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Abstracts

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Frictional Behaviors during Applications of Lotions by Use of a Novel Friction Meter and Evaluation of Tactile Feeling

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A novel friction meter that allows us to measure normal force and friction force at the same time was developed, and the frictional behavior of cosmetics during application was investigated for an evaluation of a tactile feeling, permeability. As a result of measurements of 4 lotion samples by 15 panels, time courses of normal forces, friction forces and friction coefficients were different among the panels though they used the same samples. It was also found that the maximum value of differentiation in friction coefficient with better permeability feeling was larger than those with less permeability feeling. This suggests that relative changes in the time course of friction coefficients have an important influence on a tactile feeling, permeability.

Age-Related Changes of the Three-Dimensional Structure in the Cheek Region

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Qualitative surveying of consumers using in-depth interviews has revealed that "skin smoothness" as typified by the expression "fine texture" may be an essential ingredient in the ideal "beautiful skin" desired by women. Therefore, to elucidate the reality of skin smoothness, we administered a quantitative questionnaire survey to consumers and measured the shape of the skin surface. The results confirmed that a sense of "skin smoothness" is represented by the expression "skin with fine texture" with regard to the shape of the skin. We also found that this sense of "skin with fine texture" does not arise from an awareness of the structure of the skin surface at the microscopic level, such as the sulcus cutis or crista cutis, but from skin structures that are visible to the naked eye, such as pores. "Skin smoothness" is noticed particularly in the area below the eyes and surrounding the sides of the

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nose (upper cheeks). In addition, the 3-dimensional (3D) shape of the skin surface in this area was clarified to change with age, not only in simple increases in the amount of unevenness deriving from pore enlargement, but with ridge-like structuring of the entire skin surface. We viewed this change in the 3D shape of the skin surface as a "phenomenon of skin languishment with age". This change has a large effect on whether skin is perceived as smooth.

Hyper Internal Phase W / O Emulsion Stabilized with a Specific Surfactant That Forms an Anomalous Bicontinuous Cubic Liquid Crystal

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The water in oil (W / O) emulsion is a crucial cosmetic base that makes oily constituents efficiently spread on the skin surface to provide high emollience, high SPF and other features. Despite the functionality that they offer, W / O emulsions require technical improvement. The conventional W / O emulsifiers, which stabilize the W / O emulsion at the oil-water interface, tend to be dissolved as a mono-dispersed molecule in oil bulk due to the lack of lipophobicity, resulting in inefficient stabilization. For that reason, the W / O emulsion requires a considerable amount of W / O emulsifier as well as gelling agents that add undesirable sticky and greasy textures to the finished product. In the present study, we focused on amphiphiles with multiple hydroxyl groups that should render temperature insensitive large lipophobicity to the molecule. As a result, it was found that hyper internal phase W / O emulsions can be prepared with phytantriol (3, 7, 11, 15 - tetramethyl- 1, 2, 3 –hexadecanetriol) as an emulsifier. The emulsion showed excellent stability in spite of containing 97% aqueous substances with various oils such as non-polar, polar, and silicone oils. Innovative basic research findings regarding high internal phase O / W or W / O emulsions have been reported ; however, these emulsions are unsuitable for practical use due to insufficient stability derived from temperature-sensitive lipophobicity. Phytantriol is known to form an anomalous bicontinuous cubic liquid crystalline phase with water. To gain insight into the emulsification mechanism, extensive research has been conducted on the phase behavior of phytantriol in the presence of oil and water. Consequently, the emulsification mechanism of the present emulsion was revealed. Additionally, it was found that the present emulsion left a thin liquid crystalline film extended on the skin surface following evaporation of the solvents upon application. This technology provides important functionalities to emulsions such as high emollient effect and occlusive effect, as well as a preferable non-sticky, non-greasy texture, unobtainable through conventional technologies.

A Novel Mechanism of Cutaneous Photo-Aging Mediated by the Impairment of Lymphatic Function and the Protective Role of a Lymphatic-promoting Compound

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The lymphatic system plays an important role in the maintenance of tissue fluid homeostasis and the afferent phase of immune response. However, the role of the lymphatic system in mediation of aging and its molecular mechanism have been totally unknown. Here we have identified, for the first time, the importance of the cutaneous lymphatic system in the process of ultraviolet (UV) B-induced skin-damage. UVB induced the prominent enlargement of lymphatic vessels which were leaky and hyperpermeable, suggesting that the function of enlarged lymphatic vessels induced by UVB was impaired. Moreover, impaired lymphatic function could cause prolonged inflammation with retained macrophages in the dermis, eventually leading to wrinkle formation. A potent lymphangiogenesis factor, VEGFC was downregulated after UVB irradiation in vitro as well as in vivo, suggesting that the impairment

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of lymphatic function was triggered by VEGFC downregulation. MACC, which was found to be a novel VEGFC-inducing compound in keratinocytes, has a strong potential to prevent UVB-induced skin damage / wrinkle formation by promoting lymphatic vessel growth and function.

