Review Article

UFASOME: A POTENTIAL PHOSPHOLIPID CARRIER AS A NOVEL PHARMACEUTICAL FORMULATION
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ABSTRACT
Ufasomes are unsaturated fatty acid vesicles. They are the suspensions of fatty acids and their ionized species (soap) which are arranged as closed lipid bilayer. The molecular arrangement in ufasome is that the hydrocarbon tails are oriented towards inferior of the membrane and carbonyl groups are in contact with water. The stability of formulation depends on the selection of fatty acid, pH range, amount of lipoxygenase etc. Film hydration method is used for the preparation of vesicle by using oleic acid as fatty acid principle components. The present article describes about the advantages, disadvantages, method of preparation, in vitro evaluation and resent innovations of ufasomes. The present investigation aims at exploring the potential of fatty acid vesicle for the topical delivery of drugs. Earlier ufasomes where considered as the pre-biotic models for cellular compartments. Now, ufasomes are also found as carriers for horizontal transfer of engineered gene from plants to soil microbes or environment.

Keywords: Fatty acid vesicle, topical drug delivery system, amphipilis, liposomes, surfactants

INTRODUCTION
Ufasomes (UFM) are vesicles enclosed by fatty acid obtained from long chain fatty acid by mechanical agitation of evaporated film in the presence of buffer solution. Fatty acid and their ionized species (soap) restricted to narrow pH range from 7-9 included ufasome which as we all know, are fatty acid vesicle which are colloidal Suspensions made up of closed lipid bi layers. Fatty acid vesicles contain non-ionic neutral and ionized form (the negatively charged soap) which are two type of amphipilis, the fatty acid, which contain carboxyl group are in direct contact with H2O and the hydrocarbon, tails are directed towards the inferior membrane. Ufasomes are derived from unsaturated fatty acid such as linoleic acid, oleic acid etc (Table 1). But later investigations shown that it can also formed from saturated fatty acid such as octanoic and decanoic acid.1,2 The formation of UFM was first put forward in 1973 by Gibicki and Hicks. The vesicle stability is determined by the ratio of non-ionized form, proper selection of fatty, amount of cholesterol, buffer pH range, amount of lipoxygenase and the presence of divalent cat ions are certain other criteria for the stability of ufasome (UFM) formulation. Phospholipids and the general components used in formulation of liposome, which are chemically heterogeneous even in their natural form and also the reasonable quantities of pure synthetic phospholipids are not available. The ready availability of fatty acid is one of the major advantage of ufasome (Figure 1) over liposome.3,4

Advantages
• Ufasomes are easily available than liposome.
• In case of topical application easy penetration of drug.
• Low cost effective composed to liposome and noisome due to easy availability of fatty acid.
• Appreciable drug entrapment.
• Dose requirement is due to absorption of chief constituents.

Disadvantages
• Entrapment efficiency is more over and predetermined because drug itself in configuration with fatty acid are forming vesicles so no problem of drug entrapment.

Method of Preparation
• For the preparation of the ufasomes unoxidised materials are only preferred. 10 % of oleic acid and linoleic acid in chloroform are present in stock solution which is stored at 20°C after preparation. In a test tube 0.02 ml of stock solution was taken and placed in water pump to evaporate the stock solution then it is dried under a steam of nitrogen in a typical preparation. In a 0.2 ml of 0.1M tris-hydroxymethyl amino methane buffer at a pH range of 8-9, the fatty acid film is broke completely by vigorous shaking in vortex mixer. The mixing result in the formation of ufasome suspension, which is stable at least for 24 hours. Ultrasonic generator with a titanium microtip is used in the preparation of particles in some experiments. During irradiation the suspension is blanketed with gas prior to which air is removed from the buffer by a nitrogen stream. Ice water bath is used to maintain constant temperature. Different ratios of oleic acid, drug and surfactant are used for the formulation of different batches of ufasome.
• Film hydration methods are used for the formulation of oleic acid vesicles.
• Accurately weighed oleic acid of strength 80 mM span to 20, dexamethasone were dissolved in methanol which is taken in a clean dry round bottom flask by using rotary evaporator, the solvent is evaporated under vacuum.
Recent Innovations in Conventional Ufasomes

Extension of pH range
A narrow range of pH is suitable for the formation of FA vesicle due to requirement that about half of the carboxylic acid is to be ionized.

Addition of amphiphilic additives
A vesicle are formed between the pH range 6.4 and 7.8 in case of a mixture decanoic acid decanolate, but by addition of sodium dodecylbenzenesulphonate (SDBS) the pH can be lowered to about 4.3 at which the vesicle can be formed.7

Synthetically modification in size of hydrophilic group of fatty acid
A fatty acid with an oligo unit intercalated between the hydrocarbon chain and carboxylate head group was reported to be having enhanced stability of the formed vesicle at low pH. The effects of bulky polar group are lowering of the phase transition temperature and lowering of the pH for the formation of vesicle.8

Intensity towards divalent cation
Divalent cations like Mg2+, Ca2+ etc. even in this small quantity and lower concentration result in the precipitation of the vesicles. The fatty acid vesicles where found to be stabilized by the addition of fatty acid glycerol esters in presence of ionic solutes.9 Certain studies like cryogenic transmission electron microscopy studies of the mono oleic sodium oleate-water system showed that uni and multi lamellar vesicles are found from the mixture of mono olein and sodium oleate and the formed vesicles was found to remain stable for a prolonged period of time.

Enhancement of stability
The stability of the vesicles was enhanced by crom linking the fatty acid molecules by chemical

Dynamic nature of ufasome
The fatty acid vesicles are compound of simple chain amphiphilc due to which is one of the important features of fatty acid vesicles. Conventional vesicles are found from double chain amphiphilcs and micelles are formed from single chain surfactants and hence the dynamic nature places the fatty acid vesicle in between conventional vesicles and micelles. A change in the ionization ratio of the terminal carboxylic acid result in the formation of a range of fatty acid aggregates. When compared to the micelles; vesicles have greater number of amphiphilcs and the formation of fatty acid vesicles posse a higher energy barrier. When compared to the formation of a fatty acid micelles. A fatty vesicle can be prepared by adding an alkali soap sol to a buffer sol of intermediate pH which is one of the convenient methods for the preparation of fatty acid vesicles. When alkaline micelles are added to the buffered vesicle the fatty acid vesicles grow spontaneously.10,11
Figure 1: Optical microscopic view of ufasome

Figure 2: Rotary vacuum evaporator

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<th>Common name</th>
<th>Chemical structure</th>
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CONCLUSION

Ufasomes are fatty acid vesicles obtained using oleic acid. It is a safe surfactant used widely, which can be applied nonocclusively. In delivery of anti-inflammatory drug encapsulation of drug in fatty acid vesicle can act as a potential carrier. Sustained release of drug is a benefit of ufasome. Other benefits are cost effectiveness, therapeutic viability and drug retention in deeper part of skin and their by enhances penetration. They increase the permeation of drug molecule by avoiding the stratum corneum barrier potential. They enhances in-vitro skin delivery of drug compared to normal liposome.

REFERENCES


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