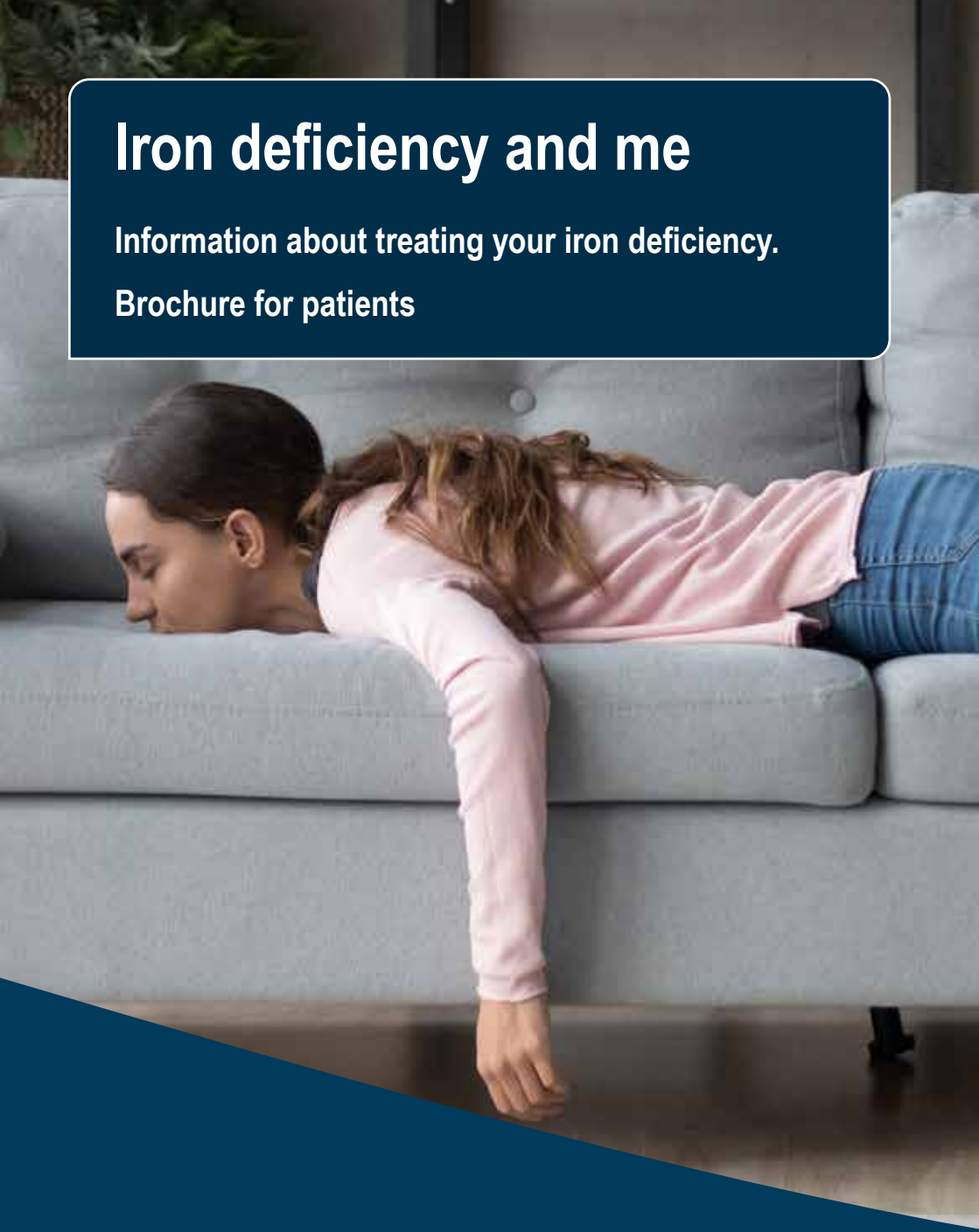


Iron deficiency and me

Information about treating your iron deficiency.

Brochure for patients

ASTRO PHARMA

Dear patient,

Have your blood test results shown an iron deficiency or iron deficiency anaemia, and your doctor has recommended intravenous iron therapy?

If you need support with this, we are happy to help.

In this brochure, you will find some key questions and answers about your treatment and lots of useful information about iron deficiency, what causes it, how to tell if you have it and what you can do to prevent it.

We are here to guide you through this journey and help you recover and get back to feeling your best and enjoying life, one step at a time.

This brochure is designed to supplement your discussions with your doctor, although it should not be used as a substitute for consulting a medical professional.

