

New Creation of perfluoropolyether Treated Powders For Makeup Cosmetics: as Innovative Functional Materials.

This study describes about “Innovative functional powder-materials” for make-up cosmetics based on novel perfluoropolyether technology. Both of body and color pigments newly created by this technology give a long-lasting make-up quality, elegant feeling to touch and extremely outstanding color tone to make-up cosmetics. And furthermore, these have no regulatory restrictions to the use and are very sustainable.

The technology demonstrated by this study will surely support for success in developing innovative cosmetics.

Development of a novel carrier having higher skin permeability ~Self-forming vesicle material composed of polyglycerin fatty acid esters~.

We focused on polyglycerin fatty acid esters (PGFAEs) as vesicle forming agents, developed vesicles using PGFAEs and evaluated their skin permeability. In the results, the vesicle formed by the optimal composition of PGFAEs showed the higher skin permeability than the liposome.

Physiological effect of hydrogen gas inhalation on skin conditions.

Hydrogen gas inhalation for long term use significantly reduced psychological stress levels, hemoglobin-derived skin redness, and melanin-derived brown spots, that is, stress reduction resolved skin troubles.

Hair color mechanism getting inspiration from Japanese traditional mordant dyeing technology.

In this paper, we report that hair color formulation with ZINC GLYCINATE kept long-lasting effect against discoloration from shampoo, and that shampoo containing ZINC GLYCINATE showed a better discoloring inhibition effect than shampoo without ZINC GLYCINATE.

Possible involvement of senescent fibroblasts in the regulatory effect of ethyl linoleate on melanogenesis through interactions between melanocytes and neighboring cells.

Interactions between melanocytes and neighboring cells such as keratinocytes and fibroblasts play important roles in regulating human skin color. Previously, it was reported that several paracrine factors derived from neighboring cells regulate melanin synthesis in melanocytes. However, the regulatory mechanisms of interactive communications among these various types of cells are still unclear. In addition, the contribution of the skin aging process on these mechanisms hasn't been disclosed, although it was reported that the aging process could lead to skin pigmentation and senile lentigos. Thus, we investigated whether the aging process contributes to the pigmentation process. In this study, we used co-culture systems of normal human epidermal melanocytes (NHEMs) and either normal human epidermal keratinocytes (NHEKs) or normal human dermal fibroblasts (NHDFs). In addition, young NHDFs (YNHDFs) and senescent NHDFs (SNHDFs) were used for co-cultures. SNHDFs were induced by repeated exposure to UVA (repeated UVA irradiated SNHDFs, RUVA-SNHDFs) or by replicative

senescence (R-SNHDFs). Both RUVA-SNHDFs and R-SNHDFs were measured for the induction of senescence using β -galactosidase staining in preliminary tests. The results showed that melanin synthesis in NHEMs-NHEKs co-cultures was increased compared to NHEMs in single culture. On the other hand, melanin synthesis in NHEMs-YNHDFs co-cultures was suppressed compared to NHEMs in single culture. Moreover, melanin synthesis both in NHEMs-RUVA-SNHDFs co-cultures and in NHEMs-R-SNHDFs co-cultures was abrogated by the suppression of melanin synthesis in the presence of YNHDFs. According to these results, protein levels of tyrosinase in NHEMs examined by western blotting showed the same tendency, which means an increase in NHEMs-NHEKs co-cultures and a decrease in NHEMs-YNHDFs co-cultures, and the abrogation of a decrease caused by YNHDFs both in NHEMs-RUVA-SNHDFs co-cultures and in NHEMs-R-SNHDFs co-cultures. To clarify this phenomenon, we determined the mRNA expression levels of paracrine factors such as Dickkopf WNT signaling pathway inhibitor 1 (DKK1) and Neuregulin-1 (NRG-1) in R-SNHDFs using real time RT-PCR. The mRNA expression levels of both DKK1 and NRG-1 were increased in R-SNHDFs compared to YNHDFs. Moreover, the secretion level of DKK1 was also decreased in R-SNHDFs compared to YNHDFs. To characterize the contribution of neighboring cells, an effective whitening agent, ethyl linoleate (EL), was used. The results show that EL reinforced the suppression of melanin synthesis both in NHEMs-NHEKs co-cultures and in NHEMs-YNHDFs co-cultures compared to the effect of EL in NHEMs in single culture. These results suggest that EL was more likely to regulate paracrine factors from neighboring cells. We then further examined the interactions focusing on NHDFs, which are more susceptible to the skin aging process. EL shifted the mRNA expression levels of both DKK1 and NRG-1 to suppress melanin synthesis in YNHDFs. In conclusion, the results revealed that the presence of neighboring cells contributes to the regulation of melanin synthesis in NHEMs. They further suggest that EL regulates paracrine factors related to the suppression of melanin synthesis and possibly affects changes in NHDFs according to the aging process.

Possible involvement of infrared radiation in deepening facial smile lines (nasolabial folds) –the improving effect of retinyl linoleate–.

Chronic sunlight exposure accelerates photoaging of the skin, which affects the facial appearance identified as deep wrinkles, sagging and/or pigmented spots (solar lentigos). Thus, in order to identify clues for photoaging care, we developed retinyl linoleate, which promotes the synthesis of hyaluronic acid and collagen in dermal fibroblasts and suppresses melanin production in melanocytes. These in vitro results suggested to us that retinyl linoleate would effectively improve the symptoms of photoaged skin. Therefore, to prove those effects in vivo, we conducted a clinical trial focusing on the improvement of nasolabial folds, which are a well-known feature of facial photoaging and also are one of the most worrisome changes for women. The clinical trial was carried out as follows; the testing site was the facial skin of 22 females with an average age of 48.41 ± 3.19 years. A sample cream containing 0.2% retinyl linoleate and a placebo cream were randomly allocated into each split face and all subjects used both test samples every morning and night for 8 weeks. Measurements were conducted at 4 week intervals, and the measurement parameters included overall size, width and depth of nasolabial folds using 3D imaging analyses, skin hydration and skin brightness. The results showed that treatment with retinyl linoleate significantly decreased the overall size of nasolabial folds after 4 and 8 weeks compared with the initial values and the placebo, and significantly decreased the width and depth of nasolabial folds after 4 and 8 weeks compared with the initial value as well. Moreover, retinyl linoleate significantly increased skin hydration and skin brightness after 4 and 8 weeks compared with the initial values and the placebo. These findings suggested that retinyl linoleate effectively improved nasolabial folds based on the mechanisms of both retinol and linoleic acid. To strengthen this, we focused on infrared rays (IR) that can cause deepening of the nasolabial folds because they are long-wavelength light that reaches deeper in the skin and we decided to further investigate the mechanisms involved. Firstly, we evaluated

the influences of IR exposure on normal human dermal fibroblasts (NHDFs). Although IR including its thermal effects shifted to a fragile matrix by changes in the expression of mRNAs related to the dermal matrix, such as COL1A1 and MMP-1, and also the synthesis of carbonylated proteins (CPs) intracellularly, eliminating the thermal effects of IR with a water filter didn't affect the expression levels of dermal matrix related mRNAs. In addition, we confirmed that the thermal effects alone were enough to induce changes of dermal matrix related mRNAs. Therefore, in order to address the effects of retinyl linoleate, we focused on CPs increased by IR exposure, because CPs could be a trigger of oxidative stress. The results showed that retinyl linoleate abrogated the elevation of IR-induced CP levels by activating catalase. In conclusion, our results suggest that IR causes photoaged skin due to oxidative stress by reaching deeper in the skin, and the active substance could be heat. In addition, the results indicate that retinyl linoleate showed improvement of nasolabial folds by reducing the highly oxidative situation.

