiting absorption, so eating iron-rich foods with calcium-rich foods can be helpful.

Avoid using phytate or phytic acid (also known as IP6) to prevent iron absorption and chelate iron out of your body, however, as this can easily result in other mineral deficiencies, such as zinc deficiency. A far safer alternative is to take curcumin. It acts as a potent chelator of iron and can be a useful supplement if your iron is elevated.

Sources and References

- ¹ Harvard School of Public Health. Iron
- ² The American Journal of Clinical Nutrition, Volume 106, Issue suppl_6, December 2017, Pages 1559S–1566S. October 25, 2017
- ³ UCLA Newsroom. Researchers Discover Hormone That Controls ... Iron ... June 1, 2014
- ⁴ Arch Latinoam Nutr 1999 Sep;49(3 Suppl 2):40S-46S
- ⁵ Chrismasterjohnphd.com January 27, 2017
- ⁶ Self Hacked, 25 Conditions Associated With Higher and Lower Ferritin
- ⁷ Iron Disorders Institute
- ^{8, 9, 13} Irondisorders.org. Iron Levels Tests
- ¹⁰ Am J Clin Nutr. 2017 Dec; 106(Suppl 6): 1567S–1574S
- ¹¹ Academia. Hemoglobin Concentration in Pregnancy and Perinatal Mortality. November 23, 2004
- ¹² Diabetes UK. Iron Overload During Pregnancy. November 11, 2016
- ¹⁴ Hemochromatosis.org
- ¹⁵ MedlinePlus
- ¹⁶ Mayo Clinic. Hemochromatosis. December 30, 2020
- ¹⁷ Mo Med. 2012 Mar-Apr; 109(2): 133–136
- ¹⁸ CDC Hereditary Hemochromatosis
- ¹⁹ Iron Disorders Institute. About Too Much Iron
- ²⁰ Iron Disorders.org
- ²¹ Frontiers in Molecular Neuroscience May 17, 2017