



FERRINA™

IRON Enriched Spirulina

Natural source. Bioavailable iron

Reduced gastrointestinal side effects.

Each serving size (5 tablets or 2 grams) provides 100% of the daily values in Iron.

Description:

Appearance: Free flowing powder or granulates
 Color: Dark green
 Aroma: typical
 Diluent: none
 Solubility: partially soluble in water
 Not soluble in ethanol
 Storage: cool dry area
 Shelf Life: Typically 3 years

Ingredient composition ratio:

100% pure *Spirulina platensis*
 (without any fillers or additives)

Typical Nutrient content:

Protein 63-68%
 Fat 2-5%
 Carbohydrate 15-22%
 Iron >6000 mg/kg

Analysis:

Moisture: 4-7% (2 hrs@105°C)
 Ashes 5-7%
 Bulk/Density 0,4-0,5 g/cc

Microbial:
 Total plate count: 50,000/g
 E.Coli: negative
 Salmonella: negative
 Coliforms thermo-tolerant 44°C <10/g

Heavy metals:

Cadmium 1 mg/kg
 Mercury <0,1 mg/kg
 Lead <3 mg/kg

IRON NEEDS

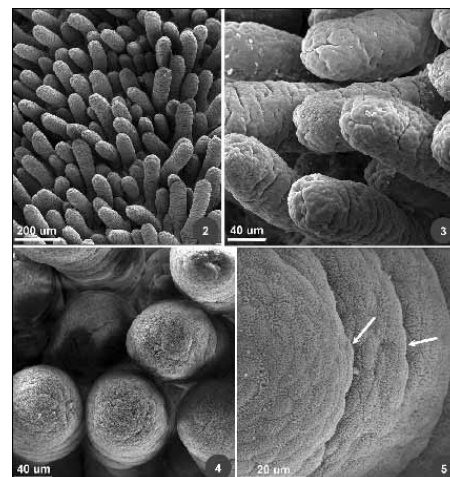
Iron is the most abundant transition metal in humans with healthy adults possessing some 3 to 4 g. Iron is distributed in two principal pools: haemoglobin fundamental iron, myoglobin and iron enzymes stored in ferritin, hemosiderin and transferrin.

Normal subjects will absorb up to one mg per day of iron from their diet, adequately balancing daily iron losses. For a safe and adequate dietary intake 10 to 18 mg of iron are recommended daily. Frequently, this quantity is not available.

The mean menstrual blood losses of adolescent girls and women increase the daily iron requirements to as much 2.1 mg per day of iron¹. Similarly, diet alone generally cannot supply the 30-40 mg per day of iron that is required for absorption of the 4-6 mg needed during the latter stages of pregnancy².

INTESTINAL IRON ABSORPTION

The absorption of iron, which is present in either a heme or nonheme form, is carried out by mature villus enterocytes (see picture) of the duodenum and proximal jejunum (small intestine)³.





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Nonheme iron is absorbed early in digestion mainly in duodenum where low pH still favors solubility of ferrous iron⁴. Hence, the time an iron compound will have in its absorption window can be relatively short⁵.

ORAL IRON SUPPLEMENTATION

The preferred treatment to preventing iron deficiencies is oral iron. Oral iron have relatively low absorption rate of only 2-10%⁶. A significant part of the iron supplementation remains unabsorbed and might participate in Fenton-driven free radical generation, leading to side-effects toxicity to the gastrointestinal mucosa⁷. Oral iron therapy was indeed shown to induce considerable gastrointestinal (GI) side effects, such as nausea, vomiting, heartburn, abdominal pain and constipation¹.

