Liposomal iron absorption and bioavailability
IRON METABOLISM

Ferro Attivo
- 60%-70% bond to Hemoglobin
- 3% bond to Mioglobin
- 15% bond to enzymes (nervous system cells)

Ferro di Riserva
- 20%-30% bond to Ferritin

Ferro di Trasporto
- 0,1% bond to Transferrin
Iron absorption and metabolism is strongly regulated

Usually only 10-15% of iron intake is absorbed

This is true for foods, supplements or drugs
LIPOSOME

- Phospholipid molecule
  - Hydrophilic polar head
  - Hydrophobic nonpolar tails

- Distribution of phospholipid molecules in aqueous medium
  - Lipidic blayer

- Longitudinal cut of a liposoma
  - Iron Pyrophosphate
  - External medium
Liposomal iron absorption is significantly different from free iron intestinal absorption.

Liposomes are **DIRECTLY** absorbed and only in the liver hepatocytes break down liposome membrane.
Molecular Trojan horses

With the prospects of genetic engineering in humans still remote, other methods of repairinginhorn, errors of metabolism have to be sought. Wrapping up enzymes in membrane sacks and injecting them into afflicted patients may be the answer.

Dr Gregory Gregoriadis
is a research scientist at the Medical Research Council’s Clinical Research Centre, Harrow, near London.

The role of enzymes in transforming one substance (substrate) to another (product) is the basis of all biological processes. The existence of enzymes in cells depends on the release of information held in a sequence of nucleic acid, the corresponding structural gene. A faulty gene results in the partial or total absence of its respective enzyme, which in turn leads to the accumulation of the relevant substrate and a deficiency in the product of the reaction. In terms of human suffering, this often means early death. Newborns suffering from lysosomal storage of enzymes or, after diffusion through the membranes surrounding the lysosomes, in other cellular compartments (for example, the nucleus).

It is true that at the moment liposomes can be applied only for the liver and the spleen. However, specific manipulations on the liposomal surface can alter both the rate of their removal from the blood and their place of uptake. We have found, for example, that positively charged liposomes will circulate in the blood for much longer than negatively charged liposomes. We hope to be able to exploit this in treating inherited enzyme deficiencies such as phenylketonuria and galactosemia in which excessive levels of phenylalanine or galactose in blood are the cause of severe clinical manifestations. Circulating liposomes containing the appropriate enzymes could help metabolize these substances and therefore lower their level in blood. Asparaginase-containing positive liposomes could be used in treating forms of leukaemia in which elimination of circulating asparaginase has been shown to be beneficial to patients. To increase these specificity the attachment on the surface of liposomes of substances (antibodies for instance)
Direct Absorption

M Cells (endocitosis)

Macrophages (Peyer's patch)

Lymphatic transport
LIPOSOMIAL IRON

Thanks to liposomal technology, the iron will never react with intestinal and other mucosaes

NO SIDE EFFECTS
Thanks to the liposome technology, bioavailability of iron increases by 3.5 times compared with the same iron source with non-liposome form (rats study).
The percentage of bioavailable iron from Sideral is significantly higher - 4.1 times - than Ferrous Gluconate (rats study).
Also compared with Ferrous Sulfate, Sideral ensures superior bioavailability: 2.7 times higher (rats study)
Absorption and Bioavailability

LipoFer

Also compared with Ferrous Fumarate, Sideral ensures 5 times higher iron plasma concentration (rats study)
UNIQUE SELLING POINTS

- High bioavailability
- No metallic taste
- No fat / vitamin oxidation
- No digestive tract irritation (even at high dose)
- Available for celiacs (gluten free)
- A registered brand®