“Prebiotic galacto-oligosaccharides and fructo-oligosaccharides, but not acacia gum, increase iron absorption from a single high-dose ferrous fumarate supplement in iron-depleted women”

Microbiome: Mastering the Market 2023
Ambra Giorgetti
University of Oxford

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More than 50% of anaemia cases worldwide are caused by iron deficiency (ID)

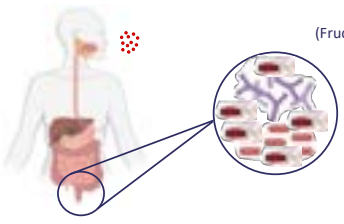
1.8 billion anemic people[1]

Oral iron supplementation

[1]Camaschella C. Iron-deficiency anemia. N Engl J Med 2015;373:319–32.
Image from: https://www.who.int

2

Side effects of oral iron supplementation



FOS
(Fructo-oligosaccharides)

GOS
(Galacto-oligosaccharides)

Camaschella C., Blood. 2019 Jan 3;133(1):30-9.
Paganini D, Zimmermann MB. Am J Clin Nutr. 2017;106:1688S-93S.
Created with Biorender

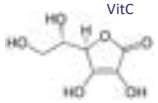
3

Can prebiotics optimise iron bioavailability from iron supplements?

Optimization of iron bioavailability

Reduction of **GI side effects**

VitC



Enhancers

Increased **iron absorption**

Reduction of iron dose

?

GOS

4

GOS acutely enhance iron absorption from low doses of ferrous fumarate (FeFum)

Consumption of galacto-oligosaccharides increases iron absorption from a micronutrient powder containing ferrous fumarate and sodium iron EDTA: a stable-isotope study in Kenyan infants

Acute Consumption of Prebiotic Galacto-Oligosaccharides Increases Iron Absorption from Ferrous Fumarate, but not from Ferrous Sulfate and Ferric Pyrophosphate: Stable Iron Isotope Studies in Iron-Depleted Young Women

Consumption of Galacto-Oligosaccharides Increases Iron Absorption from Ferrous Fumarate: A Stable Iron Isotope Study in Iron-Depleted Young Women

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Open questions: persistence of the effect under different experimental conditions

Does the **enhancing** effect on absorption from **FeFum** persists when:

1. GOS administered with **higher** supplemental **FeFum doses**
2. **Alternative dietary fibres** (FOS, acacia gum) are used

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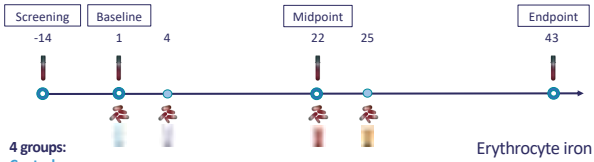
Assessment of the effect of GOS, FOS and acacia gum on acute iron absorption



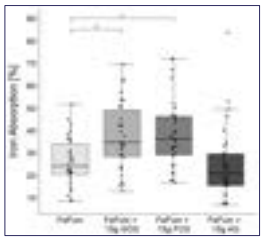
4 groups:
Control
GOS
FOS
AG

n=30 iron-depleted WRA
(Women of Reproductive Age)

Erythrocyte iron incorporation method with stable iron isotopes

7

Fractional iron absorption increases with co-administration of GOS and FOS with FeFum



Paired t-tests

1. FeFum vs FeFum+GOS
   $p < 0.05$, +45%
2. FeFum vs FeFum+FOS
   $p < 0.05$, +51%
3. FeFum vs FeFum+AG
   p-value = 0.7199

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GOS and FOS promising enhancers of iron absorption

↑ **acute iron absorption** in WRA with GOS and FOS

Open questions:

- GOS and FeFum at **different dosages**
- Effect of **different prebiotics**
- Mechanism of action

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What is the mechanism of action?

↑ **acute iron absorption** in WRA with GOS and FOS

Role of **colonic** uptake and bacterial SCFA production

Chemical interaction

↑ **solubility** and duodenal uptake

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