

# PERFORMANCE POINT

## PUMPING NUTRITIONAL IRON

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### PHYSIOLOGY OF IRON

#### What Is Iron?

An essential mineral, iron is an integral part of many proteins and enzymes necessary for normal physiology.

#### What Does It Do?

1. Red blood cell production and oxygen transport.
2. Neurotransmitter and energy production.
3. Immune system and central nervous system function.

### IRON DEFICIENCY: RISK, SYMPTOMS AND TESTING

Iron deficiency causes decreased oxygen delivery to the tissues, compromised immunity and psychomotor development will result in fatigue and decline in performance. It can take 3 – 6 months to normalize iron stores and, in the process, an entire competitive season could be lost. Here is how you can stay on top of iron:

#### Identify if you are at a greater risk for deficiency:

- Low intake (unbalanced vegetarian diet, low iron and/or energy intake, relying on sports/convenience foods)
- Excessive losses (menstruation, injury, disease)
- Adaptive increases in red blood cell mass and muscle myoglobin in response to endurance exercise and altitude
- Additional losses not enough to cause deficiency but can contribute (foot strike in runners, sweat, urine, gastrointestinal losses, regular use of anti-inflammatory medications)

#### Symptoms of Deficiency

- Decreased endurance capacity
- chronic fatigue
- high exercising heart rate
- low power
- frequent injury
- recurring illness – colds and infections
- loss of interest in exercise
- irritability
- poor appetite
- or, surprisingly sometimes no symptoms at all



Julia Murray, Ski Cross



## STAGES OF DEFICIENCY

**STAGE 1** Iron Depletion (lowered iron stores – ferritin\*)



**STAGE 2** Iron-deficient erythropoiesis (ferritin and transferrin are lowered)



**STAGE 4** Iron deficiency anemia (ferritin, transferrin and hemo-globin are reduced)

\*A 2011 study on collegiate-level rowers found that iron-depleted athletes (serum ferritin <20–25 µg/L) reported a decrease in performance time compared with those with normal iron store.

## IRON TESTING RECOMMENDATIONS

### RISK FACTORS

### HISTORY OF LOW IRON OR IRON DEFICIENCY ANEMIA

### FREQUENCY OF BLOOD TESTS

Minimal risk factors	No history of low iron status	1 or 2 times per year
Some risk factors	History of borderline low iron status	3 or 4 times per year
Some risk factors	History of iron deficiency anemia	4 or 6 times per year

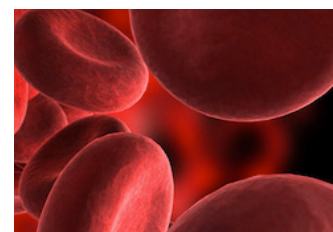
## What are the Tests?

There are many tests for determining iron status. Specific tests are individual but typically include a Complete Blood Count (CBC) and a Serum Ferritin (SF). Iron, total iron binding capacity (TIBC) and iron saturation may also be done and are best ordered and monitored under the guidance of a qualified sports medicine practitioner.

## IRON INTAKE AND ABSORPTION

### How can I prevent low iron level issues?

- Know your baseline iron status and monitor and track iron during the training year.
- Eat an iron-rich diet (see list of high iron foods below).
- Supplement if necessary on your sports medicine practitioners recommendation and monitoring



### How Much do You Need Each Day?

Iron is not manufactured in the body and therefore, you must obtain it from food or supplements.

The daily recommended intake is:



AGE	IRON — FEMALE	IRON — NON-MENSTRUATING FEMALE*	IRON — MALE
14 – 18 years old	15 mg	11 mg	11 mg
19 – 50 years old	18 mg	11 mg	8 mg
Athlete	It is estimated that athletes may need up to 50% more than non-exercising individuals. However, this estimate is controversial		
Defficient Athlete	75 – 100 mg elemental iron (may need more in some instances) <i>Caution: Do not start taking iron supplements unless it is advised by your physician as excess iron can have negative health and performance effects.</i>		

\*If you are not menstruating on a monthly basis consult with your sport medicine team.

## EAT YOUR IRON

Food contains two types of iron:

- Heme iron found in animal foods
- Non-heme iron found in plant foods and foods fortified with iron

Aim to have one or more of the following at each meal and snack: lean animal proteins, whole grains, fortified cereals, nuts, seeds, legumes or dried fruit.