Hydrogenated retinol abrogates the over-expression of neprilysin by inhibiting UVB up-regulated epithelial-mesenchymal cytokine interactions, its potential as an anti-wrinkling agent.

We recently reported that over-expression of the fibroblast-derived elastase neprilysin in the dermis of UVB-exposed skin plays a pivotal role in impairing the three-dimensional architecture of dermal elastic fibers which results in the loss of skin elasticity, leading to the formation of skin wrinkles (JBC 2010). The expression level of neprilysin in dermal fibroblasts is essentially associated with epithelial-mesenchymal cytokine interactions, including interleukin (IL)-1 α and granulocyte macrophage colony stimulating factor (GM-CSF), both of which have a distinct potential to stimulate the expression of neprilysin by dermal fibroblasts (BJ 2012). In this study, we found that hydrogenated retinol (HR) at 40 μ mol/L significantly abrogates the increased mRNA and protein expression levels of neprilysin at 48 h post-irradiation when normal human dermal fibroblasts (NHDFs) are co-cultured in cell plates with UVB (40 mJ/cm²)-exposed normal human epidermal keratinocytes (NHEKs) in cell inserts. To characterize the mode of action of HR, analyses of cytokines by ELISA revealed that the co-culture of NHDFs with UVB-exposed NHEKs significantly stimulated the secretion of IL-1 α (1550 from 424 pg/mL), GM-CSF (4046 from 561 pg/mL) and IL-6 (26823 from 11561 pg/mL) but not of IL-8 (19164 from 22646 pg/mL) at 48 h post-irradiation. However, treatment with HR at 20 or 40 μ mol/L significantly abrogated the increased secretion of those three cytokines (to 158/not detectable (ND)/2010 pg/mL at 40 μ mol/L, respectively). In UVB-exposed NHEKs, there was an increased secretion of IL-1 α (662 from ND pg/mL), GM-CSF (1462 from 599 pg/mL) and IL-6 (1574 from ND pg/mL), but treatment with HR at 20 or 40 μ mol/L significantly abrogated the increased secretion of IL-1 α (to 447 pg/mL) but not of GM-CSF or IL-6 at 48 h post-irradiation. On the other hand, in IL-1 α (1.0 nmol/L)-treated NHDFs, while there was an increased secretion of GM-CSF (711 from ND pg/mL), treatment with HR at 20 or 40 μ mol/L significantly abolished the increased secretion of GM-CSF (to 131 pg/mL at 40 μ mol/L) at 48 h post-treatment. These results of GM-CSF secretion levels indicate that the total secretion level of GM-CSF in the co-culture system is equivalent to the combined secretion level both in UVB-exposed NHEKs and in IL-1 α (1.0 nmol/L)-treated NHDFs, indicating that keratinocyte-derived IL-1 α causes fibroblasts to markedly stimulate GM-CSF in a paracrine fashion. Taken together, these findings indicate that the inhibitory effect of HR on the up-regulated mRNA and protein expression levels of neprilysin in the UVB-exposed co-culture system is attributable to its abrogating effect on the UVB-increased secretion of IL-1 α by NHEKs as well as on the IL-1 α -stimulated secretion of GM-CSF, which results in the markedly suppressed secretion of the neprilysin-inducible cytokine GM-CSF in the co-culture system. These findings strongly suggest that HR could be an effective agent to ameliorate the formation of wrinkles in photo-aged skin via the down-regulation of epithelial-mesenchymal cytokine interactions that are negatively responsible for regulating the expression level of the wrinkle-inducible fibroblast-derived elastase neprilysin.

A New Concept: development of a transparent shampoo base with high conditioning effect .

We aimed to develop a transparent shampoo that does not have hair treatment agents and has a high conditioning effect with shampoo alone.

We focused on the coacervation of shampoo and devised a method to incorporate a large amount of oil components into the coacervate.

As a result, we confirmed that the newly developed oil-in-shampoo had a higher adsorption of oil component on the hair surface than a typical hair treatment.

In addition, the newly developed oil-in-shampoo yielded similar smoothness of the hair surface as a typical hair treatment.

2020.05.01 2020 AOCs Annual Meeting & Expo

Solubilization Mechanism of Perfume Molecules in Micelles Using SAXS and NMR technologies.

We studied the solubilization state of D-limonene (LN) or Linalool (LL) in micelles formed by decaoxyethylene lauryl ether (C12EO10) aqueous solutions using the SAXS and 2D-NMR measurements.

2019.10.03 25th IFSCC Conference Milan 2019

Novel Oil Gelling Technology with High Moisturization; Oil Gelling Mechanism Developed by Alpha-gel (α -gel) Structure and its New Application for Lip Gloss.

Oil gelling technology is widely utilized in the cosmetic industry, especially in the development of make up products such as lipstick and lip gloss. In general, these are anhydrous and consequently, they lack any additional moisturization benefits. In this study, we focused on the alpha gel (α gel) structure created by highly purified Mono-hexadecyl phosphate arginine salt. This is because the α gel is a crystal of amphiphilic lipids that retain high volumes of water within the hydrophilic groups, and it also has the potential to form oil gels.

It was confirmed that the α gel could form oil gels with a wide variety of oils and its oil gelling mechanism was analyzed by SWAXS (Small/Wide angle X ray scattering) measurement. It was found that α gel exists in oil gel form and traps oils in the space of α gel sheet. Furthermore, from clinical evaluations, it was confirmed that the lip gloss formulated by this novel oil gelling technology provided superior moisturizing benefits to the lip surface and was longer lasting than those of a conventional lip gloss formulation.

Anti-aging effect of retinyl linoleate focused on the nasolabial folds using 3D imaging analyses..

