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SISTEMI NANOLIPOSOMIALI COME INTEGRATORI DI FERRO-OSO E VITAMINA C: ANALISI DI MERCATO E TECNICHE DI PRODUZIONE

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Abstract

The iron supplement market is characterized by strong competition, there is a large number of products based on different formulations and technologies that have a great demand both in Italy and in Europe. By a comparison between different iron supplements it was possible to evaluate the different cost, the quantity of iron, the different forms of iron used, the different release techniques and other main components in the formulation (ascorbic acid, folic acid, vitamin B12, etc.) that are able to increase the bioavailability of iron. In particular it was noted that the most used iron form is ferric pyrophosphate $Fe_4O_{21}P_6$ encapsulated in liposomes or lipid microparticles and containing iron in the ferric form Fe^{3+} (the less bioavailable shape). In the formulation of iron-based supplements, the status of oxidation of the iron represents a fundamental parameter, the ferrous form, Fe^{2+}, compared to the ferric form Fe^{3+}, is the only one really assimilable. In the pharmaceutical / nutraceutical field, the success of pharmacological therapies is strongly dependent on the use of adequate, efficient and intelligent technologies. In this sense, the use of nano carriers for food supplementary formulations, represents an innovation for the controlled release systems of active molecules, as they allow to minimize the loss and degradation of the active ingredients contained in them. In fact, the liposomes, thanks to their chemical properties, which make them very similar to biological membranes, can act as biocompatible and biodegradable transporters, in which molecules of different nature can be incorporated. The production of iron nano-liposomes iron, made with the microfluidic SMF technique, which is characterized by being a continuous technique, allows to produce liposomes of certain dimensions and dimensional distribution, without the need for dedicated postprocessing treatments. This technique makes it possible to reach an encapsulation effectiveness of 97%. The analysis of bioavailability conducted on the produced liposomes with SMF technique, has also allowed to conclude about their ability to release iron in the biological systems while the analysis of their stability over time has allowed to conclude about a decrease in the previously efficiency.

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