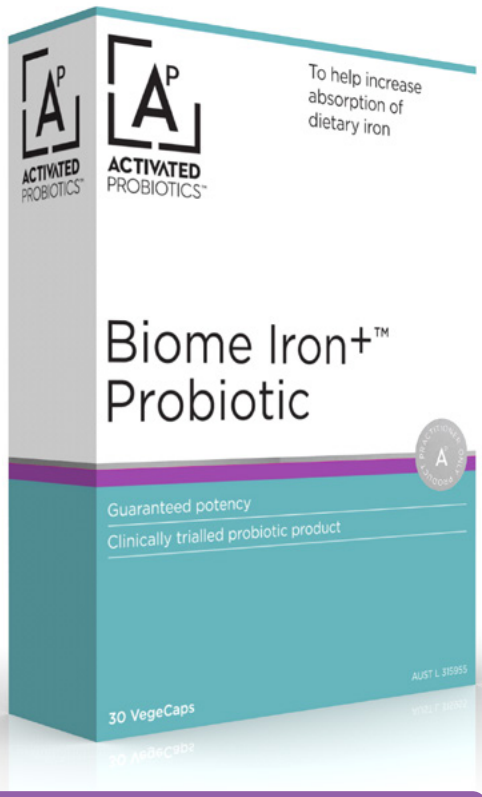
ACTIVATED PROBIOTICS®

Biome Iron+™ Probiotic

To help increase absorption of dietary iron



PREMIUM, PRACTITIONER-ONLY PRODUCT

- Significantly boosts iron absorption
- Clinically trialled probiotic product
- Guaranteed potency

INDICATIONS

- Biome Iron+™ helps increase absorption of dietary iron

FORMULATION

Lactobacillus plantarum 299v (DSM 9843)	10 BLB*
Folic acid	30mcg
Iron (as ferrous fumarate)	4.2mg
Vitamin C (as ascorbic acid)	12mg
Total live bacteria	10 BLB*

*BLB = Billion Live Bacteria

DIRECTIONS FOR USE

Adults: take 1 capsule daily (with or without food), or as directed by your healthcare practitioner.

Vitamin and mineral supplements should not replace a balanced diet. Not for the treatment of iron deficiency conditions.

NO ADDED

GMOs, wheat, gluten, dairy, lactose, fructose, yeast, nuts, seeds, peanut, soy, egg, fish, shellfish, or animal derivatives. No artificial colours, flavours, sweeteners, or preservatives.

GMP · LIVE PROBIOTIC PROMISE · DAIRY FREE · ONE A DAY FORMULATION · FRIDGE FREE · VEGAN

Activated Probiotics™ formulate premium probiotic products backed by cutting edge scientific research on the human gut microbiome. Using targeted bacterial strains at doses supported by clinical trials, we seek to provide tangible improvements in health and wellbeing with a new generation of evidence-based probiotics.

ipa INTERNATIONAL PROBIOTICS ASSOCIATION

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Lactobacillus plantarum 299v increases dietary iron absorption

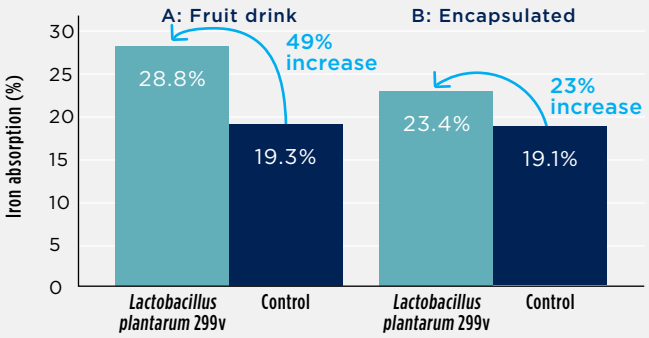

Figure 1:

a. Iron absorption from an iron-fortified fruit drink enriched with *Lactobacillus plantarum* 299v[7]. In two separate clinical trials, healthy menstruating women (n=21 in total) were served the fruit drink either with or without *Lactobacillus plantarum* 299v as a light breakfast meal. Iron absorption was assessed using a double isotope technique, which is considered the present gold standard method for assessing iron absorption. The pooled results from trials 1 and 2 showed a statistically significant increase in iron absorption of 49% from the fruit drink enriched with *Lactobacillus plantarum* 299v, compared to placebo ($p<0.004$).