All the best,

ASTRO PHARMA

Good to know...

Recommended daily iron requirement[1,2]

- Infants up to 4 months: 0.5 mg
- Young children (aged 4 months to 7 years): 8 mg
- Older children (aged 7 to 15 years): 10–15 mg
- Women after menopause and men: 10 mg
- Women of childbearing age: 15 mg
- Women who are breastfeeding: 20 mg
- Pregnant women: 20–30 mg

Facts about iron[3–6]

- The human body contains 3–4 grams of iron[3] and around two thirds of this iron content is in the red blood cells.[4]
- We need iron to form hemoglobin and myoglobin. Hemoglobin is a protein that transports oxygen around the body in the red blood cells. Myoglobin is a similar protein found in muscle tissue.[5]
- Iron is a vital trace element and the body cannot produce it itself.[6]
- The body can absorb iron from food of animal origin (bivalent iron) more easily than iron from plant-based food (trivalent iron).[6]
- Whole-grain products, meat, vegetables and pulses are our main sources of iron.[6]
- Women who are pregnant or menstruating and people who follow a vegetarian or vegan diet need to pay particular attention to ensuring they have a sufficient iron intake.[6]

Iron and your body

Iron (Fe) is essential for sustaining your body. It fulfill lots of different functions in the human organism. For example, iron is responsible for transporting vital oxygen around the body. It helps supplying energy to cells, forming red blood cells and supporting cell metabolism. If your body doesn't have enough iron, you will often feel tired and worn out.[7]

Iron and nutrition

Our bodies don't produce iron themselves, so we have to get the iron we need from food. Austria's official health portal for nutrition recommends a daily iron intake of 15 mg

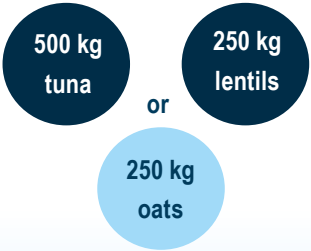
for adult women, and 10 mg for men. Pregnant women are advised to make sure they have an iron intake of 30 mg per day, while the recommended daily intake for breastfeeding women is 20 mg.[2]

Both plant-based and meat-based foods contain iron. For example, 100 g of lentils contain 8 mg iron.[1,2]

However, our bodies don't absorb all of this iron. The proportion of iron that the body actually absorbs is known as its bioavailability, which ranges from 5% (from plant-based origins) to 20% (from animal-based origins). This varies from one type of food to another.[8]

Out of the 16 mg of iron contained in around 200 g of lentils, for example, the body would only be able to absorb up to 1 mg.[1,8]

For example:
An adult with an estimated iron deficiency of around 1,000 mg would need to eat the following amounts of each of the foods below to meet their iron requirement and replenish their iron stores.[1,9]



Sources of iron for your body

Iron is found in animal products in particular, like meat and fish. Animal-based food contains bivalent iron (also known as heme iron), which the body absorbs three to four times more easily than iron from plant-based food (known as non-heme iron).[6,8] Red meat, fish and poultry or liver are particularly good sources of iron. Good plant-based iron sources include pulses such as haricot beans, lentils or peas.[7] Vitamin C (ascorbic acid) can help your body absorb more iron. Oranges or orange juice, broccoli and red peppers are good sources of vitamin C.[2,8]

What foods should you avoid?[2]

Substances like calcium from dairy products, soy protein (soy products), oxalic acid (e.g. rhubarb), polyphenols (black tea), chlorogenic acid (coffee), wheat bran or certain medicinal products (e.g. antacids – medicines for neutralising stomach acid) have inhibiting effect on iron absorption.

How much iron foods contain[9]

Meat and eggs	Usual portion size	Iron in mg per portion
Pork liver, cooked	125 g	24.4
Calf's liver, cooked	125 g	11.3
Beef liver, cooked	125 g	9.7
Venison, cooked	150 g	5.1
Beef, cooked	150 g	4.9
Pork, cooked	150 g	3.9
Mutton, cooked	150 g	3.3
Veal, cooked	150 g	3.1
Black pudding	30 g	2.3
Liver sausage, fine	30 g	2.2
Boiled ham	30 g	0.7
Salami	30 g	0.5
Hen's eggs	60 g	1.0
Fish and seafood		
Mussels, cooked	100 g	3.8
Crab	100 g	1.8
Tuna, cooked	130 g	1.3
Herring, pickled	90 g	1.1
Bread and cereal		
Spelt bread	1 slice (50 g)	2.1
Soya bread	1 slice (45 g)	2
Wholemeal buckwheat bread	1 slice (60 g)	1.7
Wholemeal oat bread	1 slice (50 g)	1.4
Wholemeal bread with sesame seeds	1 slice (50 g)	1.3
Wholemeal bread	1 slice (50 g)	1.0
Rye bread	1 slice (45 g)	0.6
Oats	60 g	2.7
Muesli	50 g	1.7
Nuts		
Pistachios	60 g	4.4
Cashews	60 g	3.8
Sesame seeds	20 g	2.0
Mushrooms		
Chanterelles, braised	200 g	11.6