IRON COMPOUNDS

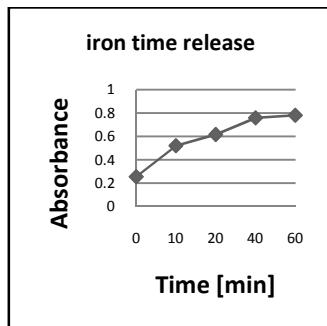
FREELY WATER SOLUBLE		SOLUBLE IN GASTRIC JUICE
Ferrous sulfate	Ferrous fumarate	
Dried ferrous sulfate	Ferrous succinate	
Ferrous gluconate	Ferrous saccharate	
Ferrous lactate	Iron BisGlycinate	

IRON RELEASE FROM FERRINA

Most of the oral iron formulations release iron rapidly. Ferrous freely water soluble preparation, such as ferrous sulfate, shows immediate and complete release of the ferrous ions.

Studies demonstrated that FERRINA releases slowly its iron content during in-vitro gastric digestion. FERRINA compares favorably(Fig 1),. Freely iron salts release immediately and completely their iron content in acidic solution.

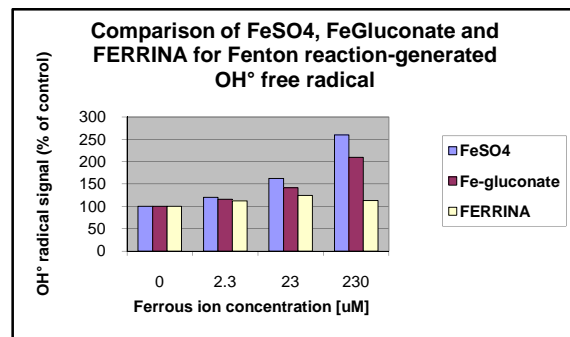
Fig 1: Mean of 14 in-vitro gastric digestions of FERRINA samples.



FREE RADICALS GENERATION

In-vitro study (not published)⁸ demonstrated that FERRINA does not involve significant production of the radical hydroxyl (Fig 2) compared to Iron sulphate and Iron gluconate. Moreover, FERRINA compounds inhibit the production of the radical hydroxyl induced by exogenous iron.

Fig 2: Production of radical hydroxyl.

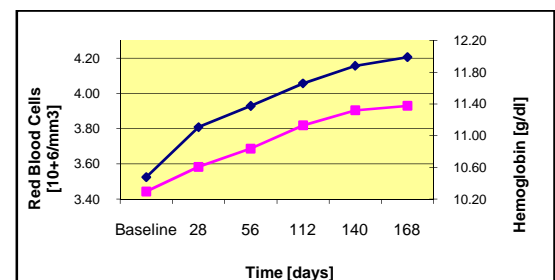


IRON BIOAVAILABILITY OF FERRINA

Iron bioavailability of FERRINA is confirmed by a study (not published) conducted with pre-dialysis patients (n=8). During the treatment period (168 days), all patients received twice daily tablets of FERRINA.

Mean serum ferritin, serum iron, Red Blood Cells (RBC) and hemoglobin (Hb) values raised during the treatment with a statistically significant increase (Fig 3 and 4).

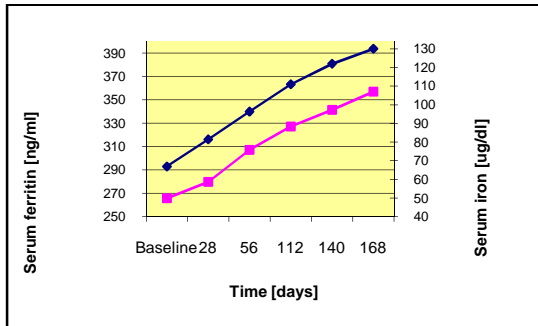
Fig 3: Changes in hemoglobin (blue) and RBC (red) from baseline to day 168.





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Fig 4: Changes in serum iron (blue) and serum ferritin (red) from baseline to day 168.



Iron bioavailability of FERRINA is confirmed and interestingly constant, even after a long period of time. Moreover, the use of FERRINA did not induce any side effects.