b. Iron absorption from a breakfast meal co-administered with a capsule of *Biome Iron+ Probiotic*, or a placebo capsule containing iron, folic acid and vitamin C only[8]. In two separate clinical trials, healthy menstruating women (n=42 in total) were served a light breakfast meal together with *Biome Iron+™ Probiotic* or the placebo capsule. The pooled results from studies 1 and 2 showed a statistically significant increase in iron absorption of nearly 23% from the meal administered with a capsule of *Biome Iron+™ Probiotic*, compared to placebo. Study 1 (n=14) (mean ± SD): 22.4% ± 17.3% vs 17.4 ± 13.4%; mean difference 5.0% ± 11.0%, p=0.04; study 2 (n=28) (mean ± SD): 24.5% ± 12.0% vs 20.9 ± 13.1%; mean difference 3.6% ± 8.6%, p=0.003.

ROLE OF IRON IN THE BODY

Iron is an essential micronutrient, required for the function of red blood cells, oxidative metabolism and cellular immune response. Iron is an integral component of the protein haemoglobin, which transports oxygen from the lungs to the body's tissues, and myoglobin, which transport oxygen in the muscle. A number of enzymes also require iron including the cytochrome family, which are involved in cellular energy production (cytochrome C) and detoxification pathways (cytochrome P450).

IRON DEFICIENCY

Iron deficiency remains the most common nutritional deficiency in Australia. Iron deficiency is a deficit of total body iron due to an inadequate dietary intake, excessive losses, or inadequate absorption. Symptoms of iron deficiency include fatigue, headaches, shortness of breath, pale skin and hair loss.

POPULATION GROUPS AT HIGHER RISK OF IRON DEFICIENCY

- Menstruating women, particularly women with heavy bleeding
- Female athletes, particularly distance runners
- Pregnant women, due to increased requirements
- Regular blood donors
- People with chronic bowel diseases such as Coeliac disease
- Vegetarians and vegans, particularly if their diet is poorly planned
- Infants and young children, who have high iron needs
- People who have undergone bariatric procedures
- Patients on certain medications, such as proton pump inhibitors (PPIs)[1]

IRON SUPPLEMENTS

The first-line therapy for the treatment of iron deficiency is a course of oral iron supplementation, providing 30-100mg elemental iron per day[2]. High dose iron supplements are typically in the form of a ferrous salt, which commonly causes side effects such as nausea and constipation. The severity of these side effects often reduces patient compliance to iron supplementation, reducing their efficacy.

EFFECT OF *LACTOBACILLUS PLANTARUM* 299V ON IRON ABSORPTION

A number of studies have suggested that lactic acid bacteria, particularly lactobacilli, are able to enhance dietary iron absorption. For example, lactic acid fermented vegetables increase iron absorption[3], an effect which is believed to be mediated by the formation of ferric (Fe^{3}+) iron[4]. A number of clinical trials have investigated the effect of supplementation with a specific strain of lactobacillus, *Lactobacillus plantarum* 299v, on iron absorption in menstruating women[5, 6, 7, 8]. Two trials investigating the effect of *Lactobacillus plantarum* 299v on iron absorption from an iron-fortified fruit drink found a statistically significant increase in absorption from the probiotic-enriched drink, compared to the placebo fruit drink (figure 1 (a))[7]. Further, two trials investigating the effect of encapsulated *Lactobacillus plantarum* 299v on iron absorption from a co-administered meal showed a significantly increase in the iron absorbed from a light breakfast meal (figure 1 (b))[8].

MECHANISM OF ACTION

The iron absorption-enhancing properties of *Lactobacillus plantarum* 299v are believed to be attributable to the persistency of the bacteria in the intestine, however, the exact mechanism by which the bacteria mediate this effect is yet to be elucidated[8]. Of interest, a recent in vitro study showed that another species of the genus *Lactobacillus* (*L. fermentum*) is able to reduce ferric iron (Fe^{3+}) to the more bioavailable ferrous (Fe^{2+}) iron form, via an excreted molecule[9]. While it is not yet known whether *L. plantarum* has ferric-reducing activity, a recent in vitro study conducted in a human epithelial cell model demonstrated that in the presence of *Lactobacillus plantarum* 299v, there was an increase in the expression of duodenal cytochrome b (Dcytb), an enzyme which reduces ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}), which is the form of iron readily transported into duodenal enterocytes[10].

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