How much iron foods contain[9]

Vegetables, mushrooms, side dishes	Usual portion size	Iron in mg per portion
Lentils[1]	100 g	8.0
Salsify, braised	250 g	5.5
Spinach, braised	150 g	4.6
Swiss chard, braised	150 g	3.6
Tinned chickpeas	150 g	3.3
Haricot beans	150 g	3.3
Peas, braised	250 g	2.5
Lamb's lettuce	100 g	2.0
Kale, prepared in the usual way	200 g	1.9
Brussels sprouts, braised	250 g	1.7
Leeks, braised	250 g	1.3
Asparagus, braised	200 g	1.3
Beetroot, cooked	150 g	1.2
Tofu	100 g	2.8
Brown rice (wholegrain), cooked	180 g	2.2
Millet, cooked	80 g	2.1
Wholegrain pasta with soya, cooked	125 g	2.0
Parboiled rice, cooked	180 g	1.9
Wholegrain pasta, cooked	125 g	1.6
Pasta (with egg), cooked	125 g	1.0
Herbs		
Thyme, fresh	5 g	1.0
Parsley	15 g	0.5
Cress	15 g	0.4
Fruit		
Strawberries	250 g	1.6
Blackcurrants	125 g	1.6
Raspberries	125 g	1.3
Dried apricots	25 g	1.1
Kiwi	125 g	1
Dried figs	25 g	0.8
Yeast flakes	5 g	0.8
Rhubarb, cooked	150 g	0.6
Nectarines	125 g	0.6

Iron deficiency and iron deficiency anaemia[7,9,10]

Iron deficiency occurs when the body absorbs less iron, needs more iron or has been losing iron (e.g. through blood loss).[9]

What can cause iron deficiency?

One reason why you might need more iron is pregnancy or breastfeeding. Blood loss, for example due to heavy periods or operations, also often leads to iron deficiency.[9,10]

Iron deficiency can also be triggered by infections or chronic diseases that lead to reduced iron absorption.[7]

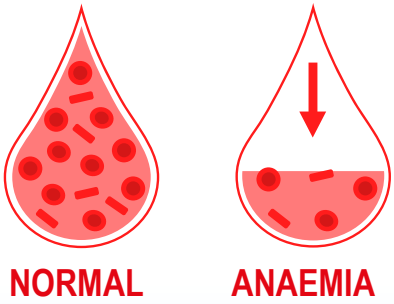
What actually happens in the body?

If the body isn't getting enough iron, the first thing that happens is that the iron stores in the spleen and liver are depleted.[9] If these iron stores are empty and red blood cell production is reduced as a result, the body's hemoglobin level drops.[10]

Distinguish between iron deficiency and iron deficiency anaemia, and to determine the severity of the condition. To testing is mainly done by measuring the level of hemoglobin, which is the pigment in the red blood cells. Talk to your doctor about whether you are suffering from anaemia (low levels of red blood cells) caused by a lack of iron.[7,10]

How can you tell if you have iron deficiency?

Iron deficiency and iron deficiency anaemia cause different symptoms in different people. The most common symptoms are tiredness, poor concentration, a decline in productivity, pale skin and brittle nails.[7]



Symptoms of iron deficiency[7,9]

Common symptoms:

- **Tiredness**
- **Feeling unusually exhausted after physical exertion**
- **Pale skin**
- Poor concentration and forgetfulness
- Anxiety
- Headaches
- Cracked skin at the corners of the mouth
- Recurring mouth ulcers (aphthae)
- Difficulty swallowing
- Restless legs syndrome (the feeling that you need to keep moving your legs)
- Hair loss
- Brittle nails

Some people with iron deficiency also feel a strong desire to chew on ice cubes or crushed ice (pagophagia).[9]

Iron deficiency and how it is treated[10]

There are oral and intravenous iron therapy options available. However, if you have a condition like celiac disease, inflammatory bowel disease or autoimmune gastritis, the effectiveness of oral iron supplements is limited.

