

## Investigating the Suitability of Utilizing Lyophilized Gels to Improve the Stability of Ufasomes

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**Abstract :** Ufasomes “unsaturated fatty acids liposomes” are unique nano-sized self-assembled bilayered vesicles that can be easily created from the readily available unsaturated fatty acid. Ufasomes are formed due to weak associative interaction of the fully ionized and unionized fatty acids into bilayers structures. In the ufasomes constructs, the fatty acid molecules are oriented with their hydrocarbon tails directed toward the membrane interior and the carboxyl groups are in contact with water. Although ufasomes can be employed as a safe vesicular carrier for drugs, the extreme instability of their aqueous dispersions hinders their effective use in drug delivery field. Accordingly, in our study, lyophilized gels containing ufasomes were prepared using a simple assembling technique from the readily available oleic acid to overcome the colloidal instability of the ufasomes dispersions and convert them into accurate unit dosage forms. The influence of changing cholesterol percentage relative to oleic acid on the ufasomes vesicles were investigated using factorial design. The optimized oleic acid ufasomes comprised nanoscaled spherical vesicles. Scanning electron micrographs of the lyophilized gels revealed that the included ufasomes were intact, non-aggregating, and preserved their spherical morphology. Rheological characterization (viscosity and shear stress versus shear rate) of reconstituted ufasomal lyophilized gel ensured the ease of application. The capability of the ufasomes, included in the gel, to penetrate deep through the mucosa layers was illustrated using ex-vivo confocal laser imaging, thereby, highlighting the feasibility of stabilizing ufasomes using lyophilized gel platforms.

**Keywords :** ufasomes, lyophilized gel, confocal scanning microscopy, rheological characterization, oleic acid

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