



Functionalized Membrane-Based Process for Selective Isolation and Enrichment of Milk Fat Globules (MFGs)

Developed at Indian Institute of Technology (IIT) Roorkee

TECHNOLOGY AVAILABLE FOR TRANSFER

UNMET NEED AND OPPORTUNITY

Amongst different milk components, lipids exist as a unique emulsion in the form of spherical droplets of varying sizes ranging from 1-15 μm known as milk fat globules (MFG) and are stabilized by a physiological functional milk fat globule membrane (MFGM). The membrane is composed of MUC 1, Xanthine dehydrogenase/oxidase (XDH/XO), CD 36 (PAS IV), phospholipids and oligosaccharides, etc. that have demonstrated enormous health benefits including anticancer properties. In addition, MFGM supplementation has been reported to modulate gut microbiome in neonates and normalization of intestine development. Similarly, MFG membrane fragments rich in sphingomyelin affect the gut microflora in humans as compared to infant formula which are devoid of sphingomyelin.

Selective enrichment of bovine fat globules with higher polar lipids has gained momentum for its usage as a supplement in infant formulas. The current techniques to isolate and enrich MFG is from cream which involves a series of centrifugation steps resulting in aggregation and denaturation leading to loss of bioactives and nutritional benefits.

TECHNOLOGY

The present invention particularly relates to a functionalized membrane and charge based isolation method of milk fat globules (MFGs) from whole milk that is non-thermal, environment friendly, faster and causes minimal damage to fat globules by avoiding the other steps of centrifugation and washing which are usually involved in the conventional method of isolating MFG, thereby retaining their health promoting benefits by preventing the structural integrity and loss of the globules. The membrane is efficient in isolating a large size range (0.1 μm – 12 μm) of anionic charged molecules from the fluid. The pore size of the membrane can be selected according to the size range of the molecules of interest for isolation directly from whole milk. The technology will be useful for selective enrichment of fat globules for development of infant formula with specific phospholipid enriched MFG and further in development of customized milk products for human consumption.

INTELLECTUAL PROPERTY

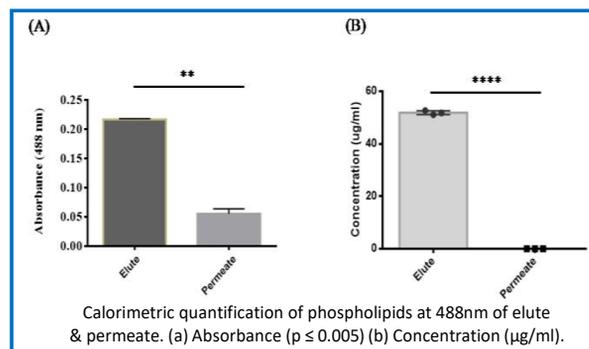
Patent granted in India (Priority year 2018)

UNIQUE SELLING PROPOSITION

1. Functionalized membrane can isolate MFGs directly from milk
2. Simple one step process as compared to conventional multistep processes
3. Less expensive than chromatographic method
4. Environmental friendly as it's a non-thermal, non-chemical process
5. Reusable membrane

STAGE OF DEVELOPMENT

- Proof of concept is established in lab set-up.
- In-house Lab Validation



APPLICATIONS

- Charge based isolation of molecules from various fluids
- Phospholipids isolation directly from whole milk
- Water treatment in Waste water treatment plant.

LICENSING OPPORTUNITY

BCIL is looking for a suitable industrial partner for commercialization of Functionalized Membrane for MFGs isolation.

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