

# Plant-based iron is effective in physiological doses

## High potential for effectiveness, few side effects

Maintaining sufficient levels of the trace element iron is a global issue – even in the industrialised world. Official figures show that not only women of childbearing age often have low iron stores, but that parts of the general population are affected too. The 2012 Austrian Nutrition Report revealed ferritin levels of <5 µg/dl in 17.2% of adult women aged 18 to 64. According to experts, levels of 15 to 30 µg/dl already indicate low iron stores.

Supplements containing high doses of ferrous salts are generally used to improve iron levels, but many users suffer from side effects. If low (“physiological”) doses of iron could be taken without any side effects while remaining effective, this would be desirable for those users. As strikingly illustrated by the present observational study, plant-based iron has the potential to do just that.

## Goal

The goal is to test the effectiveness and tolerability of a low-dose plant-based iron supplement (product: Nutrifem MoFerrin® 14 by Biogena, dosage: 14 mg of iron per day, duration: 3 months) in women with low iron levels.

## Background

High doses of ferrous salts such as ferrous sulphate, ferrous gluconate or ferrous fumarate are generally used to increase iron stores. The starting dose is often 50-100 mg of iron per day. It should be taken ½ -1 hour before and after meals to ensure good absorption. However, many users have a poor tolerance for these supplements, especially if they are taken on an empty stomach as prescribed. An estimated 10-40% of users experience side effects such as constipation, nausea, or stomach trouble.

Observations show that when iron stores are low, the intestines' iron absorption rate increases from 10% to 20-40%. This control mechanism suggests that even low doses of iron would be suitable for raising deficient iron levels. The use of plant-based iron is of particular interest here: plant-based iron is – similar to animal iron – present in bound form and is absorbed via a special transport mechanism. The high effectiveness of plant-based iron (MoFerrin® 21) was demonstrated for doses of 63 mg and 103 mg per day in a previous observational study.

Consequently, the question arose as to whether a dose as low as 14 mg of plant-based iron per day could lead to a desirable increase in iron levels.

## Methods

On several randomly selected days in April 2013, all patients present at four different Austrian gynaecological practices were given the opportunity to have their iron levels tested. The women

with lowered haemoglobin (Hb ≤ 12 g/dl) or iron store values (ferritin ≤ 30 ng/ml) were invited to participate in a 3-month observational study with 14 mg of plant-based iron per day under medical supervision. 26 women between the ages of 20 and 78 opted to participate. At the end of the observational study, participants' iron levels were measured once again and questionnaires were used to record their tolerance of the supplement and subjective changes in health.

## Laboratory

The laboratory GANZIMMUN Diagnostics AG, based in Mainz, tested the following laboratory parameters:

- Haemoglobin: haemoglobin levels provide information about iron saturation in the red blood cells.
- Transferrin: production of this transport protein increases in the event of iron deficiency.
- Ferritin: ferritin is the iron storage protein and provides information about the body's iron stores.
- CRP: ferritin levels are only diagnostically conclusive in conjunction with CRP levels. CRP levels indicate inflammatory processes in the body. Inflammation also leads to increased ferritin levels. An evaluation of ferritin levels should therefore take CRP levels into account as well.

## Intervention

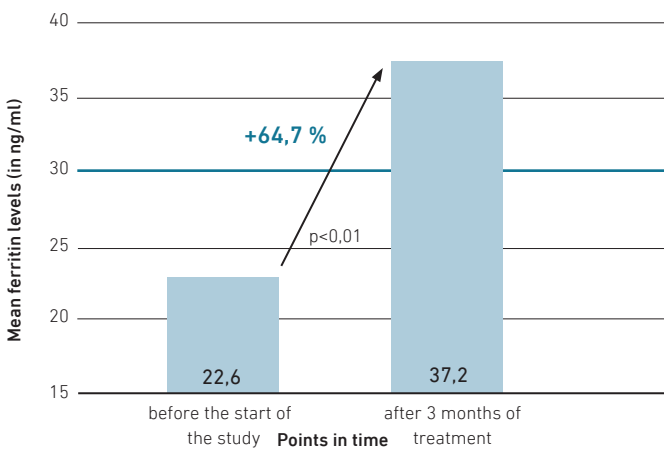
All participants received a bottle containing 90 capsules of Nutrifem MoFerrin® 14 and were instructed to take 1 capsule per day with plenty of fluids, 1-2 hours before meals if possible. Nutrifem MoFerrin® 14 contains 14 mg of plant-based iron (Vegy-Ferrin®) and 40 mg of natural vitamin C per capsule. Nutrifem MoFerrin® 14 contains no additives and is enclosed in a transparent cellulose capsule shell (Vcaps® Plus).

# Results

## 1. Iron status

The ingestion of just 14 mg of plant-based iron per day for three months led to a 4.8% increase in mean haemoglobin levels from 12.4 to 13.0 g/dl, a favourable reduction in transferrin levels from 348.7 to 301.0 mg/dl, and a 64.7% increase in ferritin levels from 22.6 to 37.2 ng/ml (Fig. 1). The present observational study thus shows that even small amounts of plant-based iron are sufficient to normalise parameters in people with low iron stores within 3 months.

**Fig. 1: The mean ferritin level of the evaluated participants (n=17) increased by 64.7% due to the intake of plant-based iron. Several women (n=9) had elevated CRP levels, so their ferritin levels were not approved for evaluation.**



## 2. Tolerability and health changes

All participants completed the observational study. 81% kept to the recommended dose of 1 capsule per day. 19% reported they did not take the iron supplement every day. Only 1 of the 26 participants reported constipation as a side effect and therefore reduced the dose by half. Apart from that, no complaints were reported, which indicates a good tolerability for plant-based iron. In addition to the low occurrence of side effects, decreased levels of the inflammation marker CRP were also observed, providing an indication of the safety of plant-based iron.

The participants' self-assessments of changes to their health were recorded by means of a personal questionnaire and have been broken down in Table 1. Due to the lack of a control group, however, these assessments have no statistical significance.

**Table 1: Self-assessment of participants' health changes (n=26) in percent following the intervention**

	Improve-ment (%)	Deteriora-tion (%)	No change (%)	Not relevant (%)
Maintaining energy metabolism – drive	36	0	20	44
Reduced fatigue	50	0	31	19
Maintaining energy metabolism – performance	27	0	19	54
Supporting haemoglobin and erythrocyte production – pale skin	8	0	42	50
Maintaining immune function	15	0	4	81
Maintaining energy metabolism – thermal sensation	12	4	15	69
Maintaining the transport of oxygen in the body – cold hands and feet	15	0	39	46

## 3. Discussion

If our iron stores are low, our bodies can increase iron utilisation in the intestine. Small doses of iron can be used to replenish low iron stores via this mechanism. At the same time, small doses of plant-based iron are well tolerated, thereby encouraging patients not to end treatment prematurely, and do not burden the intestinal mucosa.

## Conclusion:

The Biogena observational study shows that plant-based iron is effective in women with low iron stores, even in small doses. Ingesting iron in this form is not only effective, but also safe and well tolerated, and provides a good alternative to the usual iron supplements, which contain high doses of ferrous salt compounds and carry a high risk of side effects.

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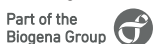
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