Milk Fat Globules As A Universal Delivery System

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ABSTRACT

Researchers at the University of California, Davis have developed methods that utilize molecules encapsulated in milk fat globules and plant oleosomes to deliver bioactive compounds for a variety of applications.

FULL DESCRIPTION

Encapsulation using naturally-occurring and pre-formed carriers has been of increasing interest recently in multiple food, agricultural, cosmetic and medical applications. However, ensuring the stability of lipid-soluble bioactives in food systems frequently requires the addition of emulsifiers and high-energy methods to stabilize encapsulated compounds. There is also a need for the encapsulation system to both maintain good chemical stability and withstand the physical stress of the gastrointestinal tract. This is particularly true for vitamin supplement and food enrichment applications.

With emerging needs for all natural formulations in food, cosmetics and agriculture sectors, the team at UC Davis has developed novel approaches to infuse diverse bioactive compounds in intact milk fat globules and plant oleosomes. The methods can encapsulate diverse bioactive compounds including vitamins, flavor molecules, lipid soluble natural compounds, and pharmaceutical actives in these natural lipid structures. These novel compositions improve the chemical stability of bioactives without the need for exogenous emulsifiers, metal ion chelators and antioxidants. Furthermore, the formulations improve bioaccessibility and have potential for taste masking. The formulations preserve the beneficial properties of milk fat globular membranes and provide high concentrations of bioactives in both liquid and solid forms.

APPLICATIONS

- Method of encapsulation
- Universal delivery system
- Food supplementation, drug delivery, or food flavors
- Cosmetic and skin care products
- Nutritional products such as infant nutrition and nutraceuticals

FEATURES/BENEFITS

- Improved loading, dosage, and stability of encapsulated compounds
- Improved bioaccessibility via gastrointestinal route
- Eliminates need for exogenous anti-oxidants and emulsifiers
- Suitable for heat labile compounds
- Diversity of molecules can be encapsulated/bound
- Uses a GRAS substance

RELATED MATERIALS

- M. Alshehab, M.S. Budamagunta, J.C. Voss, N. Nitin. "Real-time measurements of milk fat globule membrane modulation during simulated intestinal digestion using electron paramagnetic resonance spectroscopy." Colloids and Surfaces B: Biointerfaces Volume 184, 1 December 2019, 110511 - 11/05/2019
- M. Alshehab, N. Nitin. "Encapsulation and release of curcumin using an intact milk fat globule delivery system." Food Funct., 2019, Advance Article - 11/05/2019
- M. Alshehab, M. Reis, L. Day, N. Nitin. "Milk fat globules, a novel carrier for delivery of exogenous cholecalciferol. Food Research International." 126. 108579. 10.1016 - 11/05/2019

INVENTORS

- Alshehab, Maha
- Nitin, Nitin

OTHER INFORMATION

KEYWORDS

Lipid-soluble, Vitamins, Cholecalciferol, Retinyl acetate, Curcumin, Lutein, Flavonoids, Milk, Fat, Globules

CATEGORIZED AS

- **Agriculture & Animal Science**
  - Nutraceuticals
- **Biotechnology**
  - Food
  - Health
- **Medical**
  - Delivery Systems

RELATED CASES

2019-100-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Methods for Selecting and Identifying Cancer Stem Cells
- Method for Efficient Loading of Bioactives into Lipid Membrane Microcapsules

- Antisense Oligonucleotide Therapy for B Cell Mediated Cancers
- Non-Living Edible Surrogates For Process Validation Food Processing Plants

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