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POSTER

Development of nanostructured lipid carriers based on oleogel using rhamnolipids as surfactant

Authors: Maria A. Azevedo[1,2,*], Artur J. Martins[2], António A. Vicente[2], José A. Teixeira[2], Lorenzo Pastrana[1], Miguel A. Cerqueira[1]

Affiliation:
(1) INL - International Iberian Nanotechnology Laboratory, Braga, Portugal
(2) CEB – Centre of Biological Engineering, University of Minho, Braga, Portugal

Author contact information: *alexandra.azevedo@inl.int

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Plain abstract summary:

Food and pharmaceutical industries face important challenges regarding the delivery of lipophilic compounds with bioactive properties. Issues such as poor water solubility, degradation under harsh conditions and unsatisfactory bioavailability, are limitations that should be overcome. Nanostructured-lipid carriers (NLC's) are presented as one of the answers due to their unique features (e.g. easy scalability, presence of digestible lipids, possible absence of solvents and the use of food-grade materials during production) [1]. It is also important to find new bio-based and biodegradable food-grade materials with new well-known properties, such as biosurfactants produced by microorganisms [2]. Due to their physico-chemical properties (low toxicity, high biodegradability, high selectivity, low micelle concentrations and effectiveness at extreme temperatures, pH's and salinities), the biosurfactants are already used in the food industry to improve, for example, texture, organoleptic properties and creaminess of products [3,4]. With that in mind, a strategy based on a lipid structuring mechanism was used to produce bioactive lipid-based nanostructures. Such mechanism was directed towards the development of a self-assembled nano-structure, using gamma-oryzanol and beta-sitosterol as structuring agents. This phytosterols binary mixture has the ability to impart anti-oxidant functionality without needing additional lipophilic bioactive compounds. It is important to mention that phytosterols have authorized disease risk-reduction health claims in place by the European Union [5]. In order to develop NLC's, high energy methodologies involving ultra-homogenization followed by ultra-sonication at high temperature were applied. The samples were prepared with 8 or 10% (w/w) of a solid fraction of sterols using different concentrations (0.05 and 0.01%) of rhamnolipids. The NLC's produced with 8 and 10% of total sterol solids, dispersed in 0.05% of rhamnolipids, showed a polydispersity index (PDI) of approximately 0.230 and particle size distribution around 180 nm. NLC's prepared with 0.01% of rhamnolipids did not reveal the same stability (evaluated by size and PDI). Particle size was confirmed by transmission electron microscopy. The intrinsic bioactivity of such nano-carriers, conferred by the molecules that self-assemble to induce lipid gelation at nano-scale, represents an important step towards the delivery of functionality in complex food systems and pharmaceuticals.

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