American Journal of
Experimental and Clinical Research

Am J Exp Clin Res 2019;6(3):359-363

Original Article

Effect of milk cleansing and all-in-one serum on the facial skin

Hirohisa Kojima[1], Michihiro Mori[2], Jun Matsuyama MD[3]*
[1]*TFC Lab Co., Ltd. 2-4-5 Kita Koenji, Suginami-ku, Tokyo, Japan*
[2]*Anynext Inc., 176-10 Sanwa, Furukawa city, Ibaraki, Japan*
[3]*Medical Corp. Shojyu-Kai Matsuyama Hospital, Ohtemachi, Maebashi-City, Gunma, Japan*

Abstract. The goal of this study is to assess reduction in dirt accumulation in pores, improving crow's feet, moisture content, elasticity, and lightness of the skin through the combined use of two skincare products, cleansing milk and all-in-one serum. All 14 participants (mean age: 45.0±4.8) completed their course of study. As they neither experienced any adverse events nor became ineligible for subsequent assessment, the results from all the 14 participants were subjected to analysis. As for the objective indexes of skin conditions, the 6-week intervention significantly lowered crow's feet score (1.8 to 1.4) in the applied group. Moreover, significant improvement was observed in cheek pore condition (3.0 to 3.4), nostril pore condition (3.0 to 3.5), and skin elasticity (0.6 to 0.8). Meanwhile, the other group with no product application did not show statistically significant changes in crow's feet score, cheek pore condition, and skin elasticity. Furthermore, nostril pore condition became worse; the applied group showed improvement while for the unapplied group it remained unchanged or became worse. There was a statistically significant difference in the scores between the groups. No statistically significant difference was found in moisture content during the study period for the applied group, while moisture content dropped significantly in the unapplied group. With regards to moisture loss, the intervention caused neither within-group variation nor inter-group differences. In the subjective indexes of skin conditions, Crow's feet score in the applied group showed improvement (2.5 to 3.2) while its score in the unapplied group decreased; the change in this score significantly differed between the two groups. In the applied group, the score for each item increased significantly, showing improvement in the corresponding skin condition (dirt from pores (2.2 to 3.3), enlarged pores (1.9 to 3.0), skin lightening (2.4 to 3.2), skin firmness (2.3 to 3.2), skin dryness (1.8 to 3.5), and flawless makeup application (2.2 to 3.6)). In the unapplied group, those scores showed little change before and after the intervention. Intergroup comparison revealed that a feet, skin moisture content, elasticity, and lightness in all the subjective indexes in the applied group were significantly improved compared to those in the unapplied group. We suggest that the combined use of the milk cleansing and the all-in-one serum for six weeks reduces dirt accumulation in pores, enlarged pores, improves crow's feet, skin moisture content, elasticity, and lightness in healthy Japanese women.

Keywords: Milk cleansing, all-in-one serum, facial skin, skincare

Introduction

Majority of women (80%) are known to have considerable interest in beauty care, and for 60.1% of them ageing-related skin changes are the main cause for worry [1]. Skin troubles have been categorized into wrinkles, pores, dryness, firmness, elasticity, dullness, spots, and flawless makeup application. Various approaches have been proposed for skincare. Beauty magazines present information on diverse strategies against skin aging. This ranges from skincare methods and products, functional cosmetics, anti-aging cosmetics, massage, and amendments to daily habits including smoking and sleep. Some authors point out that the enormous amount of media coverage on skincare is causing people to misunderstand appropriate skin care routines [2]. Moreover, in modern times, there is increased demand for simple skincare products that can be used on a regular basis to alleviate skin troubles. Therefore, we conducted a study to assess the effect of a six-week skincare regimen which included using a basic facial cleansing "Milk Cleansing" and a skincare product "All-in-one Serum".

The goal of this study was to assess reduction in dirt accumulation in pores, improvement of crow's feet, moisture content, elasticity, and lightness of the skin through the combined use of the two skincare products; cleansing milk and all-in-one serum.

Materials and Methods

This study was conducted using the half-face test, and

* Corresponding author: Jun Matsuyama, MD
(youngerjp1@yahoo.co.jp).

