



# ATHLETES AND IRON DEFICIENCY

## Athlete Spotlight

A 15 yr old female runner was at her peak, then her energy and times started dropping rapidly. A Serum ferritin test result was low.

She worked with a doctor, improved her diet, took supplements, and several months later she felt better and her times improved greatly!

## DID YOU KNOW?

~15%-35% of female athletes and ~3-11% of male athletes may experience iron deficiency!

## WHAT IS IRON & WHAT DOES IT DO?

- Iron is a mineral found within red blood cells.
- It helps transport oxygen to muscles and body tissues
- It helps energy metabolism and the immune system
- Low iron means your muscles could be starving for oxygen!

## SYMPTOMS

- Fatigue that worsens with exertion
- Sudden decrease in athletic performance
- Reduced endurance, loss of energy
- Breathless or abnormally winded in workouts
- Poor concentration
- Sometimes there are no obvious symptoms

## HIGH RISK FACTORS

- Intense endurance athletic training
- High foot-strike sports, ex: running
- Vegetarian or other restrictive diets
- Menstruation or regular blood donations
- Sleep deprivation
- Underlying health conditions

## STAGES OF IRON DEFICIENCY - KEY ATHLETIC THRESHOLDS

01

### Depleted Iron Stores

Serum Ferritin is low <35 µg/L  
Hemoglobin is normal >115 g/L

**Mild:** Address now before further escalation. Effects include light fatigue. Improve iron intake via a "food first" approach.

02

### Early Iron Deficiency without Anemia

Serum Ferritin is very low <20 µg/L  
Hemoglobin is normal >115 g/L

**Moderate:** Effects include fatigue and weakness which impact training. Consider supplements plus dietary changes.

03

### Iron-Deficient Anemia

Serum Ferritin is extremely low <12 µg/L  
Hemoglobin is low <115 g/L

**Severe:** Performance is impacted, health is at risk, Supplements are needed & potential other medical /dietary interventions.

By Dr. Peter Peeling, a renowned expert on Iron. Athletic thresholds are different than the general population, since athletes have higher iron needs.



**Hemoglobin** an iron-rich protein in red blood cells that TRANSPORTS oxygen.



**Serum Ferritin** indicates how much iron is STORED in the body. It's a reliable marker of iron deficiency.



**Anemia** a condition when hemoglobin is low and the body is not getting enough oxygen.



Iron is like a taxi driver that gives his passenger, Oxygen, a ride. Hemoglobin is like the taxicab itself. It's the car that transports iron & oxygen around the body.



Ferritin is like a car that's stored in a garage, ready, when you need it.



Anemia is like a car running out of gas.

**There is debate as to what the lower limit of normal levels should be in athletes. Doctors that treat high-performing athletes tend to lean toward higher levels of serum ferritin.**

## COMPLETE BLOOD COUNT (CBC) TEST

- A general test that examines overall health & many parts of the blood, including hemoglobin, but NOT ferritin.
- Hemoglobin levels may appear normal, even with Early Iron Deficiency. To understand if you are iron depleted, also ask for a Serum Ferritin test.

## TYPES OF IRON TESTS



A good initial screening is to do both a CBC and a Serum Ferritin test.

## SERUM FERRITIN TEST

- Measures ferritin, stored iron, found in bone marrow etc
- Low ferritin can signal low iron before anemia starts.
- It's a great "screening test" for all athletes!
- May be completed on its own or as part of an Iron Panel (Often an Iron Panel is step 2, if a deficiency is found.)



**TEST TIPS** Test at the right time to get accurate results. Ideally in the morning, on a rest day when you're feeling well. Avoid muscle damaging exercise 2-3 days in advance. Otherwise, levels can be falsely elevated and a deficiency could be missed.

# TWO BIGGEST MYTHS OF IRON DEFICIENCY

## MYTHS

**Myth** You only need to test hemoglobin and if results are normal, your iron is normal too.




**Fact** Testing hemoglobin alone won't give you the whole picture, be sure to test ferritin too.

**Myth** A normal ferritin level is the same for both athletes and non-athletes.

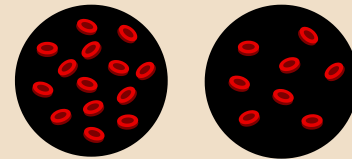


**Fact** A "normal" ferritin level for others may be low for athletes, since they need more iron.

## WHY ARE ATHLETES AT GREATER RISK?

- Iron is lost in sweat, urine, and in red blood cells that break down during exercise.
- Increased demand for iron to produce new muscle.
- Foot Strike Hemolysis - the breakdown of red blood cells in the feet associated with running.
- Endurance athletes can struggle w/refueling.
- With low iron, less oxygen goes to muscles, max VO<sub>2</sub> drops, performance suffers.
- Hepcidin is a hormone that inhibits iron absorption.  
*It's like an iron roadblock* 

## WHAT DOES ANEMIA LOOK LIKE?



Normal Blood


Anemia


Anemia: Low Hemoglobin, the body is not getting enough oxygen

**REMEMBER: LOW STORAGE OF IRON, EVEN WITHOUT ANEMIA, CAN NEGATIVELY IMPACT ATHLETIC PERFORMANCE!**

## TIPS FOR PREVENTION AND TREATMENT

- Eat plenty of iron-rich foods. Hepcidin (which inhibits absorption) is highest ~3-6 hours after exercise, so try to eat within ~1 hour after exercise, ideally in the morning, to improve intake.
- Get sleep, a minimum of 8 hours or more. Lack of sleep can impact iron absorption.
- Wear shoes in good condition. High-mileage athletes may need several pairs per season.
- If you're exercising at high altitudes you need even more iron, so plan in advance!
- Test and if iron levels are low, talk with your doctor about supplements or other options.

 **Do THIS** Consume iron and Vitamin C together to improve iron absorption greatly.

 **NOT THAT** Avoid consuming iron along with Calcium and Caffeine, as they can inhibit iron absorption.

## FDA IRON RECOMMENDATIONS





### Women

Age 14-18: 15 mg/day  
Age 19-50: 18 mg/day  
Age: 51+: 8mg/day

### Men

Age 14-18: 11mg/day  
Age 19+: 8 mg/day

## BEST SOURCES OF IRON

- **Heme Iron:** from meat & seafood ex: beef, seafood, poultry (*more easily absorbed than plant based iron, up to 2x*) 
- **Nonheme Iron:** from plant foods ex: spinach, tofu, legumes, fortified cereal (*less easily absorbed than heme iron*) 

## CAUTION

Talk to your doctor before starting any supplements. It is possible to overdose on iron and this can be very serious.

## SUPPLEMENTS

The goal of supplements is to increase iron levels so then diet can take over. They should be used intermittently, not permanently.

- **Multi-vitamins with Iron:** a moderate amount of iron per pill ~18mg
- **Iron Pills:** Concentrated ~65+ mg
- **Liquid Iron:** Concentrated ~65+ mg, often absorbed more easily
- Contain **heme** and/or **non-heme** iron. The amount varies by brand.
- **Side Effects** can include constipation, nausea, and staining of teeth (liquid iron). Take with food, adjust timing as needed. Brush your teeth!
- **Improve absorption** when taking supplements, avoid caffeine & calcium
- **Be patient!** It can take up to four weeks to see improvement.

Increase iron absorption up to 4x by combining with Vitamin C!