Chronic UV exposure accelerates the photo aged skin, which affects to the facial appearance identified as deep wrinkle, sagging, and/or skin pigmentation. Thus, we developed a novel retinyl linoleate structured in a combination of retinol and linoleic acid. We previously found that retinyl linoleate promoted hyaluronic acid and collagen synthesis in dermis and suppressed melanin production in epidermis. These facts suggested that retinyl linoleate is effective for photo aged skin. To prove these effects in clinical trials, we focused on the nasolabial folds, which are well-known feature of facial photo aging. We conducted clinical trials as follows; testing site and subjects were the face skin of 24 female average ages of 48.41 ± 3.19 years old. The measurement parameters were overall size, width, and depth of nasolabial folds using 3D imaging analyses, skin hydration, and skin brightness. 0.2% retinyl linoleate cream and placebo cream were randomly allocated into each split face and all subjects used test samples every morning and night for 8 weeks. Measurement was conducted each of 4 weeks intervals. In results, overall size of nasolabial folds were significantly decreased after 4 and 8 weeks compared with both initial and placebo by retinyl linoleate treatment. And, width and depth of nasolabial folds were significantly decreased after 4 and 8 weeks compared with initial as well. Moreover, retinyl linoleate increased skin hydration and skin brightness significantly after 4 and 8 weeks compared with both initial and placebo. These findings suggested that retinyl linoleate effectively improved nasolabial folds based on the mechanisms of both retinol and linoleic acid. To strengthen this, we additionally evaluated the skin turnover. We made DHA brown staining for 20 subjects on forearm and the same test sample were treated until 10 days. Results showed a greater increase in the skin lightness which means skin turnover promoted by the treatment of retinyl linoleate. Taken together, retinyl linoleate is a possible ingredient to improve facial appearance of the photo aged skin caused by nasolabial folds.

Development of highly purified mono alkyl phosphate and its application to cosmetics.

Aqueous phase diagram of monohexadecyl phosphate neutralized by L-arginine (C16MP-Arg) was studied. We found that the mixture can form α -gel in a wide range of concentrations and temperatures. The α -gel is thermodynamically stable, and does not transform into coagel at least for 1 year. This behavior is unique when compared with other anionic surfactant systems.

For developing the application to cosmetic formulations, improvement of small wrinkle and anti-pollution effect were evaluated. The small wrinkle improvement effect was evaluated using the placebo cream formulation and the α -gel cream formulation by VISIA Evolution. As a result, the number of wrinkles was significantly decreased in the α -gel cream formulation compared with the placebo cream formulation. In addition, anti-pollution effect was evaluated. As a result, the α -gel cream formulation showed good anti-pollution ability compared with placebo cream formulation.

Booster of Penetration and Moisturizing Effect for Skin.

PPG-24-GLYCERETH-24 was synthesized by adding 24 mol each of ethylene oxide and propylene oxide to glycerin. Being hydrophilic, ethylene oxide is easily incorporated in water-based formulations. In contrast, propylene oxide is hydrophobic, and is thus compatible with oil components. PPG-24-GLYCERETH-24 can be added to water-based formulations and also be compatible with the oil components. Therefore, the water-based formulation with PPG-24-GLYCERETH-24 can be spread easily on skin because it has the hydrophobic part and reduces the hydration ability between water molecules in bulk. In this study, we investigated that how PPG-24-GLYCERETH-24 has the effect of moisturizing and penetration for skin.

Lysophosphatidic acid prevents sensitive skin via suppression of nerve growth using hiPS techniques induced by environmental pollutants.

Nerve elongation related to sensitive skin is induced by exposome, which is defined as environmental stimuli that causes skin disorders. It was reported that the production levels of nerve growth factor (NGF) were lower than that of Semaphorin3A (Sema3A) in healthy skin epidermis. In contrast, the balance between the production levels of both components collapsed in the sensitive skin as represented by atopic dermatitis and the dry skin. These findings suggested that the suppression of penetration and/or elongation of nerve fibers into the normal epidermis are necessary to maintain healthy skin. Recently, environmental pollutants, which are defined as representative of exposome, are recognized as triggers of skin disorders. Although the possible mechanisms underlying skin disorders induced by the environmental pollutants are studied, the influences on sensitive skin are still unclear. The aim of this study is to elucidate whether diesel particulate extract (DPE) as an environmental pollutant affects nerve elongation as found in sensitive skin using hiPS techniques. Also, we examined to clarify its underlying mechanisms controlling the balance between NGF and Sema3A. The results indicate that the substances secreted from DPE-exposed keratinocytes stimulate nerve elongation in hiPS-derived skin nerve cells. To characterize the contribution of epidermal function, lysophosphatidic acid (LPA), which recovers skin roughness via regulation of epidermal barrier function, was used as an active agent to maintain skin homeostasis after DPE exposure. The results showed that LPA increased Sema3A mRNA expression in keratinocytes and suppressed hiPS-derived skin nerve cell elongation after DPE exposure. These results demonstrate that environmental pollutants can be a trigger of sensitive skin via nerve elongation, and there is possibility to recover by regulation of epidermal function.

***New application of lipophilic vitamin C as a hair repairing agent
~repair of hair hydrophobicity and improvement of cuticle lifting~.***

Ascorbyl Tetraisopalmitate (VC-IP) has good skin penetration due to its lipophilicity, and is decomposed by esterase into ascorbyl and isopalmitate after skin penetration. Applying this decomposition reaction, VC-IP is expected to repair the properties of the damaged hair such as hair hydrophobicity and cuticle lifting when it reacts with amino group in/on damaged hair. Furthermore, the continuous hair repair effect is expected by chemical reaction with hair.

Effects of a lipophilic pro-vitamin C derivative, tetra-isopalmitoyl ascorbic acid (VC-IP), on senile lentigos via controlling melanocyte-keratinocyte interactions..

Vitamin C is well known to play an important role in maintaining skin physiology. Since vitamin C has limited stability and permeability, we developed a lipophilic pro-vitamin C derivative, tetra-isopalmitoyl ascorbic acid (VC-IP). Previously, we reported the efficacy of VC-IP on UVB-induced skin pigmentation through the suppression of reactive oxygen species (ROS) generation and the following inflammation process. However, senile lentigos are more commonly known as symptoms of skin photoaging and hyperpigmentation. In this study, we elucidated the effects of VC-IP on senile lentigos focusing on endothelin-1 (ET-1), which is an inducer of melanogenesis that is highly secreted in the hyperpigmented spots of senile lentigos.

To clarify the effects of VC-IP on melanogenesis, we examined melanin production. VC-IP significantly suppressed melanin production that had been stimulated by ET-1. Next, we examined the effects of VC-IP on melanosome transfer, which is a critical process in the excess melanosome accumulation in keratinocytes that is recognized as a typical event in senile lentigos. The results show that treatment with VC-IP drastically inhibited the elongation of dendrites in ET-1 stimulated melanocytes, which means that VC-IP regulated the abnormal melanin delivery in senile lentigos. Finally, we assessed the clinical effects of VC-IP on patients. Treatment with VC-IP significantly improved remarkably pigmented spots in addition to skin brightness and skin color evenness. Moreover, in a self-assessment study, the patients were highly satisfied with the effects of VC-IP on their age spots, skin brightness, fading of dull/yellow skin color and had no adverse reactions.

Senile lentigos are commonly known as a symptom of skin photoaging and hyperpigmentation associated with the excess secretion of ET-1. VC-IP, a derivative of vitamin C, showed a brightening effect on age spots through the suppression not only of the oxidative stress induced inflammation process but also of ET-1 stimulated aging signs. More specifically, VC-IP inhibited melanogenesis and dendrite elongation of melanocytes. Altogether, these results suggest that VC-IP could be an active reagent possessing highly promising clinical effects on senile lentigos based on controlling melanocyte-keratinocyte interactions in hyper-pigmented spots without any adverse reactions.

