Proniosomes: a novel provesicular drug carrier

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ABSTRACT

Proniosomes can be ready using appropriate service provider among the different providers such as maltodextrin, sorbitol, lactose, mannitol, magnesium metal silicate, microcrystalline cellulose. Approaches to strengthen niosomal medication distribution program without impacting its qualities of benefits have led to the growth of the appealing medication service provider, proniosomes. Proniosomes is dry ingredients using suitable carrier covered with non ionic surfactants and can be turned into niosomes instantly before use by water. These proniosome-derived niosomes are as excellent as or even better than traditional niosomes. The concentrate of this evaluation is to carry out different factors relevant to proniosomes planning, depiction, entrapment performance, in vitro medication launch, programs and benefits.

1. INTRODUCTION

Proniosomes are dry remedies of surfactant covered service provider, which can be calculated out as needed and rehydrated by brief frustration in hot water. These “proniosomes” reduce problems of niosomes physical balance such as gathering or amassing, combination and dripping and offered additional comfort in transportation, submission, storage space and dosing. Proniosome-derived niosomes are excellent to traditional niosomes in comfort of storage space, transportation and dosing. Stability of dry proniosomes is predicted to be more constant than a pre-manufactured niosomal ingredient. In launch research proniosomes appear to be comparative to traditional niosomes. Size withdrawals of proniosome-derived niosomes are somewhat better that those of traditional niosomes so the discharge performance in more crucial situations changes out to be excellent. Proniosomes are dry dust, which makes further handling and appearance possible. The dust form provides maximum versatility, device dosing, in which the proniosome dust is offered in tablet could be valuable. A proniosome ingredient based on maltodextrin was lately designed that has potential programs in provide of hydrophobic or amphiphilic medication. The better of these remedies used an empty compound with extremely great surface area. The major benefits with these ingredients were the amount of service provider required to back up the surfactant could be easily modified and proniosomes with very great huge percentages of surfactant to service provider could be ready. Because of the convenience of development of proniosomes using the maltodextrin by slurry method, water of surfactant from proniosomes of a variety of arrangements can be analyzed.

The conventional colloidal systems like micro-spheres and emulsions showed up in 1950’s, out of which emulsions has mainly used by the aesthetic market in the topical/dermal distribution of aesthetic providers. In Sixties Liposomes were found, and the release of liposomes in aesthetic market was in 1988 by company Dior. And from some time liposomes were regarded as the main impressive members in the skin area for both drug and cosmetics. Due to some disadvantages like heavy cost, varying cleanliness of natural phospholipids and volatile characteristics, surfactant based vesicles ‘Niosomes’ came into lifestyle. Niosomes are minute lamellar components, which are established on the admixture of non-ionic surfactants with or without development of cholesterol levels or other fats. Niosomes are commonly analyzed as a substitute to liposomes. These vesicles appear to be just like liposomes with regards to their actual physical qualities. From a specialized perspective, niosomes are appealing medication providers as they have higher balance and deficiency of many drawbacks affiliate with liposomes. These vesicular distribution techniques have drawn significant interest in topical/transdermal medication distribution for many reasons. These transmission boosters are eco-friendly, non-toxic, amphiphilic in characteristics, and effective in the modulation of medication launch qualities. Their efficiency is highly reliant on their actual physical qualities, such as structure, size, cost, lamellarity and program circumstances. L’Oreal had introduced the first aesthetic item known as ‘Niosomes’ containing niosome vesicles into the industry. The item also had its successors like ‘Niosome Plus’ anti-ageing lotion by Lancome, which achieved the industry in the beginning Nineties. But the enhancements in the distribution techniques are necessary to generate the better features and generality of the ingredients procedure. The progression in the niosomes results in the progress of proniosomal distribution techniques. Proniosomes are non-ionic centered surfactant vesicles, which may be moisturized instantly before use to generate aqueous niosome dispersions. Proniosomes are these days used to improve medication distribution moreover to traditional niosomes. They are turned into niosomes respectively upon easy water or by the water of epidermis itself after program. Proniosomes prevails in two types, i.e. semisolid live screen gel and dry granular dust, depending on their technique of planning. Out of these two types, the proniosome gel is mainly used for topical/transdermal programs.

2. SUITABILITY OF DRUG TO THE PRONIOSOMES

Different groups of medication choices for proniosomes development dependant on the below described points;

- Low Aqueous solubility drugs
- High dose regularity drugs
- Low half-life
- Controlled medication distribution appropriate drugs
- Higher negative medication responses drugs

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2.1. Spraying method

Proniosomes are ready by treating the surfactant in natural solution onto sorbitol dust and then evaporating the solution. Because the sorbitol service provider is dissolvable in the natural solution, it is necessary to do it again until the preferred surfactant fill has been obtained. The surfactant covering on the service provider comes out to be very slim and water of this covering allows multilamellar vesicles to type.

