

## IRON SUPPLEMENTS

Older people in residential aged care are at a high risk of developing iron-deficiency. Multiple factors may contribute to iron deficiency. In persons with heart failure, iron deficiency is frequent but overlooked, with a prevalence of 30 to 50%. Many chronic diseases worsen with iron deficiency. Iron deficiency can be easily corrected.

### Causes of iron deficiency

The causes of iron deficiency can broadly be grouped into two categories:

- Increased iron needs
- Decreased iron intake or absorption

Factors that may increase iron needs include heavy menstruation and certain gastric and intestinal conditions. People who have had gastric bypass surgery or have Crohn's disease or coeliac disease are unable to absorb sufficient iron from diet.

Decreased iron intake often occurs with vegetarian diets. Excessive doses of antacids can decrease iron absorption in the stomach.

### Signs and symptoms

The early signs and symptoms of iron-deficiency are often vague and nonspecific:

- Fatigue
- Pale skin
- Weakness
- Dizziness
- Headache
- Shortness of breath, especially on exertion
- Inflammation or soreness of the tongue
- Tachycardia
- Numbness of extremities
- Cold intolerance
- Split or spoon-shaped nails

### Tests

Serum iron levels do not reflect total body stores. The best measure of total body iron stores is serum ferritin. However, serum ferritin levels increase very rapidly in the presence of inflammation; therefore, elevated ferritin levels are not always indicative of high iron stores.

### Dietary iron

The amount of iron absorbed from foods is low, ranging from 5 to 35%. A feedback mechanism exists in the body that enhances iron absorption in people who are iron deficient. When gastric acid production is impaired by an age-related decline, certain conditions and use of proton pump inhibitors (PPIs), dietary iron absorption is reduced substantially.

Dietary iron is absorbed by the intestinal mucosa from two separate pools of haem and non-haem iron. Haem iron, derived from haemoglobin and myoglobin, is well absorbed (15-35%) and relatively little affected by other foods eaten in the same meal. Red meat, chicken, fish contain haem iron.

Non-haem iron is obtained from grains and cereals, legumes, eggs, fruits and vegetables and is less well absorbed (2-10%). The absorption of non-haem iron, the major dietary pool, is greatly influenced by meal composition. Coffee, tea, milk, eggs, calcium, and phosphorus may inhibit non-haem iron absorption from food. With vegetarian diets, phytate is the main inhibitor of iron. Phytates are found in bran and other cereal grains, legumes and nuts. Polyphenols also inhibit iron absorption and occur in various amounts in plant foods and beverages, such as vegetables, fruit, some cereals and legumes, tea, coffee, and wine. Proteins from soybean also decrease iron absorption. Ascorbic acid (vitamin C) is a powerful enhancer of non-haem iron absorption and can reverse the inhibiting effect of such substances as tea and calcium/phosphate, increasing the absorption of iron from food. Foods containing high amounts of ascorbic acid include citrus fruit, broccoli, and capsicum. Cooking, industrial processing, and storage degrade ascorbic acid and remove its enhancing effect on iron absorption.

In summary, dietary modifications involve increased intake of iron rich foods, increased consumption of fruits and vegetables rich in ascorbic acid to enhance non-haem iron absorption, and reduced intake of tea and coffee, which inhibit non-haem iron absorption.

*continued over*

## Iron supplements

Dietary changes alone will be insufficient for treatment of iron deficiency. Optimal treatment for iron deficiency is an oral supplement of elemental iron in a dose of 2 to 3 mg/kg daily in adults. Thus a 50kg person will require 100 to 150mg of elemental iron daily. For best absorption iron supplements should be taken on an empty stomach; however if gastric irritation and side effects occur, iron supplements may be taken with meals.

Iron supplements contain a variety of iron salts, including ferrous sulfate, fumarate, gluconate, and phosphate. It is important to determine the amount of elemental iron in products. Dried ferrous sulfate contains 30% elemental iron. Many over-the-counter iron supplements do not contain sufficient iron to treat iron deficiency, containing as little as 5mg of elemental iron.

Some products that provide sufficient iron include:

- ferrous sulfate slow release 325 (elemental iron 105mg) (*Ferro-Gradumet*)
- ferrous fumarate 200 mg (elemental Fe 65.7 mg) (*Ferro-Tab*)

Iron supplements are sometimes given in conjunction with folic acid:

- ferrous sulfate 270 mg (elemental iron 87.4 mg), folic acid 300 mcg (*Fefol*)
- ferrous sulfate 250 mg (elemental iron 80 mg), folic acid 300 mcg (*FGF*)
- ferrous fumarate 310 mg (elemental Fe 100 mg), folic acid 350 mcg (*Ferro-F-tab*)

Oral iron therapy may be of limited benefit to some people, including those with impaired intestinal iron absorption (eg, irritable bowel disease or chronic kidney disease) or who experience GI side effects that reduce adherence. Ferric carboxymaltose (*Ferinject*) is an intravenous iron preparation used to quickly correct iron-deficiency anaemia across a range of clinical conditions.

Other parenteral iron preparations include:

- iron polymaltose (*Ferrum H, Ferrosig*)
- iron sucrose (*Venofer*)

All these preparations have similar efficacy and tolerability and are superior to oral iron supplementation.

## Duration of treatment

Treatment usually takes 3 to 6 months to replenish iron stores. Iron studies should be repeated to

determine that serum ferritin concentration is well within the normal range.

## Adverse effects

Adverse effects such as nausea, bloating, abdominal pain, constipation and diarrhoea may be minimised by gradually introducing therapy. Oral iron supplements can cause black stools.

## Drug interactions

Concurrent therapy with iron causes a marked decrease in the bioavailability of a wide range of medicines. If co-prescribed these medicines should be at least two hours apart from iron supplements.

- levodopa
- tetracyclines
- fluoroquinolones eg, ciprofloxacin
- bisphosphonates
- thyroxine
- calcium supplements

## Role of vitamin C

It is often advised that ascorbic acid supplements can increase iron supplement absorption. Ascorbic acid facilitates iron absorption by forming a chelate with ferric iron at acid pH that remains soluble at the alkaline pH of the duodenum.

Vitamin C is added to some iron products:

- ferrous sulfate 325 mg (equiv. elemental iron 105 mg), ascorbic acid 500 mg (*Ferrograd C*)

The role of vitamin C is to enhance the reduction of ferric to ferrous iron, which seems to be a requirement for the uptake of iron into the mucosal cells. Therefore, it is illogical and unnecessary to give in combination with ferrous salts.

## References

*J Res Med Sci. Feb 2014; 19(2): 164–174.*  
*Heart. Published Online First 23 June 2014*

## Further information

<http://www.gesa.org.au>

<http://www.nps.org.au/topics/signs-and-symptoms/fatigue>

The Webstercare Consultant Pharmacist Continuing Education Service come to you each month from your pharmacist. If you would like extra copies please visit [www.webstercare.com.au](http://www.webstercare.com.au) or ask your pharmacist.