Improvement of post-inflammatory hyperpigmentation (PIH) by ethyl linoleate via the regulation of fibroblast-derived factors.

Post-inflammatory hyperpigmentation (PIH) occurs following various types of skin inflammation such as acne and scars. Recently, it was reported that not only inflammation factors from the epidermis but also dermal fibroblast-derived factors contribute to the process of PIH associated with disruption of the dermal epidermal junction. However, laser treatments are usually chosen as a clinical remedy rather than topical medicine. This is because the most common targets of whitening agents are focused on epidermal events after UV-irradiation such as the production and accumulation of melanin and turnover delays. Thus, the long-term application of medicine is required to improve these symptoms. In this study, we demonstrated that the presence of fibroblasts decreased melanin synthesis in co-cultured melanocytes and in melanocytes in a 3D epidermal model. Further, we found that ethyl linoleate (EL) remarkably decreased melanogenesis in melanocytes via the regulation of fibroblast-derived factors. In addition, we assessed the efficacy of a cream containing 2% EL to treat patients with acne-induced PIH with the following conditions; testing site and subjects were the facial skin of 24 females with an average age of 41.86 ± 6.37 years. The parameters measured were: skin brightness (L^* value measured using a chromameter), skin pigmentation (spot area, brown spot and UV spot measured by VISIA-CR), skin desquamation (size of corneocytes measured by keratin sticker and iScope), self-assessment by each volunteer, and assessment of adverse reactions by the researcher and each volunteer. The results show that EL significantly improved the parameters of L^* , the number of spots and the skin turnover. Thus, we conclude that EL is effective for the improvement of PIH via the regulating of fibroblast-derived factors.

The effects of a natural derived fragrance on skin conditions via controlling the autonomic nerve system.

In recent years, the concept that skin aging progresses by multiple factors due to environmental and psychological stresses has been proposed. This concept is defined as "Exposome" that affects human individuals from conception to death as well as the responses of the human body to these factors that lead to biological and clinical signs of skin aging. Especially, it is well known that chronic psychological stress and the quality of sleep are involved in changes of skin conditions via effects on the autonomic nerve system (ANS). Accordingly, it has been suggested that controlling the ANS should be important to reduce skin aging and improve stress resistance. In order to improve psychological stress and the quality of sleep, various fragrances have been used to modify lifestyle habits. However, few reports have focused on the long-term psychological effects of fragrances on skin conditions. In our previous study, we indicated that the inhalation of damask rose fragrance induced a parasympathetic nerve system dominant state.²⁾ Thus, in this study, we evaluated the effects of the continuous inhalation of damask rose oil on skin conditions in a clinical study. The results show that the skin surface water content was significantly increased by the long-term use of damask rose oil. In addition, a^* value, which indicates the redness of skin color, was increased associated with the improvement of blood circulation. These findings strongly suggest that those changes of skin physiological parameters were associated with changes of psychological parameters, stress level, mood of confusion and quality of sleep elicited by the damask rose oil. These results suggest that the long-term use of the fragrance improved skin conditions by regulating the ANS, which dominates the status of psychological conditions.

Chimyl Alcohol Suppresses PGE2 Synthesis by Human Epidermal Keratinocytes Through the Activation of PPAR- γ .

Alkyl glyceryl ethers (AKGs) are widely used as emulsion stabilizers, and their anti-inflammatory effects are well known. Daily exposure to environmental stresses, such as chemicals, low humidity and ultraviolet light (UV), can initiate and promote the development of various skin problems. Among those stresses, it has been established that UV induces skin pigmentation and accelerates premature skin aging due to the inflammation that results. Here, we investigated whether chimyl alcohol (CA), which is an AKG, suppresses the inflammatory process. The suppression of cell damage and the reduction of intracellular levels of reactive oxygen species (ROS) in normal human epidermal keratinocytes (NHEKs) after UVB exposure was evaluated using the Neutral red (NR) and the 2',7'-dichlorodihydrofluorescein diacetate (DCFDA) assays, respectively. Moreover, the expression levels of mRNAs and proteins related to inflammation were evaluated by Realtime RT-PCR and ELISA assays, respectively. CA suppressed prostaglandin E2 (PGE2) production in UVB-exposed NHEKs according to the down-regulated expression level of cyclooxygenase-2 (COX-2) mRNA. Furthermore, CA up-regulated the mRNA expression levels of peroxisome proliferator-activated receptor (PPAR)- γ , nuclear factor E2-related factor 2 (Nrf2) and γ -glutamyl cysteine synthase (γ -GCS) in NHEKs. Finally, we examined the effects of CA on siPPAR- γ transfected NHEKs. siPPAR- γ transfection of NHEKs abolished the mRNA expression levels of Nrf2 and UVB-stimulated PGE2 secretion that were regulated by CA. Hence, CA suppresses the UVB-induced COX-2 mRNA expression and PGE2 production through PPAR- γ as an agonist. We conclude that CA provides useful protection and/or alleviation against UV damage.

New application of lipophilic vitamin C as a hair repairing agent ~Repair of hair hydrophobicity and improvement of cuticle lifting~

Ascorbyl Tetraisopalmitate (NIKKOL VC-IP) has good skin penetration due to its lipophilicity, and is decomposed by esterase into Ascorbyl and Isopalmitate after skin penetration. Applying this decomposition reaction, NIKKOL VC-IP is expected to repair the properties of damaged hair such as hair hydrophobicity and cuticle lifting when it reacts with amino group in/on damaged hair. It was confirmed that NIKKOL VC-IP has higher reactivity with amino group than the other oils by in vitro evaluation. Furthermore, NIKKOL VC-IP repaired the hair hydrophobicity and improved cuticle lifting of the damaged hair.

Effect of a new lipophilic pro-vitamin C, tetra-isopalmitoyl ascorbic acid (VC-IP), on senile lentigo via controlling melanocytes-keratinocytes interaction.

Objectives

Vitamin C is well known to play an important role in maintaining skin physiology. Since vitamin C has limited stability and permeability, we developed a new lipophilic pro-vitamin C derivative, tetra-isopalmitoyl ascorbic acid (VC-IP). Previously, we reported the efficacy of VC-IP on UVB-induced skin pigmentation through the suppression of reactive oxygen species (ROS) generation and the following inflammation process. However, senile lentigo is more commonly known as a symptom of skin photo aging/pigmentation. In this study, we elucidated the effect of VC-IP on senile lentigo focusing on endothelin-1 (ET-1), which is an inducer of melanogenesis highly secreted in the spots of senile lentigo.

