Human In Vivo Study: Dermal Application of Rutin SmartCrystals® & Peptide-Loaded Liposomes to Decrease Skin Roughness

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ABSTRACT SUMMARY
The effect of a cosmeceutical product containing rutin smartCrystals® and peptide loaded liposomes was evaluated to decrease the skin roughness in healthy woman volunteers. The skin roughness significantly decreased after eight weeks of treatment. This effect showed a positive correlation with the applied dose.

INTRODUCTION
Stratum corneum is the outermost layer of skin which has a function as a barrier for water soluble and lipid soluble materials. Modification of dermal delivery system can increase the skin uptake and therefore the biological effect of the active delivery. Rutin is a strong natural antioxidant. However, its poor solubility in water and oil limits its skin penetration. Decreasing its particle size into nano scale using smartCrystals® technology increases its solubility, diffusion rate, skin penetration, and therefore improves the biological effect [1]. Higher concentration of antioxidant may decrease the skin roughness, which is the beginning of wrinkle formation [2]. Acetyl hexapeptide-8 (Argireline®) was clinically proved to reduce skin wrinkles [3]. Acetyl tetrapeptide-5 (Eyeseryl®) was reported to prevent collagen crosslinking [4]. Both peptides have been loaded into liposome to increase the skin uptake. In this study, we evaluated the skin roughness after application of a cosmeceutical product containing rutin smartCrystals®, Argireline® and Eyeseryl®.

EXPERIMENTAL METHODS
A marketed cosmeceutical product (ageLine® w/o/man one eye lifting serum) containing rutin smartCrystals®, acetyl hexapeptide-8 (Argireline®) and acetyl tetrapeptide-5 (Eyeseryl®) as the active ingredients was used in this study. Both peptides were loaded in liposomes. Six healthy women (47-58 years old) took part in the study and provided their written consent forms. The test product was regularly applied on their skin around eye twice daily for eight weeks. The compliance was controlled and the test product consumption was recorded. The skin roughness was measured using the PRIMOS system (GF Messtechnik GmbH, Teltow, Germany) for three-dimensional analysis. The volunteers stayed in a room with constant temperature (20-22°C) and relative humidity (40-50%) for at least 20 minutes prior to the measurement. Pictures of the crow’s feet area were taken using the PRIMOS system for skin roughness analysis. Paired t-test was applied for statistical analysis. This study was carried out between October 2011 and January 2012 in Berlin, Germany.

Three roughness parameters were used in the data analysis by applying six lines. Ra is the arithmetical average height calculated over the surface and the mean line within the assessment line length. Rp is the distance of the highest peak from the surface and the mean line within the assessment line length. Rmax is the maximum distance between the peaks and the valleys of the surface within the assessment line length [5].

RESULTS AND DISCUSSION
The volunteers finished the study in eight weeks with compliance more than 95%. Skin roughness parameters (Ra, Rp and Rmax) significantly decreased after eight weeks of treatment (P<0.05) as shown in Figure 1. A good correlation coefficient (r > 0.8) between the roughness parameter (Ra) and product consumption was observed (Figure 2).

The increase of skin smoothness might be related with the increasing level of antioxidant in the skin. Oxidized lipid and protein can cause a rough skin [2]. Higher level of antioxidant protects the skin cells from oxidation. The skin renewal will replace the oxidized skin cells with the new protected ones. Rutin has low skin penetration due to its low solubility. Rutin smartCrystals® has particles sizes in nano scale, therefore it has higher solubility, faster dissolution rate, and faster skin diffusion compared to the coarse rutin [1]. This characteristic improves the biological effect of rutin. Argireline® may also contribute to this improvement by reducing the
wrinkle depth which contributes to skin roughness parameter as well [3]. Eyeseryl® as collagen crosslinking preventor might not give direct contribution to the increase of skin smoothness in this study. However, it prevents further development of skin wrinkles. In addition, liposomes as the delivery system of the peptides can carry water into the stratum corneum (increased hydration by occlusion effect). The increase of skin hydration will decrease the skin roughness as well.

Figure 1. Change of roughness parameters (data as mean ± standard deviation; n=6) after eight weeks of treatment. Skin roughness significantly decreased for all parameters (P<0.05).

Figure 2. Correlation between the change of roughness parameter (Ra) after eight weeks of treatment and product consumption.

CONCLUSION
Regular application of the test product containing rutin smartCrystals®, Argireline® and Eyeseryl® decreased significantly the skin roughness. The change of the skin roughness showed a positive correlation (r > 0.8) with the applied dose.

Nanocrystal increased antioxidant efficiency in humans was shown previously [1]. The present study is the first one looking at a combination of penetration enhancing nanocrystals and occlusive liposomes. The results support combinational use of 2 carriers systems, of course requiring further studies looking at the single contributions of each system.

REFERENCES

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