

Lactoferrin

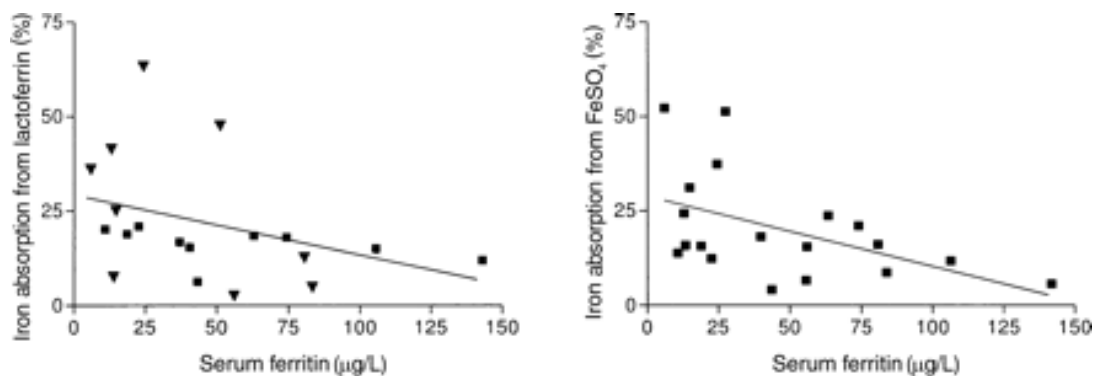
1. Clinical trials referenced for bioavailability and side effects

(Lönnerdal and Bryant 2006)

20 women given either sulfate or recombinant human lactoferrin from rice. Small amounts (0.15 mg) added to food which included dairy and wheat and ascorbic acid. Food taken after an overnight fast. Only two women were iron deficient at beginning of study. Measured whole body iron content.

results

"there were no significant differences in iron absorption between the groups given ferrous sulfate, untreated lactoferrin, or heat-treated lactoferrin; mean values for these groups were $18.8 \pm 13.2\%$, $16.2 \pm 4.4\%$, and $24.6 \pm 20.8\%$, respectively. When the 2 lactoferrin groups were pooled, the mean value was $20.4 \pm 15.3\%$, which was not significantly different from the value in the ferrous sulfate group, $18.8 \pm 13.2\%$."



my summary

The article concludes that lactoferrin is as well absorbed as ferrous sulfate. After reading more about lactoferrin I'm thinking that it can't be concluded from this whether iron was increased due to the iron in lactoferrin or else it's properties of reducing inflammation.

(Lönnerdal 2010)

Talks quite a bit about lactoferrin. States that lactoferrin can bind to two ferric iron ions and has its own absorption pathway. Talks about the dual role of lactoferrin, as a bacterial scavenger and therefore reducing inflammation and also its role in iron transport. The view seems to be that lactoferrin increases iron absorption from its role in iron transport more than it's ability to reduce bacterial infections.

(Lönnerdal, Jiang, and Du 2011)

Says that bovine LF does still have some of the iron binding and other benefits of human milk. This is talking about infant digestion not adults. Also states that there is a difference between the free and saturated type of lactoferrin.

(Brock 1980)

Lists studies with some mixed results. In general the conclusion made is that lactoferrin is a regulator rather than a provider of iron. Says that it may even be in breast milk to reduce

iron absorption in babies who absorb it better than adults. Also mentions that adults break down lactoferrin a lot more than babies, which seems to suggest that adults would need a coated form of lactoferrin for it to survive digestion and be much benefit.

(Brock 2012)

Similar to his older article above, he says that lactoferrin doesn't provide iron but regulates or inhibits. It helps with inflammation that may be reducing absorption.

"In conclusion, the balance of evidence suggests that lactoferrin serves to regulate or inhibit iron absorption in infants, but may be of use as a nontoxic iron supplement in adults."

(Nappi et al. 2009)

Study of 100 pregnant women given either one capsule of 100 mg bovine lactoferrin twice a day or 520 mg ferrous sulfate once a day. Results seem similar to **(Lønnerdal and Bryant 2006)**, where there is not much difference between the two except less side effects for the lactoferrin.

My summary

Their conclusion was that "The results show that bovine lactoferrin has the same efficacy as ferrous sulfate in restoring iron deposits with significantly fewer gastrointestinal side effects." Again it's hard to conclude if lactoferrin increased iron levels by adding iron by increasing absorption of iron already in the system.