Materials and Methods

Melanin production in NHEMs-NHEKs – Melanin production was evaluated using NHEMs-NHEKs co-culture system. Both cells were separated by a culture insert. Co-culture was treated with VC-IP and ET-1 as an inducer of melanogenesis for 6 days. Then, melanin extracted from NHEMs was quantified. **Melanosome transfer focusing on the dendrite elongation** – We evaluated the dendricity of NHEMs using NHEMs-NHEKs co-culture system. Both cells were seeded together at a ratio of 1 NHEMs for 5 NHEKs and treated with VC-IP for 24 hours before stimulation. The ET-1 was added with VC-IP for 3 supplementary days. The cells were immuno-labelled with tyrosinase (NHEMs) and cytokeratin 5 (NHEKs) respectively and observed with a confocal microscope.

Clinical trials with the patients of senile lentigo – Also, we conducted clinical test as follows; testing site and subjects were the face skin of 60 females from the age of 30~69 years old, and measurement parameters were skin brightness and skin color, visual assessment, self-assessment, and assessment of adverse reactions.

Results and discussions

To clarify the contribution of VC-IP onto the melanogenesis induced by ET-1, we examined the melanin production. VC-IP suppressed melanin production induced by ET-1, significantly. Next, we confirmed the interaction of NHEMs and NHEKs focusing on the dendrite elongation of NHEMs stimulated by ET-1 underlying melanosome transfer. That is because it should be the first process of excess melanosome accumulation in NHEKs recognized in senile lentigo. Pretreatment of VC-IP inhibited dendrite elongation stimulated by ET-1, which means VC-IP regulated abnormal melanin delivery on senile lentigo. Finally, in clinical test, we confirmed the effect of VC-IP on actual patient, showed significant improvement of pigmentation spots such as skin brightness and evenness. Moreover, we obtained highly satisfactory feedback from subjects on the following parameters of self-assessment; appearance of aging spots, skin brightness, fading of dullness or yellowing, and zero adverse reaction.

Conclusions

Senile lentigo is a commonly known as a symptom of skin photo aging/pigmentation associated with ET-1 excess secretion. VC-IP, precursor of vitamin C, showed a brightening effect of aging spots through the suppression of not only oxidative stress induced inflammation process but also ET-1 induced aging sign. More specifically, VC-IP inhibited melanogenesis and dendrite elongation induced by ET-1. Altogether, these results suggested that VC-IP strongly supported highly satisfactory clinical effect on senile lentigo without adverse reaction based on controlling melanocytes-keratinocytes interaction on hyper-pigmentation spots.

Preparation of elastic niosome by polyglycerol fatty acids and skin penetration property.

Molecular assembly with vesicle formation composed of nonionic surfactants is usually called Niosomes. They have been expected as alternative to liposomes in order to improve the liposome problems such as expensive cost, lower physicochemical stability, and so on. From the above background, there are some of reports about the preparation of niosomes, but they prepared the niosomes by using the specific preparation methods such as super critical carbon dioxide. If the preparation methods are improved more easily, the application of niosomes is expand to the industry area. In this study, we developed the niosomes having easy preparation, higher stability, and excellent skin permeability.

As a result of the combination of polyglycerol fatty acids, the niosomes with high stability and small particle size were prepared by using optimal ratio of decaglycerol diisostearate and decaglycerol laurate. And the vesicle formation was confirmed by cryo-TEM. It is considered that higher liquidity of the isostearic acid in the surfactant increase the dispersion ability in the system and help to easily form lamellar membrane structure. In addition, the membrane fluidity improved the niosome's stability.

Finally, the skin permeability of the prepared niosomes with above condition was evaluated by using the 3D skin model. In this result, the prepared niosomes showed higher skin permeability compared with the liposome made by hydrogenated lecithin and the polyglycerol fatty acid aqueous solution. The small vesicle size and the higher membrane fluidity of the prepared niosomes contributed to the above higher skin permeability.

Interactions between melanocytes and neighboring cells: the contribution of fibroblasts to the ethyl linoleate-induced inhibition of melanogenesis.

Interactions between melanocytes and neighboring cells such as keratinocytes and fibroblasts play important roles in regulating human skin color. Previously, it was reported that several paracrine factors derived from neighboring cells regulate melanin synthesis in melanocytes. However, the regulatory mechanisms of interactive communications among these various types of cells are still unclear. The purpose of this study was to elucidate whether the presence of fibroblasts affects melanogenesis using a co-culture system of fibroblasts and melanocytes and a reconstructed 3D epidermis containing melanocytes. Our results showed that the presence of fibroblasts decreased melanin synthesis in co-cultured melanocytes and in melanocytes in the 3D epidermis. Further, we found that the fibroblast-induced inhibitory effect of melanogenesis was diminished when aged fibroblasts were used compared to young fibroblasts and this was confirmed by the altered of tyrosinase levels determined by Western blotting analysis. We then evaluated the effect of ethyl linoleate, a derivative of linoleic acid known as a skin lightening agent that degrades tyrosinase via the ubiquitin proteasome system, on melanin synthesis using the co-culture system composed of melanocytes and fibroblasts. The results revealed that ethyl linoleate remarkably decreased melanogenesis in melanocytes in the presence of fibroblasts, while that inhibitory effect was limited in the absence of fibroblasts. These results suggest that interactions between melanocytes and fibroblasts contribute to the inhibitory effect of ethyl linoleate on melanogenesis.

alpha-gel properties of highly purified mono hexadecyl phosphate arginine/fatty alcohol/water system.

We have already reported that mono hexadecyl phosphate neutralized with arginine (C16MP-Arg) organized very stable alpha-gel structure in the water. In this study, we investigated the effect of adding fatty alcohol into C16MP-Arg/water alpha-gel.

Liquid Crystal and α -gel-Based Emulsion and Soft Gel Formulations for Skin-care.

Unique formulations, soft gel, micro gel dispersion and multilamellar emulsion, were produced using the lamellar liquid crystal and the stable α -gel obtained from L-arginine salt of long-chain monoalkyl phosphates.

Lamellar liquid crystal of L-arginine β -branch-type long-chain monoalkyl phosphate was applied to the preparation of gel-like oil-in-liquid crystal (O/LC) emulsions of high internal phase ratios, and fine O/W emulsions (Figure 1). This liquid crystal emulsification was available for a wide variety of oils of various polarities, and even for silicone oils and perfluoropolyethers. From the phase behavior during emulsification and analysis of the dynamic behavior of the liquid crystal membrane, it is concluded that the unique property of liquid crystal emulsification is attributed to the independence of liquid crystal membrane as a phase against oil and water.

The stable α -gel was formed with L-arginine linear long-chain monoalkyl phosphate. It stabilized the α -gel of mixed system with polar lipids. The stabilization was accomplished by the bulky hydrophilic group showing strong intermolecular interaction which stimulates the molecular association but suppresses the precipitation of β - or γ -crystals. Multilamellar emulsions in which emulsion droplets possess layered structure of α -gel was produced with L-arginine hexadecyl phosphate as the emulsifier. It showed strong skin moisturizing effect in the identical mechanism with intercellular stratum corneum lipids. These formulations are suitable for skin-care products.

Effect of Molecular Assembly for the Emulsion and Gel Formulations.