Taking oral iron supplements to treat iron deficiency anaemia is effective as long as your intestines are able to absorb them properly. However, it is only possible to increase your daily iron intake through intestinal absorption to 25 mg.

Despite these limitations, oral iron treatment can be successful in many cases. However, there are situations where alternative treatment approaches are required.

Depending on your underlying diseases and the severity of your anaemia, it may take up to three months for your hemoglobin levels to normalize.

Compared to oral iron supplementation, intravenous iron therapy works more quickly and, since it is not administered via the intestines, it is also effective for people with impaired intestinal iron absorption. It also has a low risk of gastrointestinal side effects, so it can also be used for people who cannot tolerate oral iron supplements.

Different individual doses can be taken depending on the particular product used. This means that more severe or persistent levels of deficiency can also be balanced. Your doctor will assess your personal iron requirement and often it can be resolved with just one infusion.

However, please inform your doctor if you[15–22]

- have any known allergies, especially to medicines,
- have had an allergic reaction to intravenous iron supplements in the past,
- are suffering from anaemia that is not caused by iron deficiency,
- have too much iron in your body (iron overload) or you has problems with iron utilization,
- have liver disease,
- are pregnant, think that you might be pregnant or are planning to become pregnant.

Blood test results[2,10,11]

If you think you have iron deficiency or iron deficiency anaemia, your doctor will carry out a blood test to check various levels in your blood.

The table below explains the most important values to look for in your blood test results:

Blood test results	Explanation
Serum ferritin → iron stores	Ferritin is a protein that stores iron in your body. It is mostly found inside cells (liver, spleen, bone marrow).
Transferrin saturation → iron transport	Transferrin saturation is an important blood test marker for diagnosing iron deficiency. It shows the iron saturation level of the transport protein transferrin. Transferrin saturation is measured in the blood serum. If the transferrin saturation level is low, this indicates a lack of iron. However, the cause of this can only be determined based on an overall picture including other blood test values too.
Hemoglobin (Hb) → blood volume	Hemoglobin enables the erythrocytes (red blood cells) to perform their main function – transporting oxygen in the blood. Oxygen binds to iron atoms in the hemoglobin in red blood cells. If you are not absorbing enough iron, your hemoglobin level will fall.
C-reactive protein (CRP) → inflammation marker	An increased level of C-reactive protein in your blood indicates inflammation. Inflammation can have a negative impact on your ability to absorb iron through your intestines and inhibit the release of iron from your iron stores.

Other levels are checked in blood tests too. Talk to your doctor about this.

Before the treatment[7,10,12–22]

Before your treatment, your doctor will carry out a blood test to determine what iron dose you need. Your iron deficiency can probably be resolved with a single iron infusion.[15,16]

Why do I need iron?[12,7]

Many living cells and organs need iron, particularly for forming red blood cells to transport oxygen around the body. If your body doesn't have enough iron, this can have a negative effect on its ability to produce red blood cells.

Why am I having an iron infusion?

Your blood tests have shown that you do not have enough iron in your body.[10] This may be because you are not getting enough iron through your diet, because you have an underlying condition that prevents you from absorbing iron properly, or because you have lost some blood.[13]

Your doctor has prescribed an iron infusion either because taking iron tablets has not helped and/or you need to replenish your iron stores quickly.[15–22]

How should I prepare for my treatment?

You might be feeling nervous about having an iron infusion. Talk to your doctor about the procedure beforehand for reassurance.[14]

You do not have to prepare in particular for an intravenous iron infusion. However, if you feel unwell or have a bacterial infection, please talk to your doctor.

During the treatment[15–22]

What should I expect?

Your doctor will give you a predetermined amount of iron by means of an injection or an infusion through a drip into a vein. Medical staff will monitor you during the treatment to see how you respond to the infusion. Injections or infusion solutions containing iron are brown.

Will the treatment cause any side effects?

Some patients can have reactions to infusions. However, these reactions are nothing to worry about. Medical staff will be on hand to help and support you throughout the infusion/ injection procedure.

If you feel unwell during the treatment, please tell the medical staff. The infusion can then be stopped.

Infusion reactions usually subside soon after the iron supplementation has been stopped and do not normally recur if the infusion is restarted at a lower rate.

How long will the treatment take?

The length of the infusion procedure varies depending on the product used and how much iron you need. Once it has been completed, medical staff will monitor you for around 30 minutes.