Figure 1 Milk cleansing product A and all-in-one serum product B.

TABLE 1
LIST OF INGREDIENTS IN THE MILK CLEANSING

Mineral oil, Water, BG, Cetyl Ethylhexanoate, Triethylhexanoin, Tocopherol, 3-O-ethylascorbic Acid, Ceramide NP, Jojoba Seed Oil, Squalane, Aphanothece Sacrum Polysaccharide, Mesembryanthemum crystallinum Juice, Sedum rosea Root Extract, Aloe barbadensis Leaf Extract, Sodium Dilauramidoglutamide Lysine, Lactobacillus/Milk Ferment Filtrate, Carbomer, Sodium Hydroxide, Methylparaben, Pentylene Glycol, Cananga odorata Flower Oil, Citrus aurantium var. Dulcis (Orange) Peel Oil, Citrus grandis (Grapefruit) Peel Oil, Coriandrum sativum (Coriander) Fruit Oil, Citrus nobilis (Mandarin Orange) Peel Oil, Pelargonium graveolens Oil, Vetiveria zizanoides Root Oil, Ocimum basilicum (Vasil) Oil, Lavandula angustifolia (Lavender) Oil.

TABLE 2
LIST OF INGREDIENTS IN ALL-IN-ONE SERUM

L-Ascorbic Acid 2-Glucoside, Dipotassium Glycyrrhizinate, Hydrolyzed Hyaluronic Acid, Sodium Dilauramidoglutamide Lysine Solution, *Alpinia katsumadai* Seed Extract, Neem Leaf Extract, *Aesculus hippocastanum* (Horse Chestnut) Extract, *Paeonia lactiflora* Extract, *Cynara scolymus* (Artichoke) Extract, *Impatiens balsamina* Flower/Leaf/Stem Extract, Squalane, Methyl Polysiloxane, Methyl Siloxane Network Polymer, Polyoxyethylene Hydrogenated Castor Oil, Polyoxyethylene Coconut Oil Fatty Acid Sorbitan (20E.O.), Xanthan Gum, Acrylates/Alkyl Acrylate Crosspolymer, Potassium Hydroxide, Citric Acid, Sodium Citrate, Diethylenetriamine-pentaacetic Acid Pentasodium Salt Solution, Methyl p-Hydroxybenzoate, Ethanol, 1,3-Butylene Glycol, Purified Water, Aroma Chemicals.

the test products were applied to the left side of the subject's face while the right side of the face was undisturbed.

Participants in the study

Participants in the study were 14 healthy Japanese women aged between 35 and 59, who satisfied the selection criteria, volunteered to be a test subject, and gave written consent to participate in this study after being sufficiently informed of the details. Skin conditions at week 0 and week 6 were evaluated in the groups with and without application of the skincare products, milk cleansing (product A) and all-in-one serum (product B) respectively.

Selection criteria included:

1. Age: not younger than 35 and not older than 59 (at the time of receiving consent)
2. Gender: woman
3. Healthy person: a healthy person in this study defines someone who neither has a serious organ disorder or a specified disease nor is receiving treatment for that or any other medication. Whether a volunteer was healthy was determined based on their report at the start of the study.
4. A person who had no plan to change their daily habits during the study period.
5. A person who was bothered by dirt accumulation in pores, crow's feet, dryness, and firmness of the skin.
6. A person who could give written consent.

TABLE 3
STUDY SCHEDULE

Item	Before study	Week 0	Week 6	Follow-up
Screening	○			
Informing for consent and acquisition of written informed consent		○		
Skin measurement		○	○	
Questionnaire		○	○	
Adverse events		○	○	○