The significance of molecular assemblies for preparation of functional cosmetic formulation will be reviewed. When a liquid crystal or α -gel phase is formed in an emulsion, the physical properties like stability and the rheology property will change markedly. From the phase behavior during emulsification and analysis of the local motion of the liquid crystal membrane, it was confirmed that the interaction between a surfactant and a polyol molecule such as glycerol promotes hydrogen bonding and enhances the strength of the liquid crystal membrane, which results in the formation of oil-in-liquid crystal (O/LC) emulsions. Though an α -gel is thermodynamically metastable, it can be stabilized by selecting proper molecules and therefore applicable as a cosmetic base.

When a self-organizing artificial stratum corneum lipid containing pseudo-ceramide was used as a principal component of the oil, a multilamellar emulsion of concentric lamellar structure was generated. This multilamellar emulsion supplements the physiological function of the stratum corneum by a similar mechanism as that of the natural intercellular lipids.

Effect of a new lipophilic pro-vitamin C, tetra-isopalmitoyl ascorbic acid (VC-IP), on senile lentigo (aging spot) via controlling of melanocytes-keratinocytes interaction.

Senile lentigo or aging spots are hyperpigmented macules of skin that occur in irregular shapes, appearing most commonly in the sun-exposed areas of the skin such as on the face and back of the hands, and are a common component of photoaged skin. Vitamin C is well known to play an important role in maintaining skin physiology, especially as a skin whitening and blighting agent. We previously demonstrated that a new stable lipophilic pro-vitamin C derivative, tetra-isopalmitoyl ascorbic acid (VC-IP), showed significant suppressive effect for UVB-induced skin pigmentation by conversion into vitamin C in skin tissue. In addition, we reported that VC-IP showed multiple physiological activities represented by scavenging of ROS and reduction of inflammatory cytokines, IL-1 α and PGE2, in keratinocytes. In this study, we evaluated that effectiveness of VC-IP on senile lentigo (aging spot) by conducting clinical test approved by the institutional ethical committee. VC-IP significantly improved brightness of aging spot and skin tone to evenness by mechanical measurements. Moreover, self-assessment study demonstrated that subjects were satisfied with the following parameters; appearance of aged spot, skin brightness, fading of dullness or yellowing and zero adverse reaction. Furthermore, we newly identified that VC-IP strongly suppressed the melanin delivery by inhibition of dendrite elongation stimulated by endothelin-1 in melanocytes-keratinocytes co-culture system. There are still many discussions on how senile lentigo represents in skin, however, these results suggested possibility that VC-IP is effective for improving hyperpigmented spot based on controlling of melanocytes-keratinocytes interaction without any adverse reaction.

Serious eye damage/eye irritation assessment: SkinEthic™ HCE reconstructed human corneal test method relevance and reliability after Asia Pacific region shipment.

Validation and regulatory acceptance of in vitro test methods for serious eye damage/eye irritation are a worldwide priority considering the legislation requirements e.g. REACH, Cosmetics Directive. In response to this need, L'Oréal developed the SkinEthic™ Human Corneal Epithelium (HCE) Eye Irritation Test (EIT), a widely applicable, straightforward and economic method that was validated by the EURL ECVAM in 2016. From the validation study and its independent peer review it was concluded that the SkinEthic™ HCE EIT is able to correctly identify chemicals (both substances and mixtures) not requiring classification and labelling for eye irritation or serious eye damage according to UN GHS. Results generated in the validation study have demonstrated that the SkinEthic™ HCE EIT is transferable and reproducible within (WLR) – and between (BLR) – laboratories in Europe.

In an effort to allow the global use of the test method for chemical categorization and safety assessment, the transferability and reproducibility of the method in Asia Pacific region was evaluated, following an extended shipment. The current study present the validation study conducted in Cosmos Technical Center (Tokyo, Japan) after extended tissues transit in comparison to results obtained in L'Oréal (France).

Briefly, 40 blinded chemicals representing different functional chemical classes were tested. The chemicals provided a balanced set consisting of 7 Cat 1 liquids, 7 Cat1 solids, 6 Cat 2A/Cat 2B liquids, 6 Cat 2A/Cat 2B solids, 7 No Cat liquids and 7 No Cat solids. The WLR of the three independent runs, based on the concordance of predictions (Cat1/Cat2 or Not Classified) was 100% for Cosmos. Thirty nine out of 40 chemicals were consistently classified in Cosmos and sponsor laboratories showing a

BLR of 100% for solids and 95% for liquids. Accuracy obtained by Cosmos' partner was 88.8% with a sensitivity of 100% and a specificity of 67.9% thereby meeting all acceptance criteria for predictive capacity.

Thus, transferability, reliability and relevance of SkinEthic™ HCE EIT test method after extended shipment remain in agreement with regulatory validation criteria consolidating and supporting its integration as a Validated Reference Method in the OECD Test Guideline 492 currently under revision.

2016.11.04 IFSCC 29th Congress Orland, FL 2016

A New Cleansing Booster in Cleansing Lotion Formulations by Promoting Interface Adsorption of Surfactants.

Cleansing products (e.g., make-up removers) have various types of formulation (oil, cream, milk, gel, lotion, and sheet); all these products are required to possess high cleansing ability and comfortable feel. In recent years, cleansing lotions have become increasingly popular among Japanese consumers. Lotions have a comfortable feel and are practically very easy to use; further, since most formulations are water-based, rinsing with water is not required. However, water-based systems have reduced cleansing efficiency because the highly hydrophilic environment has a limit to perform enough wettability against make-up residue. Many studies regarding cleansing from various points have been investigated. In the cleansing process (Fig. 1), it is important to promote greater efficiency at each stage, which is how to promote the complex formation and the desorption and so on. Many studies have focused on STEP 3 or 4. By contrast, the process shown in STEP 2, which is adsorption, the state of bulk and the wetting has not been the subject of much study. In this study, we focused on STEP 2 of the cleansing process by using a new moisturizing agent, PPG-24-GLYCERETH-24. PPG-24-GLYCERETH-24 was investigated to demonstrate the correlation linking its interfacial activities with the boosting effects on the detergency of cleansing lotions containing PPG-24-GLYCERETH-24. We speculate that by using PPG-24-GLYCERETH-24 with detergents, we can obtain a cleansing lotion with higher cleansing ability, because PPG-24-GLYCERETH-24 decreases the surface or interfacial tension and it has the behavior as if promotes the adsorption efficiency of the detergents. It has solvent-like characteristics and does not prevent the interfacial activities of detergents.

2016.11.04 IFSCC 29th Congress Orland, FL 2016

Systematic-quantitative evaluation of sedative effect of an aromatic component, "Rosa damascene", using integrative physiological analysis.

Introduction

Rose damascene is the one of the most popular and common fragrance. Although it has been traditionally used for achievement of sedative effect, there are few reports regarding how it works on the physical and mental relaxation. In general, preference and sensitivity to aromatic compounds should be varied in accordance with gender, race and age, therefore, it has been considered that it is difficult to define the physiological effect of those on relaxation. In this study, we addressed to establish systematic-quantitative evaluation method to identify the mechanism of sedative effect of Rose damascene on physical condition, through focusing on human autonomic and central nerve system by using the integrative physiological technics.

