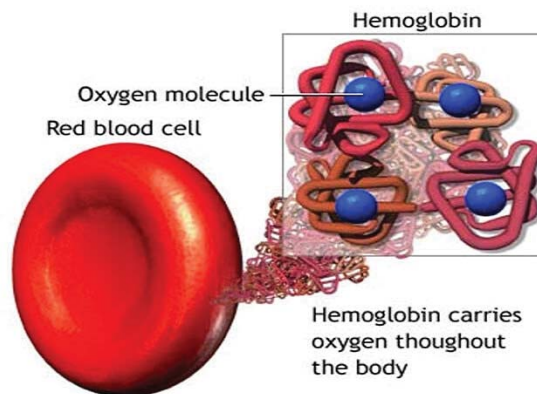


## Iron and the Body

Iron is an important mineral involved in the transportation of oxygen throughout the body and in the production of red blood cells (RBC). Iron is part of the protein contained in RBCs, known as hemoglobin and myoglobin. Hemoglobin carries oxygen from the lungs to tissues, while myoglobin allows muscles to store and use oxygen efficiently.



### Insufficient iron levels can result from:

- ▶ Low overall calorie consumption
- ▶ Low animal protein consumption
- ▶ Loss of iron in blood (menstruation, injury/disease, or gastrointestinal trauma)
- ▶ Poor absorption of iron due to interactions with food, frequency of consumption or medication
- ▶ Loss of iron through sweat, feces, and urine during periods of heavy training

## Importance of Iron to Performance

The physical demands of training by athletes increases their physiological need for oxygen.

Without adequate circulating and stored iron in the body, oxygen is not delivered effectively to muscles, which impairs muscle function and aerobic capacity.

### Symptoms of Deficient Iron Stores

- ▶ Increased irritability or negative mood states
- ▶ Breathless or early fatigue during training
- ▶ Decreased motivation to train
- ▶ Increased rating of perceived exertion (RPE)
- ▶ Decreased aerobic capacity and adaptations
- ▶ Decreased time to exhaustion

### Altitude and Iron

When training at altitude, athletes typically experience an increase in production of RBCs, which increases the need for iron.

- If training is planned at altitude, test iron status in the blood 6-8 weeks prior to travel to ensure there is time to achieve optimal levels prior to departure
- If living at altitude or traveling to altitude frequently, monitor iron status regularly
- Speak to your sport dietitian about whether you should take an iron supplement at altitude

## How Much Iron is Enough?

### The Daily Recommended Intake (DRI):

Females (18-50 years old) = 18 mg/d

Males (18-50 years old) = 8 mg/d

Vegetarians (all ages) = 1.9 x DRI

*\*Iron needs are higher in order to replenish when stores are low*

### Two Types of Iron Found in Food:

**Heme iron** is found in animal foods like meat, fish, and poultry. This type of iron is highly absorbed by the body.

**Non-heme iron** is found in plant foods like legumes, dark leafy vegetables, dried fruit, enriched grains, fortified cereals and sports bars. This type of iron is poorly absorbed by the body.

## Iron in Training Meals and Snacks

Food sources of heme iron	Iron (mg)
Oysters - 3 oz.	7.8
Lean beef steak - 3.5 oz.	3.8
Egg, whole	1.7
Lean pork/ham - 3.5 oz	1.5
Tuna, cooked - 3.5 oz.	1.1
Salmon or chicken breast - 3.5 oz.	0.8 - 0.9
White fish - 3.5 oz.	0.4

Food sources of non-heme iron	Iron (mg)
Fortified cereal - 1 cup	4.5 - 18
Tofu, raw - 1/2 cup	6.7
Lentils - 1 cup	6.6
Oatmeal, instant (1 pkg); Sport bar (1)	6.3
Kidney or garbanzo beans - 1 cup	4.8 - 5.2
Black beans - 1 cup	3.6
Spinach, cooked - 1/2 cup	3.2
White pasta or rice, cooked - 1 cup	1.9
Dried figs (4) or dried apricots (10 halves)	1.7
Raisins - 1/3 cup	1.0

### Considerations for Iron Absorption

- Calcium-rich foods, tea, coffee and cocoa can inhibit heme iron absorption
- Certain types of fiber (e.g. phytates and oxalates) found in spinach, kale, walnuts, and almonds can inhibit non-heme iron absorption
- To increase absorption of non-heme iron containing foods, combine with foods rich in vitamin C (e.g. pineapple, orange, grapefruit and their juices; strawberries, peppers, broccoli, tomato, kiwis) or heme iron food sources

Before taking an iron supplement, consult with a Sport Dietitian on best forms to take, proper dosing, and appropriate timing of ingestion.

### Iron-Rich Meal and Snack Suggestions

- Include iron-rich foods like meat, fish, poultry, or tofu in 2 meals per day to meet recommendations
- Pair dried fruits like figs and apricots with hard boiled eggs for an iron-rich snack
- Boost iron at breakfast by topping oatmeal with 1/2 cup of raisins
- Make a vegetarian iron-rich brown rice bowl by combining black beans, tofu and veggies
- Whip up a batch of tuna salad for sandwiches throughout the week
- Choose the highest % iron fortified cereal (most Kellogg brands) - check labels

*Athlete Recommendations:*