Characterization of Eye Bags in Chinese Women

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Most Chinese women aspire to beauty around the eyes, and the "eye bag" is a major concern for them. The purpose of this study is to characterize the eye bags of Chinese women using skin measurement instruments. The degree of slackness, dark rings and wrinkles of the skin under the eyes were evaluated by questionnaire and direct observation in Chinese women. The levels of hemoglobin and melanin were analyzed with a Skin Image Analyzer. The elasticity was measured with a Cutometer. Visual observation indicated that the eye bags in young Chinese women were characterized by slackness and swelling under the eyes. Color analysis showed that the level of hemoglobin under the eyes tended to be higher than that on the cheeks, suggesting that the eye bags may result from impaired circulation. The level of melanin under the eyes was higher than that in the cheek. The elasticity under eyes was significantly lower than that in the cheek, indicating that the skin under the eyes is looser than that of the cheek. In conclusion, the eye bags of Chinese women were characterized by pigmentation and impaired circulation, in addition to skin sagging owing to reduced resilience.

Characteristic Microstructure of Curved Human Hair

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Hair appearance is affected by several factors, such as hair shape, color and optical properties relating to hair luster. For example, recently, we have found that meandering (curved) hair fibers increase with aging and cause the disordered alignment of hair fibers, resulting in a decrease in hair luster in older women. It is, therefore, important to understand the relationship between hair shape and its microstructure to control the fiber alignment and then the hair appearance. In this study, we have investigated the characteristic microstructure of curved human hair with microscopic methods and the following results were obtained : (a) The permeation behavior of fluorescein isothiocyanate into curved hair was asymmetrical. The permeation rate was faster from the convex-side but slower from the concave-side of the curved hair. This difference in permeation rate suggests structural and / or compositional differences between the convex- and concave-sides. (b) Transmission electron microscopic (TEM) observations revealed that macrofibril morphology is different between the convex- and concave-sides. The macrofibrils in the convex-side are relatively smaller and dispersed in inter-macrofibrillar material, while those in the concave-side are relatively larger and fused together. (c) TEM observations also suggested that the alignment structure of intermediate filaments in the convex-side is helical or twisted in each macrofibril, while that in the concave-side is approximately parallel to the fiber axis. (d) The amino acid analyses of the convex- and concave-halves of the curved hair fibers revealed that Cys is lower and Asp, Glu and Gly are higher in the convex-half. Interestingly, these results of the TEM observation and the amino acid analysis are analogous to the difference between ortho- and para-cortical cells in wool fibers, suggesting the universal structure of curved mammalian hair.

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Effects of Deoxyribonucleoside 5′-Monophosphates on Human Skin Conditions

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We investigated the effects of deoxyribonucleoside 5′-monophosphates (dNMP) on human skin conditions. dNMPs (dAMP, dGMP, dCMP, dTMP) were prepared from salmon milt DNA using enzymatic and chromatographic techniques. First, we investigated the rubbing test of dNMP mixture on skin. 1% of dNMP mixture-containing cream (1% dNMP group), 3% of dNMP mixture-containing cream (3%-dNMP group), or no dNMP-containing cream (control group) was rubbed on the skin of the face and hand of the male subject (ten/each group) for 12 weeks. The 1%-dNMP group had significantly improved skin-elasticity compared to that of the control group at 8 weeks, and the tendency of improvement of skin-elasticity was also recognized at 4 and 12 weeks. The 3%-dNMP group tended to have improved skin-elasticity at every period. The water content of face skin was significantly increased in the 3%-dNMP group at 12 weeks. In addition, in the questionnaire, more than 80% of the 3%-dNMP group answered that they felt the improvement of skin roughness after 4 weeks. These results indicated that the dNMP mixture has the effect of improving skin conditions by rubbing. Next, we evaluated the effect of the enzymatic digested DNA-Na which contained dNMPs using normal dermal fibroblast from human skin (SF-TY cell) Enzymatic digested DNA-Na showed the activation effect of cell proliferation and the promoting effect of collagen production on SF-TY cell. In a comparison of dNMPs, dAMP showed the higest activity of collagen production.

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