

# Iron Deficiency and Anemia in Athletes

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Training for and competing in an Ironman Triathlon is an enormous physical challenge. Imagine if that challenge were made even more formidable by having to endure vexing symptoms such as lack of endurance, persistent fatigue, a higher heart rate during exercise, irritability, and a noticeable reduction in your motivation to train.

Faced with these symptoms, your first instinct might be to assign blame to overtraining or perhaps not enough carbohydrates to meet the muscle fueling demands of your workouts. So you make the necessary adjustments to your recovery and you eat more carbs. But those same debilitating symptoms persist.

## What could be the culprit?

One possibility is low iron, resulting in iron deficiency anemia. This preventable condition can develop over time and rob you of your ability to work out and compete at your best. This article explains iron deficiency anemia, how it develops, who is most at risk and why — and, most importantly, simple steps you can take to prevent it.

## Ironman athletes need iron

As a triathlete, you push your body virtually every single day. It's your muscles that power you as you train in the water, on the bike, and on your feet. Your muscles depend on a constant supply of energy and oxygen. The mineral iron turns out to play a key role in both energy production and the delivery of oxygen throughout the body.

Cells, including muscle cells, require energy in order to function. Without this energy, your muscles would simply shut down. The energy powerhouses found in cells are called mitochondria, and iron is a critical player in allowing these energy-producing biological structures to produce the metabolic energy needed for the muscle contractions that enable you to exercise. Your hard-working muscles also require oxygen. Here again it is iron, this time in partnership with red blood cells in the bloodstream, that participates in getting much-needed oxygen to muscle tissues. Red blood cells get the credit for making these all-important oxygen deliveries, but it's a protein bound to iron and found in red blood cells — called hemoglobin — that is responsible for binding to oxygen in your lungs and then releasing it to tissues, such as your muscles, that require it.

## Iron Deficiency Anemia Deconstructed

Iron is an essential nutrient. That means your body can't make it and you have to get it from your diet. But if you don't consume enough iron to meet your needs, over time, iron deficiency anemia can develop. Anemia is a condition where the blood's ability to transport oxygen is reduced. While there are many types of anemia, and just as many causes, a common type is iron deficiency anemia; when it occurs in athletes, it has debilitating effects on athletic performance.

Iron deficiency anemia doesn't develop overnight. Instead, depletion of iron occurs in stages. It starts when an individual consumes too little iron to meet their daily needs. When this happens, the body is forced to rely on its reserves, and gradually stores of iron in the body become depleted. In the absence of adequate iron stores, red blood cells continue to form, but they are small in size and contain less-than-normal amounts of hemoglobin. Red blood cells have a lifespan of about 120 days. So gradually over time the new less-than-optimal red blood cells that are smaller than normal and low in hemoglobin replace more and more of the older, normal versions. Unfortunately, the ability of these newly formed cells to carry oxygen is impaired. As a result, during exercise your heart has to beat faster to try to keep up with the metabolic demand for oxygen. But it's a losing battle. With suboptimal oxygen delivery, neither

your brain nor your muscles can function at their best. The end result is lagging motivation to exercise, feelings of irritability, persistent fatigue, and overall poor endurance. Needless to say, Ironman Triathlons and iron deficiency anemia do not make for a good combination.

### **Problematic in athletes**

Iron deficiency anemia is the most common nutrient deficiency condition in the world, so it's not a problem that is exclusive to athletes. But its detrimental effects are quite apparent in athletes. According to an expert in the field, being an athlete definitely shines the spotlight on the condition if it is present. In fact, an individual who is not very physically active might not even be aware that they have anemia, whereas an individual who trains hard and tries to get the most out of their body on a daily basis will clearly notice a difference in physical performance as iron deficiency anemia takes hold.

Being a triathlete puts a stress on your iron stores in a number of ways. For example, when you train and compete, you sweat a tremendous amount in order to cool yourself. With each drop of that sweat, a tiny amount of iron is lost. Endurance athletes also have a reduced flow of blood to the digestive tract during extended exercise, and this can be accompanied by some gastrointestinal bleeding. Any time you lose blood, you lose the iron associated with hemoglobin in red blood cells. Many triathletes take aspirin or other pain-relieving or anti-inflammatory medications, and these too can cause blood to be lost via the gastrointestinal tract. Finally, the physical impact of running is believed to take a toll on iron stores. Experts call the phenomenon foot-strike hemolysis. The idea is that as your feet pound the pavement when running, the impact causes red blood cells to burst, and the iron inside these cells is then lost. These effects of exercise aren't enough to cause iron deficiency anemia, but the depleting effects can compound the problem if your iron stores are already low to begin with.

### **Triathletes at highest risk**

While exercise itself increases the daily need for iron a bit in virtually all endurance athletes, some athletes are more at risk for iron deficiency anemia than others. Those with either higher needs for iron, lower iron intakes, or a combination of both are at highest risk.