Methods

Peripheral blood flow

Peripheral blood flow of palm was measured by Laser speckle blood flow imager (Zone Pro). Peripheral blood flow of each subject was monitored at before, during and after inhalation of the sample.

Pupillary light response

To evaluate the response of autonomic nervous system, the light reflex of the pupil was measured by pupil measurement instrument (IrisCorder Dual). The changes of pupil diameter (miosis rate) were calculated as a parameter of the autonomic nervous system state. The miosis rate of each subject was monitored at before and after inhalation of the sample.

Brain blood flow

Brain blood flow of prefrontal area was measured by near-infrared spectroscopy (NIRS OEG-16). Brain blood flow of each subject was continuously monitored at before, during and after inhalation of the sample. The average movie images of brain blood flow were composed for measurement of brain blood flow.

Results

It is well known that there is a correlation between physical and mental relaxation and the increasing of blood flow. Therefore, firstly, we evaluated the effect of Rose damascene on peripheral blood flow. Palm blood flow was promptly increased during Rose damascene inhalation, and this state was continued after odor inhalation. Secondly, we evaluated the effect of Rose damascene on the pupillary light response and blood flow of prefrontal area of brain, as a respective parameter of autonomic and central nerve system response. The miosis rate was drastically increased by inhalation of Rose damascene. Brain blood flow of imaging analysis indicated that the center and the right fields of blood flow on prefrontal area were specifically decreased by odor inhalation.

Discussion and Conclusion

In this study, we investigated the mechanism of sedative effect of Rose damascene by integrative physiological technics. The increasing of peripheral blood flow was eventually induced by suppression of sympathetic nerve system by Rose damascene inhalation. The significant increase of miosis ratio by odor inhalation suggests that autonomic nerve activity shifts to parasympathetic nervous system dominant. A significant decrease of blood flow in the right from the center field of brain prefrontal area suggested the function of sympathetic nerve system suppressed by Rose damascene inhalation. These sequential results strongly suggest that the sedative effect of Rose damascene appears by suppressing sympathetic nerve system. These findings contribute to the objective development of personal care product containing of an aromatic components, regardless of the preference or sensitivity.

2016.11.02 IFSCC 29th Congress Orland, FL 2016

INFLUENCE OF ANTIOXIDANT-BASED COSMETIC FORMULATIONS ON SKIN INFLAMMATORY RESPONSE .

Skin inflammation is a fundamental and beneficial response to initiate the healing process aiming to restore skin homeostasis. During the early inflammatory phase, ROS are generated, and at high concentrations, ROS can induce severe tissue damage, which disrupts the cutaneous barrier. The epidermis is composed mainly of keratinocytes, and it is rich in ROS detoxifying enzymes, such as superoxide dismutase, catalase, thioredoxin reductase, and glutathione peroxidase. The epidermis is also rich in antioxidant molecules, such as tocopherol, glutathione, and ascorbic acid. The combination of these natural antioxidants provides some natural protection against oxidative stress.

Several studies clearly demonstrate protective effects of antioxidants when administered to cultured cells or applied to animals. However, it is valuable to consider the antioxidant capacity of the whole stratum corneum, and the possible interactions with other biomolecules and baseline antioxidants content.

The cardinal signs of inflammation are redness, heat, pain, swelling and loss of function of the inflamed tissue. Some of them can be measured using skin biophysical techniques and Reflectance Confocal Microscopy (RCM). By non invasive measurements, biophysical techniques and RCM allow for real time way to observe the superficial layers of the skin and their healing after skin inflammation³. In this context, the combination of these techniques contributes to the better understanding of the role of exogenous antioxidants in the skin inflammatory process.

2015.12.21 Pacifichem 2015

The potential of microalgae as a novel cosmetic ingredient.

In nutraceuticals and functional foods, microalgae are targeted as a novel nutrition, and they are appealing as a next generation natural source. Various microalgal components have been found to have a good physiological and/or helpful effect for nutrition. Specifically, omega-3 fatty acids and carotenoids are attracting attention for functional lipids reported to show many bioactive effects as such as antioxidant, anti-aging and so on. As such, they are considered to use as a nutritional food or cosmetics.

Cosmos Technical Center Co., Ltd. is a group company and R&D center of Nikko Chemicals Co., Ltd. that currently has been developing a novel cosmetic ingredient. And so, we aim to develop an application of cosmetics from microalgae focused on stable extraction of functional lipids with anti-oxidation ability. Various solvents based on polarities were tested to extract the functional lipids from biomass representing several strains including Chlorophytes and Rhodophytes, with the result that triglyceride, ester oil and hydrocarbon were effective, on the other hand, ethanol and 1,3-butanediol were not effective. Notably, squalane (NIKKOL Sugar Squalane provided by Nikko Chemicals) could be extracted most efficiently (20% higher yield over other solvents) and with best stability over a 4-week test period at 25° C. Moreover, the extract of squalane was confirmed to possess high antioxidant activity by singlet oxygen quenching evaluation. It was concluded that marine algal squalane extract could be directly used as a cosmetic ingredient for an antioxidant cream and/or hair oil mist.

2015.10.05 Development of Cosmetic Ingredients from Microalgae

Development of Cosmetic Ingredients from Microalgae.

In the oleochemical industry, microalgae are targeted as a novel oil raw material, and they are appealing as a next generation natural source. Various microalgal components have been found to have a good physiological and/or helpful effect for nutrition. Especially, omega-3 fatty acids and carotenoids are attracting attention as functional lipids reported to show many bioactive effect as such as antioxidant, anti-aging and so on. As such, they are considered to use as a nutritional food or cosmetics.

Nikko Chemicals Co., Ltd. has been developing, manufacturing and selling cosmetic ingredients over 60 years. Cosmos Technical Center Co., Ltd. is a group company and R&D division of Nikko Chemicals that currently has been developing a novel cosmetic ingredient under GCS+E strategy. GCS+E means green, clean and sustainable plus economical. And so, we aim to develop an application of cosmetics from microalgae focused on stable extraction of functional lipids with anti-oxidation ability. Various solvents

based on polarities were tested to extract the functional lipids from biomass representing several strains including Chlorophytes and Rhodophytes, with the result that triglyceride, ester oil and hydrocarbon were effective. Notably, sugar squalane could be extracted most efficiently (20% higher yield over other solvents) and with best stability over a 4-week test period at 25° C. Moreover, the extract of sugar squalane was confirmed to possess high antioxidant activity by singlet oxygen quenching evaluation. It was concluded that marine algal sugar squalane extract (we named “NIKKOL GS-Alohalge-SSQ”) could be directly used as a cosmetic ingredient for an antioxidant cream or hair oil mist.

2015.06.01 The Korean Society of Pharmaceutical Science and Technology

Basic Properties of SAA and their Applications.

Surfactants and oils are commonly used in many kinds of industrial fields such as cosmetics, personal care items and pharmaceutical topical agents. In these fields, because these products would be used for human skin, safety, efficacy and formulation techniques are required from manufacturer and consumer. NIKKOL GROUP runs the wide business in such fields for a long time. We have a lot of knowledge about emulsification and solubilization technology.