REDUCED SIDE EFFECTS INDUCED BY FERRINA TREATMENT

Study on the tolerance and compliance with treatment had been conducted to determinate side effects induced by FERRINA vs BisGlycinate iron in pregnant women⁹ (n=46).

FERRINA did not demonstrate a lower efficiency in hematological evolution (Hb and serum ferritin) but significant lower induction of side effects and better compliance (Fig 5 and 6).

Fig 5: Side effects induced by iron treatment.

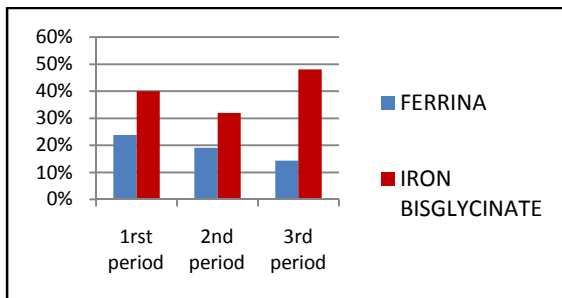
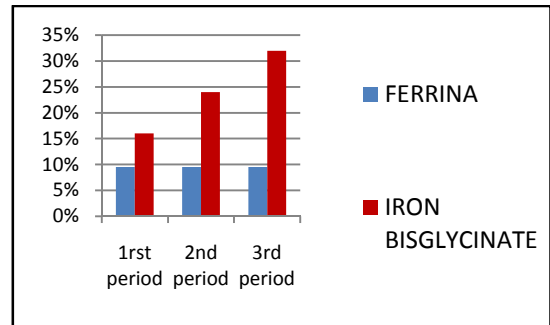


Fig 6: Non compliance with the treatment.



The study concludes that FERRINA did not induced elevated gastrointestinal side effects and can be prescribed preventively for long period of time.

BIBLIOGRAPHY:

1. Beard JL Effectiveness and strategies of iron supplementation during pregnancy *Am J Clin Nutr* 2000; 71(suppl):1288S-94S
2. Jai S, Sandhya J, Venkatesan M, Tejinder S, Ashok K, Raksha A, Nandagui S.M. A prospective, partially randomized study of pregnancy outcomes and hematologic responses to oral and intramuscular iron treatment in moderately anemic pregnant women *Am J Clin Nutr* 2004;79:116-22
3. Frazer DM, Anderson GJ. Iron imports. I. Intestinal iron absorption and its regulation. *Am J Physiol Gastrointest Liver Physiol.* 2005 Oct;289(4):G631-635.
4. Miret S, Simpson R, McKie A. Physiology and molecular biology of dietary iron absorption *Annu. Rev. Nutr.* 2003 23:283-301
5. Weitschies W, Cardini D, Karaus M, Trahms L, Semmler W Magnetic marker monitoring of esophageal, gastric and duodenal transit of non-disintegrating capsules *Pharmazie* 1999 54(6):426-30
6. Umbreit J. Iron deficiency: a concise review. *Am J Hematol.* 2005 Mar;78(3):225-231. Review.
7. Lund EK, Wharf SG, Fairweather-Tait SJ, Johnson IT Oral ferrous sulfate supplements increase the free radical-generating capacity of feces from healthy volunteers *Am J Clin Nutr* 1999; 69:250-55
8. BIORIGIN VEGETAL IRON : Potentiel bioprotecteur vis-à-vis du radical hydroxyle généré par le fer. Etude comparative avec le gluconate ferreux. Drs Hannaert P. et Garay R. INSERM U400 Faculté de médecine. F- Créteil
9. Barberis J, Beltrán S, Avilés M. Tolerancia y adherencia al tratamiento de la deficiencia de hierro con dos preparaciones de hierro oral (hierro bis glicinato quelato estabilizado vs espirulina enriquecida con hierro) en mujeres embarazadas *Revista Ecuatoriana de Ginecología y Obstetrica VOL XVI N° 1-2 Enero-Agosto del 2009*