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Preparation of Liposome Film With Pleasant Texture and High Water-Loss Suppression for Lip Care

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Abstract

With the aim of developing water-based lip-care cosmetics, the properties of liposome dispersions and films were examined. Liposome dispersions with small particle size and containing fish-derived cholesterol showed favorable properties regarding their stability, texture, and water-loss suppression when applied to the lips.

Key-words: Liposome, Cholesterol, Phytosterol, Water-loss suppression, Lip care

1. Introduction

The suppression of water loss (evaporation) from the lip surface with lip-care products like lip-creams is known to be the most effective way of improving lip condition¹⁻³). The amount of water that evaporates from the lip surface is ca. three times that from other skin parts⁴). Wrinkles or lines on the lips are far deeper, and lip movements are more frequent than those of other facial parts. Therefore, the use of water-based lotions or emulsions that are applied for facial skin care is not effective for lip care. Usually, lip-care cosmetics are oil-based products. However, compared to water-based products, these oil-based products tend to have an unfavorable or unnatural oily or greasy feeling.

We are investigating the possibility of using of a liposome film as a water-based lip-care cosmetic. Liposome particles dispersed in water have an affinity for the skin or mucus membrane, but the bilayer-membrane-forming liposome is hardly permeable to water molecules⁵⁻⁸).

In this report, we describe the relationship between the preparation of the liposome water dispersion and the suppression of water loss by the liposome film actually applied on the lips, as well as the texture of the film. Specifically, the types of sterols (which enhance the formation of the liposome) and the dispersing conditions are examined.

2. Experimental

Hydrated Lecithin derived from soy was used as a phospholipid consisting mainly of saturated C18 fatty acid. Two types of sterols were used: fish-derived cholesterol (Nissui Marine Cholesterol) and plant-derived phytosterol

of cosmetic grade. The composition ratio of the dispersion was phospholipid/sterol/phosphate buffered saline (PBS) = 0.9:0.1:9.

The Bangham method⁹) was followed for liposome preparation. A chloroform solution containing the phospholipid and sterol was evaporated with an evaporator, and a liposome film was formed on the surface of an eggplant-shaped flask. PBS was added to the flask, and the liquid was stirred with a vortex mixer for some minutes, and subsequently treated with an ultrasonic bath at 353 K for a specified time. Note that these dispersion conditions were far milder than those of the common preparation method using a probe type ultrasonic dispersion equipment.

The shape and size of the obtained liposome particles were observed through transmission electron microscopy (TEM, Hitachi H-7600, negative stain with phosphotungstic acid) and phase microscopy (Nikon Eclipse 50i). The particle size was also measured with a Fiber-Optics Particle Analyzer (FPA-1000, Otsuka Electronics Co.).

The stability of the obtained liposome dispersion was estimated with a UV-vis spectrophotometer (JASCO V-650) from its transmission at 750 nm. Stabilization tests were performed on the dispersion samples under three sets of conditions: heating at 323 K; repetition of freezing at 243 K and thawing at ambient temperature; and addition of 1% aqueous NaCl solution.

One drop of each of the liposome dispersions was applied to dry pig leather for handcrafts (1 cm²) and allowed to dry, and the films obtained were observed with SEM.

One drop of the liposome was applied onto the lip with a finger and allowed to dry. This procedure was repeated three