Women athletes of reproductive age are at the top of the high-risk list. Two things are working against you if you fall into this category. The first is that monthly menstrual blood loss, while completely normal, can be a big contributor to iron depletion. In fact, because of menstrual blood losses, women of childbearing age require about 18 mg of iron from the diet on a daily basis, while men require only about 8 mg of iron daily. That's just half the story. Men not only have lower iron needs, they consume more calories or food on a daily basis, and so they usually easily meet their iron needs. Women, on the other hand, have a greater need for iron, but they typically have to meet their needs while consuming fewer calories than men. Thus, it's all too common that women of childbearing age often come up short on iron and suffer a disproportionate share of iron deficiency anemia.

Endurance athletes tend to be at higher risk for iron depletion because the high-carb diet needed to meet the ongoing energy demands of the sport doesn't provide iron with the best bioavailability. Plant-sourced foods such as grains, fruits, vegetables, and beans are chock-full of carbs and other important nutrients, but the iron from these sources is not as well absorbed as iron from meat, poultry, or fish.

Vegetarian athletes who rely only on plant-derived foods are at higher risk for iron deficiency for the same reason.

Finally, adolescent athletes undergoing growth spurts also make the high-risk list because they have a higher need for iron to support growth and development. If their daily iron needs go unmet, reserves dwindle and iron deficiency anemia can develop.

### **How to know if you're low**

Full-blown iron deficiency anemia and low iron stores are detected by blood tests. A low hemoglobin level generally indicates that you've reached the anemia stage. You can also be iron deficient with dwindling iron stores yet not have full-blown iron deficiency anemia. Often, physicians will not only test the blood for hemoglobin concentration, they will also test for the ferritin level in your bloodstream. Ferritin is a protein

that binds to iron and circulates in the bloodstream. A low serum ferritin level suggests that your stores of iron are low and that you may be headed for iron deficiency anemia.

### **Prevention is the best medicine**

The best way to ensure adequate iron stores and prevent iron deficiency anemia is to consume adequate iron. While you need a high-carb diet in order to keep up with the demands of triathlon workouts and competitions, getting enough iron every day requires a few tweaks to your dietary strategy. If you make those course corrections, iron deficiency anemia is preventable:

#### **Strategy #1: Consume a diet naturally rich in iron**

If possible, try to include some lean cuts of red meat, beans, lentils, dark-green leafy vegetables, eggs, and nuts in your diet. These are some of the higher-iron sources in the diet. Red meat is a particularly good source because the chemical form of the iron is easier to absorb. Plant-derived foods have a different chemical form of iron that is harder to absorb.

#### **Strategy #2: When eating iron-containing foods, consume a vitamin C source**

Vitamin C strongly enhances iron absorption, especially the iron from plant-derived sources. A little vitamin C goes a long way. When 25–50 mg of vitamin C is taken during a meal, iron absorption increases by two- to sixfold. Vitamin C-rich foods include citrus fruits, cantaloupe, and strawberries. Vegetable sources of vitamin C include broccoli, spinach, potatoes, tomatoes, and peppers.

#### **Strategy #3: Take advantage of iron-fortified cereals**

Iron-fortified foods such as cereals can be a good way to get iron along with the carbs you need to fuel your training. Many fortified cereals contain anywhere from 45% –100% of the daily value for iron per serving, or between 8.1 mg and 18 mg of iron. (The percentages for labeling are based on a daily value of 18 mg per day.) And don't forget to pair that cereal with a glass of orange juice to improve iron absorption.

#### **Strategy #4: Consider an iron-containing multivitamin/mineral supplement**

If you are a woman of childbearing age, a vegetarian, or you're in the midst of your growth spurt, you may need a little dietary iron insurance. If that's the case, consider a one-a-day type of multivitamin/mineral that includes iron.

#### **Strategy #5: Talk to your doctor**

If you think you have iron deficiency or iron deficiency anemia, talk to your doctor about getting tested. Your doctor can also advise you on the need for and risks associated with iron supplementation.

### **A Word To The Wise About Iron Supplementation:**

Competitive athletes are always trying to get an edge on their competition; thus, it's not too surprising to find athletes taking iron supplements. Case in point, a study of elite road cyclists in France found that one-third of the athletes had elevated serum ferritin levels, meaning they had excessively high stores of iron. This indiscriminate use of iron supplements is not a good idea. While a little iron is clearly essential for good health, and eliminating iron deficiency anemia improves athletic performance, too much iron can cause gastrointestinal side effects. In addition, there is a subset of the population that has a hereditary disorder that is characterized by excessive iron absorption from food, which, if left untreated, can cause harm to the liver. The bottom line is to meet your daily need for iron, preferably with food sources, and avoid over-consuming iron.

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