In this time, we would like to introduce the emulsification and solubilization technology for preparing a good product with good texture and high stability.

2015.05.01 12th Biannual Conference of the Asian Societies of Cosmetic Scientists

A possible role of apoptosis associated serine proteinase, HtrA1, in the maintenance of a homeostasis of skin epidermis.

HtrA1 is serine protease which has been identified in the epidermis. Although the precise function of HtrA1 in the epidermis is still unclear, some reports have suggested that HtrA1 is involved in programmed cell death, apoptosis and anoikis. On the other hand, it is generally known that excess apoptosis caused by UVB exposure is involved in the accumulation of cell damage in the skin epidermis, and it adversely affects skin epidermis homeostasis that causes chronic cell inflammation and parakeratosis. However, the precise mechanism underlying how UVB induced apoptosis adversely affects epidermal alterations has not been elucidated. This study aims to clarify the behaviour of HtrA1 in the apoptosis of epidermal cells induced by UVB exposure. In this study, we identified that HtrA1 plays a dominant role in the initiation of epidermal cell apoptosis specifically induced by UVB. The overproduction of representative inflammatory substances, IL-1 α , PGE2 and VEGF was associated with a high level of HtrA1 followed by UVB exposure in the epidermal keratinocyte. Furthermore, Japanese maple extract, a potent inhibitor of HtrA1 we found through this study, showed efficacy in inhibiting UVB-induced apoptosis and VEGF overproduction. Clinical evaluation revealed that topical application of this novel extract prevented skin redness and decreased the number of pores, which are associated with alterations of homeostasis in the skin epidermis.

THE DEVELOPMENT OF NEW W/O EMULSION WHICH HAS LIQUID-CRYSTALIZED WATER PHASE AND ITS SUPERIOR SKIN CARE EFFECT

Long chain mono alkyl phosphates were investigated to demonstrate formation of self-assemblies. In this study, we focused on the β -branched mono hexyldecyl phosphate and found that the salt of β -branched mono hexyldecyl phosphate neutralized with L-arginine (R6R10MP-Arg) formed unique self-assemblies in aqueous system spontaneously. R6R10MP-Arg organized into lamellar liquid crystal structures and stable vesicles at various concentrations and temperatures. These structures were confirmed by polarized microscope, DSC, SAXS, and TEM. The ternary phase diagram of R6R10MP-Arg/Water/Oil was drawn at 25 ° C. Based on its properties, a unique type of W/O (Water-in-Oil) emulsions containing liquid-crystalline structures (called spherulites) was prepared. This W/O emulsions would be performed higher moisturizing efficacy and the other cosmetic functions as well.

A new strategy for improvement of skin radiance by inhibition of MCP-1 overproduction associated with AGEs accumulation.

Radiant skin can be attributed to different parts of the skin but is commonly known to be affected by skin subsurface substances, melanin. The amount of melanin relates to the appearance of brown spots, hyperpigmentation and uneven skin tone. It has been reported that advanced glycation end products (AGEs), which are characterized by a fluorescent brownish color, are deposited in the dermal matrix with age. Because of AGE's characteristics, the direct contribution of AGEs to the discoloration of aged skin has been a topic for many years. We previously studied on the possibility that the AGEs acts as a physiological substance, and not as a pigment in the skin. In past study, we demonstrated that the accumulation of AGEs triggered induction of specific substance, monocyte chemoattractant protein-1 (MCP-1), from normal human dermal fibroblasts, which increase tyrosinase production in normal human melanocytes. However, the precise mechanism underlying how MCP-1 stimulates the melanogenesis of normal human melanocytes has not been elucidated. This study aims to clarify the pathway of melanogenesis triggered by a new endogenous substance, MCP-1, associated with accumulation of AGEs, as well as usefulness of Japanese PRUNUS MUME FRUIT EXTRACT, as a potent degradation agent of AGEs found on skin.

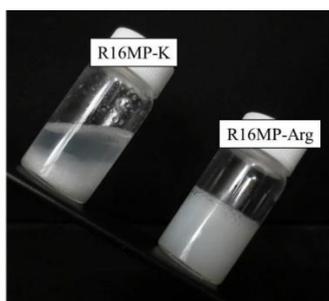
The possible involvement of skin dryness on alterations of the dermal matrix.

Moisturization of the skin plays an important role in maintaining skin homeostasis. Although it is understood that skin dryness initiates the formation of fine wrinkles, there are few objective reports to support that understanding. The purpose of this study was to establish an in vitro dry epidermal model using reconstructed human epidermal equivalents (RHEEs) and to elucidate the relationship between skin dryness and alterations of the dermal matrix which is one of the causes for the formation of wrinkles. An in vitro dry epidermal model was prepared by loading a CaCl₂-filled ampoule on the surface of an RHEE. To evaluate whether the in vitro model reproduced the characteristics of in vivo skin dryness, histological studies and biological assays using a protein array were carried out. Histologically, a distinct fluorescence which originated from carbonylated protein was observed in the stratum corneum. In addition, conditioned medium from RHEEs cultured under dry conditions for 24 h revealed the secretion of several proteins, such as IL-1 α , IL-1ra, IL-8, MMP-9, VEGF, M-CSF and IGFBP-2 and IGFBP-3, galectin-1, Cys-C, FGF-6, OPG, Glc and TSP4 compared with normal RHEEs. It has been reported that an increase in IL-1 α and the accumulation of carbonylated proteins are observed in the intact stratum corneum in the low humidity winter season. Thus, the in vitro dry epidermal model expresses the features of in vivo skin dryness observed in the winter season. Furthermore, the conditioned medium from RHEEs cultured under dry conditions enhanced MMP-1 secretion by normal human dermal fibroblasts. Taken together, we propose the hypothesis that skin dryness contributes to alterations of the dermal matrix through the elevation of MMP-1 secretion.

Discovery of the stable α -gel formation generated by the highly purified mono alkyl phosphates

An α -gel is one of self-assemblies obtained by a surfactant. However, because of their unstable properties, α -gels have not been investigated actively and the improvement methods to increase its stability have not been studied.

Long chain mono alkyl phosphates were investigated to demonstrate formation of self-assemblies. In this study, we revealed that hexadecyl phosphate neutralized with L-arginine (R16MP-Arg) has very unique self-assembling behavior in the aqueous system. On the DSC measurement, the krafft temperature (T_c) of this material in the water was observed around 50 – 60 C. However, on the visual observation, the aqueous solution of this material remained gel-like structure even below the T_c . Its association structures were lamellar structure conformed by SAXS. In addition, spontaneous swelling was observed below the T_c without heating and shaking. These results were suggested that R16MP-Arg has different aqueous behaviors compared to other common ionic surfactant. It is considered that R16MP-Arg could form a stable “ α -gel” thermodynamically below the T_c .



R16MP-K : Hexadecyl phosphate neutralized with KOH
R16MP-Arg : Hexadecyl phosphate neutralized with L-Arginine