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Clinical evaluation of the brightening effect of cationc liposome-based formulation on facial skin

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*Kim, Suji; Park, Myeong Sam; Lee, Jun Bae**
Innovation Lab., R&I Center, COSMAX INC, Korea, Republic of (South)

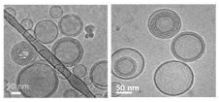
Introduction:

The most important functions of the skin are physical protection from environment and maintenance of homeostasis [1]. Intercellular lipids, which consist of hydrophobic components such as ceramide, cholesterol, and free fatty acids, play a key role in skin barriers that defend against skin penetration of external substances. Accordingly, active ingredients, especially hydrophilic components, have limitations in skin absorption [2].

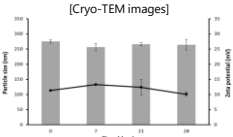
In order to overcome this problem, lipid-based skin carriers are widely used because they do not damage the skin barrier and effectively help absorb active ingredients [3]. In particular, liposomes are the oldest commercial technology among these lipid carriers and are the most effective and highly likely to mass-production [4]. We recently showed that cationic liposomes containing niacinamide (NA) effectively facilitated the migration of melanin to the epidermis in 3D skin models, thereby enhancing the brightening effects of NA [5]. The 3D skin model contains a stratum corneum with charged groups, such as keratin and other sulfated glycosaminoglycans, resulting in electrostatic interactions between cationic liposomes and the skin. In this work, we investigate the clinically evaluated the percutaneous delivery of NA using chitosan-based liposomes and examined the resulting clinical outcomes on skin brightening and melanin transfer in human subjects.

Materials & Methods:

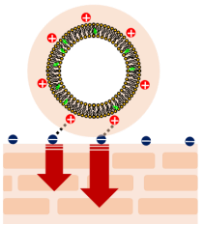
◈ **Characterization of Chitosan-based cationic liposomes**



[Cryo-TEM images]



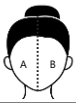
[Size and Zeta potential for 28 days]



[schematic diagram of electrostatic attraction of cationic liposomes and skin]

◈ **Clinical trial**

Cosmetic applied **without liposome**

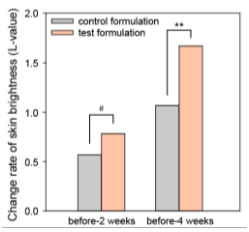


Cosmetic applied **with Chitosan based cationic liposome**

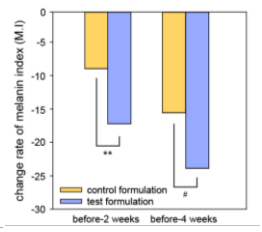
Test Products	· A: control formulation (without liposomes) · B: test formulation (with Cationic liposomes)
Participant	· 21 persons (20-59 years old, average 50.048 years old)
Test methods	· right and left side twice a day (morning/evening) for 4 weeks · Instrument measurement before, 2 weeks and 4 weeks after using the product
Evaluation Criteria	① Skin brightness ② Skin melanin ③ Skin melasma

Results & Discussion:

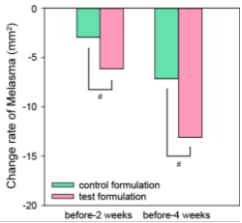
① Skin brightness

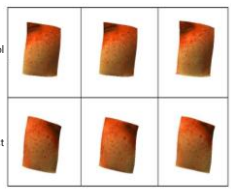


② Skin melanin



③ Skin melasma





· Test formulation containing cationic liposome exhibited statistically significant increase in skin brightness, melanin and melasma parameters compared to con-trol formulation.

(#: $p < 0.05$ using Wilcoxon signed rank test, **: $p < 0.05$ using paired sample t-test).

Conclusions:

- Chitosan-based cationic liposomes were prepared by high-pressure homogenization and applied to cosmetic formulation.
- As a result of clinical evaluation, test formulation, containing cationic liposome, enhanced percutaneous delivery of NA.
- Test formulation enhanced various indices related to skin brightness, such as L-value, M.I., and melasma area, in comparison to the control formulation after 2 and 4 weeks of treatment.
- Cationic liposomes presumably increased the propensity to adhere to the negatively-charged skin surfaces through electrostatic interactions.
- Therefore, chitosan-based cationic liposome would be helpful to improve skin penetration of cosmetic ingredients and also skin efficacy enhancement effect.

Acknowledgements:

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References:

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