(Maznah 1999)

A study using the caco-2 cell method to look at the transport of lactoferrin across mucosal cell monolayers. Not sure how the study relates to bioavailability, but it summarises some other studies

"These findings are in line with the in vivo study of iron absorption from ⁵⁸Fe- labelled bovine lactoferrin in newly born infants which did not demonstrate any difference from the absorption of ferrous chloride (Fairweather-Tait et al., 1987). These workers concluded that lactoferrin- bound iron was handled by the body in exactly the same way as other non-haem dietary iron. In addition other in vivo studies show that lactoferrin neither inhibits nor enhances absorption of inorganic iron (Fransson et al., 1983; Davidson et al., 1990)."

1.1. Other information

(Conesa, Calvo, and Sánchez 2010)

This article talks about the way bovine lactoferrin is different from human, and goes into detail about the different types of recombinant human lactoferrin.

The [manufacturer of these lactoferrin supplements](#) say not to take it for iron deficiency, and instead take a brand that contains iron and lactoferrin.

[John R. Lee, M.D.](#) says it helps iron absorption by reducing inflammation. He implies taking it with iron rather than on its own (but only if you can't increase your iron levels through diet adjustments).

"Lactoferrin enhances iron absorption, and at the same time protects the body from the negative, oxidative effects of excess iron. It can decrease or eliminate the side effects of nausea and constipation caused by iron supplementation. Recent research suggests that lactoferrin may also have beneficial effects in regulating the immune system, as well as anti-inflammatory, anti-bacterial and viral, and antioxidant effects.

"Lactoferrin is listed as an ingredient in some colostrum products, which you can find at your local health food store. It only takes about 20 mg of lactoferrin, taken with the iron, to reduce or eliminate the side effects."

[This article](#) mentions the (Nappi et al. 2009) study and I think one of the comments made on it is relevant. It states the important distinction between the different types of lactoferrin.

"Based on literature and calls I've made to supplemental Lactoferrin manufacturers, it appears that virtually all Lactoferrin sold in the US is of the low-iron or iron-depleted (apolactoferrin) variety"

2. References used in this section

Jeremy H. Brock, 'Lactoferrin - 50 Years on', *Biochemistry & Cell Biology*, 90 (2012), 245–51 <<http://dx.doi.org/10.1139/o2012-018>>.

J H Brock, 'Lactoferrin in Human Milk: Its Role in Iron Absorption and Protection against Enteric Infection in the Newborn Infant.', *Archives of Disease in Childhood*, 55 (1980), 417–21.

Celia Conesa, Miguel Calvo and Lourdes Sánchez, 'Recombinant Human Lactoferrin: A Valuable Protein for Pharmaceutical Products and Functional Foods', *Biotechnology Advances*, 28 (2010), 831–38 <<http://dx.doi.org/10.1016/j.biotechadv.2010.07.002>>.

Bo Lönnerdal and Annika Bryant, 'Absorption of Iron from Recombinant Human Lactoferrin in Young US Women', *The American Journal of Clinical Nutrition*, 83 (2006), 305–9.

Bo Lönnerdal, Rulan Jiang and Xiaou Du, 'Bovine Lactoferrin Can Be Taken Up By The Human Intestinal Lactoferrin Receptor And Exert Bioactivities':, *Journal of Pediatric Gastroenterology and Nutrition*, 2011, 1 <<http://dx.doi.org/10.1097/MPG.0b013e318230a419>>.

Bo Lönnerdal, 'Alternative Pathways for Absorption of Iron from Foods', *Pure and Applied Chemistry*, 82 (2010), 429–36 <<http://dx.doi.org/10.1351/PAC-CON-09-06-04>>.

I. Maznah, 'The Use of Caco-2 Cells as an in Vitro Method to Study Bioavailability of Iron', *Malaysian Journal of Nutrition*, 5 (1999), 31–45.

Carmine Nappi and others, 'Efficacy and Tolerability of Oral Bovine Lactoferrin Compared to Ferrous Sulfate in Pregnant Women with Iron Deficiency Anemia: A Prospective Controlled Randomized Study', *Acta Obstetrica Et Gynecologica Scandinavica*, 88 (2009), 1031–35 <<http://dx.doi.org/10.1080/00016340903117994>>.