## PRONE TO DEFICIENCY?

Choose foods from the following list at each meal and snack.

### HEME IRON SOURCES

#### Animal Foods Heme Iron (mg)

(90 g = 3 – 4 oz. cooked)

Clams, 90 g	24
Oysters and Mussels, 90 g	6
Sardines, 90 g	2
Turkey — dark meat, 90 g	2
Beef, 90 g	1.6 – 3
Lamb, 90 g	2
Turkey — light meat, 90 g	1.5
Chicken — dark meat, 90 g	1.5
Chicken — light meat, 90 g	1
Tuna, 90 g	1
Egg, 1	0.6

### NON-HEME IRON SOURCES

#### Plant Foods Non-Heme Iron (mg)

Pumpkin Seeds, ¼ cup	9
Firm Tofu, ¾ cup	3.5 – 8 check labels
<b>Legumes</b>	
Cooked White Beans, ¾ cup	6
Lentils, ¾ cup	5
Cooked Red Kidney Beans, ¾ cup	4
Soybeans, ¾ cup	3
Chick Peas, 1 cup	3
<b>Cold Cereals :</b>	
such as Raisin Bran, Bran Flakes, Kashi, Cheerios, Special K, All-Bran etc.	5 or more - check labels
Blackstrap Molasses, 1tbsp	3.5
Prune Juice, 1 cup	3
Baked Potato with skin	3
Dried Fruit, ½ cup	1.5 – 2
Nuts, ¼ cup	1 – 2
Whole Wheat Bread	1





## IRON ABSORPTION

The body will absorb approximately 15–35% of heme-iron and 2–20% of non-heme iron.

### Absorption is affected by:

- **Levels of iron in the body**

Absorption increases when body stores are low and decreases when iron stores are high. This helps protect against the toxic effects of iron overload. Heme iron absorption is not significantly affected by diet while non-heme and supplemental iron **are** affected by what you eat.

- **What you eat or drink**

Maximize non-heme iron absorption by eating meat, fish or poultry and/or Vitamin C rich foods at your meals and snacks and avoiding coffee and tea and calcium rich foods within 1 hour of your meals as the tannins, caffeine and calcium in these drinks interfere with iron absorption.

## THINGS TO KEEP IN MIND WHEN SUPPLEMENTING:

- You will absorb more iron from 2 or 3 evenly spaced doses versus one large dose.
- Avoid taking iron with calcium and zinc supplements, as they may interfere with one another.
- Take iron supplement with Vitamin C-rich food/fluids to increase absorption.
- Supplemental iron can cause side effects including nausea, constipation, dark colored stools, stomach upset and rarely vomiting or diarrhea.
- Minimize side effects by:
  - starting with half the recommended dose;
  - gradually increase to the full dose.
  - dividing the doses
  - taking with food

**VITAMIN C RICH FOODS INCLUDE** ORANGES, ORANGE JUICE, GRAPEFRUIT, GRAPEFRUIT JUICE, KIWI FRUIT, STRAWBERRIES, CANTALOUPE, BROCCOLI, PEPPERS, CABBAGE, POTATOES AND TOMATOES.



## WHEN YOU NEED TO SUPPLEMENT

Iron supplementation is recommended when diet alone cannot restore iron levels to normal levels within an acceptable timeframe.

### Three Main Iron Supplements

Ferrous Sulphate  
Ferrous Gluconate  
Ferrous Fumarate

Look for the amount of elemental, not total iron as only elemental iron is available for absorption. Example: supplement containing 200 mg of ferrous sulfate provides 40 mg elemental iron.

## PRACTICAL WAYS TO BOOST DIETARY IRON INTAKE

- Add orange slices or tomatoes to a spinach salad.
- Vary your sandwich and dinner meats by choosing roast beef or lean steak.
- Add pumpkin seeds or a nut and seed mix to cereal, trail mixes, yogurt or salads.
- For recovery choose an iron fortified energy bar (e.g. Luna Bar) and drink orange juice.
- Choose a cereal fortified with iron (e.g. Bran Flakes).
- Try some new recipes, such as lentil or bean-based recipes with tomatoes.
- Use a cast iron pan.

Although not always practical, try to keep iron food and calcium food intake separate by a few hours because calcium may inhibit iron absorption.

## References

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\*Additional references available upon request.