After the treatment[15–22]

When will I feel any effect?

Your body may start responding to the treatment within a few days. However, how long it takes to feel any improvements will depend on your personal situation.

Will there be any delayed side effects?

Like all medicinal products, intravenous iron therapy can cause side effects, but not everyone will experience them. As a general rule, any side effects will subside after a few days. Please contact your doctor if you need to or if you are concerned.

What happens after the treatment?

In the weeks or months following the treatment, you may have another blood test to check whether your body's iron stores have been fully replenished. This is how your doctor can tell whether you need any further treatment.

Some patients need more than one course of treatment. If you have a chronic disease that is causing your iron deficiency, it is likely that this treatment will need to be repeated.

Intravenous iron infusion[15–23]

Fact check

- You need intravenous iron therapy if:
  - oral iron supplements are not effective or you cannot tolerate them
  - your doctor thinks you need iron very quickly to replenish your iron stores.
- Intravenous means that liquid is fed straight into a vein through a drip.
- Iron infusions are given either in undiluted form or diluted with a sterile saline solution.
- The infusion is inserted into a suitable vein (in the back of your hand or the crook of your elbow).
- The liquid drips slowly into your bloodstream through a tube.
- The liquid used for an intravenous iron infusion is brown.
- Allergic reactions can occur during an infusion and the medical staff must be informed immediately if they do.
- You will be monitored for around 30 minutes after receiving the treatment.

To find out more about the effects and possible adverse effects of this treatment, please see the patient information leaflet or ask your doctor or pharmacist.

The information in this brochure comes from the following sources:

1.https://www.zentrum-der-gesundheit.de/ernaehrung/mineralstoffe-spurenelemente/eisen-uebersicht/eisenhaltige-lebensmittel [in German]. **2.** https://www.gesundheit.gv.at/ [in German]. **3.** National Institutes of Health, Iron Fact Sheet for Health Professionals: https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/#en1 accessed 03.09.2021. 7. Pasricha SR et al. Iron deficiency, Lancet 2021 Jan 16;397(10270):233–24. **4.** Pasricha SR et al. Iron deficiency, Lancet 2021 Jan 16;397(10270):233–24. **5.** Cremonesi et al. Iron Absorption: Biochemical and Molecular Insights into the Importance of Iron Species for Intestinal Uptake, Pharmacol Toxicol 2002;91(3):97–102. **6.** https://www.dge.de/wissenschaft/referenzwerte/eisen/ [in German]. **7.** https://fet-ev.eu/eisen/#more-153 [in German]. **8.** https://www.klartext-nahrungsergaenzung.de/wissen/lebensmittel/nahrungsergaenzungsmittel/eisen-qualitaet-nicht-quantitaet-ist-die-frage-8026# [in German]. **9.** https://www.informedhealth.org/. **10.** Jimenez K, et. al. Algorithmus zur Diagnose von Eisenmangelanämie [Algorithm for diagnosing iron deficiency anaemia]. Wien Med Wochenschr (2016) 166:402–410. **11.** https://www.netdoktor.de/laborwerte/transferrin/transferrinsaettigung/ [in German]. **12.** Besarab A, et. al. Iron metabolism, iron deficiency, thrombocytosis, and the cardiorenal anemia syndrome. Oncologist. 2009;14(Supplement 1):22–33. **13.** Aspuru et al. Optimal management of iron deficiency anemia due to poor dietary intake, Int J Gen Med, 2011;4:741–750. **14.** Achebe M and DeLoughery TG., Clinical data for intravenous iron – debunking the hype around hypersensitivity, Transfusion. 2020;60(6): 1154–1159. **15.** Monofer patient information leaflet 09/2023. **16.** Monofer summary of product characteristics 09/2023. **17.** Venofer patient information leaflet 12/2021. **18.** Venofer summary of product characteristics 12/2021. **19.** Ferinject patient information leaflet 08/2023. **20.** Ferinject summary of product characteristics 08/2023. **21.** Fermed patient information leaflet 06/2022. **22.** Fermed summary of product characteristics 06/2022. **23.** https://www.oegari.at/web_files/dateiarchiv/editor/patienten-information_eisen-infusion2015.pdf [in German]. All website sources were last accessed on 01.05.2024.

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ASTRO PHARMA

Astro Pharma GmbH | Allerheiligenplatz 4 | 1200 Vienna, Austria | Tel.: +43/1/979 98 60 | www.astropharma.at

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