2.2. Slurry method

Slurry technique to generate proniosomes using maltodextrin as a service provider. Enough time needed to generate proniosome by this is separate of the rate of surfactant remedy to service provider content. In slurry technique, the whole number of surfactant remedy is included to maltodextrin dust in a turning evaporator and machine used until the dust seems to be dry and 100 % free streaming. Medication containing proniosome-derived niosomes can be ready in way comparable to that used for the traditional niosomes, by including drug to the surfactant combination before treating the remedy onto the service provider (orbital, maltodextrin) or by inclusion of drug to the aqueous remedy used to melt moisturize the proniosomes.

2.3. Coacervation phase separation method

Perfectly considered or needed quantity of surfactant, service provider (lecithin), cholesterol levels and medication can be taken in a fresh and dry extensive mouthed cup vial (5 ml) and solution should be included to it. All these substances have to be warmed and after warming all the substances should be blended with cup rod. To avoid the lack of solution, the start end of the cup vial can be protected with a lid. It has to be warmed over water shower at 60-700 C for 5 moments until the surfactant demolished absolutely. The combination should be permitted to awesome down at 70 degrees until the distribution gets transformed to a proniosomal gel.

3. COMMONLY USED MATERIALS FOR PRONIOSOMES PREPARATION

1. Surfactants: Span20, Span40, Span60, Tween80, Tween20, Tween40, Tween80.
2. Stabilizers: Cholesterol, lecithin.
3. Carriers: Maltodextrin, sorbitol, mannitol, magnesium aluminum silicate, microcrystalline cellulose, spray dried lactose, and sugar monohydrate.

Selection of the service provider in the proniosomal ingredients needs more attention as it impacts some factors like versatility in surfactant and other element rate, surface area, effective running, etc.

4. CHARACTERIZATION OF PRONIOSOMES

Proniosomes are characterized for vesicle size, size distribution, shape, surface morphology, aerodynamic behavior.

5. SEPARATION FREE (UNENTRAPPED) DRUG

The encapsulation performance of proniosomes is identified after separating of the un-entrapped medication from entrapped medication using methods like centrifugation and by using clear wrapping dialysis tubing D-9777 and dialyzing exhaustively against 400 mL saline at 4°C for 24 hours.

6. DETERMINATION OF ENTRAPMENT EFFICIENCY (MEASUREMENT OF PARTITIONING)

The vesicles obtained after removal of drug by centrifugation, the pellet was collected and re-suspended in 0.9% saline followed by addition of 1:1 ratio of absolute alcohol: propylene glycol mixture to lyse the vesicles. The vesicles obtained after removal of un-entrapped drug by dialysis is then resuspended in 30% v/v of PEG-200 and 1ml of 0.1% v/v Triton X-100 solution was added to solubilize vesicles. The resulting clear solution is then filtered and analysed for drug content. The percentage of drug entrapped is calculated using the following formula.

\[ EE\% = \frac{ED}{TD} \times 100 \]

Where EE\% is the entrapment efficiency percent, ED is the entrapped drug concentration and TD is the theoretical drug concentration.

7. IN VITRO DRUG RELEASE FROM PRONIOSOMAL VESICLES

In vitro medication evaluation and epi-dermis permeation research for proniosomes were identified by different methods like Franz diffusion mobile, Keshary-Chien diffusion mobile, Clear wrapping dialyzing membrane, USP Dissolution equipment Kind I, Spectrapor® molecular permeable tissue layer tube. In vitro epi-dermis permeation researches have been performed using dorsal epi-dermis of albino rabbit female albino rat (Sprague-Dawley strain), flank epi-dermis and Wister rat epi-dermis (7-9 several weeks old). Drug delivery from proniosome produced niosomal vesicles can adhere to any one or more of the following mechanisms: desorption from surface of vesicles or diffusion of medication from bilayered tissue layer or a mixed desorption and diffusion procedure.

8. CONCLUSION

In comparison to liposome and niosome revocation, proniosome symbolizes a significant enhancement by removing physical balance problems, such as gathering or amassing or combination of vesicles and dripping of entrapped drugs during long lasting space for storage. Proniosome are practical to store, transportation and for device dosing since proniosome’s have similar launch features as traditional niosomes, it may offer enhanced bioavailability of some medication with inadequate solubility managed launch remedies or decreased side effects of some medication.

REFERENCES

1. Muller RH, Radtke M, Wissing SA. Solid lipid nanoparticles (SLN) and nanostructured lipid carriers (NLC) in cosmetic and dermatological preparations. Adv Drug Deliv Rev 2002, 54(1), S131-S155