TABLE 4
CHANGE IN OBJECTIVE INDEXES OF SKIN CONDITIONS

Index	Group	Measured value		Within-group comparison p value	Inter-group comparison p value
		0 w	6 w		
Crow's feet (score)	Applied	1.8±0.5	1.4±0.4	<0.01	<0.01
	Unapplied	1.7±0.5	1.8±0.5	0.16	
Cheek pore condition (score)	Applied	3.0±0.0	3.4±0.5	0.02	<0.01
	Unapplied	3.0±0.0	2.9±0.3	0.34	
Nostril pore condition (score)	Applied	3.0±0.0	3.5±0.5	<0.01	<0.01
	Unapplied	3.0±0.0	2.6±0.5	0.02	
Moisture content (index)	Applied	49.3±9.9	52.6±14.2	0.31	<0.01
	Unapplied	50.4±16.0	32.2±13.3	<0.01	
Moisture loss ($g/h/m^2$)	Applied	14.5±4.2	13.8±3.2	0.47	0.34
	Unapplied	15.1±4.1	15.7±4.8	0.53	
Skin elasticity (R2%)	Applied	0.6±0.1	0.8±0.1	<0.01	0.01
	Unapplied	0.6±0.1	0.7±0.1	0.09	

TABLE 5
CHANGE IN OBJECTIVE INDEXES

Index	Group	Measured value		Within-group comparison p value	Inter-group comparison p value
		0 weeks	6 weeks		
Crow's feet	Applied	2.58±0.7	3.2±0.7	<0.01	<0.01
	Unapplied	2.6±0.5	2.2±0.6	0.05	
Dirt from pores	Applied	2.2±0.7	3.3±0.8	<0.01	<0.01
	Unapplied	2.3±0.6	2.1±0.7	0.27	
Enlarged pores	Applied	1.9±0.5	3±0.9	<0.01	<0.01
	Unapplied	2.0±0.6	2±0.7	1	
Skin lightening	Applied	2.4±0.6	3.2±1	<0.01	<0.01
	Unapplied	2.4±0.6	2.2±0.8	0.16	
Skin firmness	Applied	2.3±0.7	3.2±1.1	<0.01	<0.01
	Unapplied	2.3±0.7	1.9±0.7	0.05	
Skin dryness	Applied	1.8±0.6	3.5±0.8	<0.01	0.01
	Unapplied	1.8±0.6	1.6±0.6	0.43	
Flawless makeup application	Applied	2.2±0.6	3.6±0.7	<0.01	<0.01
	Unapplied	2.2±0.6	1.9±0.8	0.17	

Products under evaluation

The test products were "Milk Cleansing" (Fig. 1) and "All-in-one Serum" (Fig. 2). Table 1 and Table 2 show the ingredients of "Milk Cleansing" and "All-in-one Serum," respectively.

The participants performed the following steps every night: The product A was dispensed onto the dry hand by pressing down the pump head twice. Then, it was applied to the left side of the face. This was followed by rinsing with water or lukewarm water, massaging around the nostril and cheek in a circular motion. Skip follow up, face-washing after rinsing, and then the product B was dispensed onto the hand by pressing down the top of the bottle twice, and was applied to the left side of the face. The additional product B was applied to crow's feet and visibly dry areas. In the morning, they washed their faces with water or lukewarm water, and they applied the product B in the same manner as previously described.

Study period

The study was conducted for 6 weeks from November 15 to December 27, 2018. Table 3 shows the study schedule.

Assessment method

Measurement environment

The measurement room used was able to maintain certain environmental conditions (temperature, humidity, and lighting), which were kept unchanged throughout the study. Temperature and humidity were kept at 20±2°C and 50±5%, respectively. During the study, the subjects washed their faces using the same cleansing and facial wash, and then acclimatized the faces to the environment for 15 minutes. They were prohibited from touching their face during acclimatization. After acclimatization, the evaluation parameters were measured.

Measuring instruments and method

The corners of both eyes, cheek pores, and nostril pores were photographed with VISIA-Evolution2 (Canfield Scientific). Then, skin moisture, firmness, and moisture loss were measured using Corneometer CM825 (Courage + Khazaka), Cutometer DUAL MPA580 (Courage + Khazaka), and Tewameter TM300 (Courage + Khazaka), respectively. They were measured at the point where the vertical line from the corner of the eye and the horizontal line from the nostril intersect.

Evaluation items

The image of crow's feet was assessed based on the wrinkle grading scale in the Guidelines for Evaluation of Anti-wrinkle products[3-4]. Visual evaluation was performed by a dermatologist or a researcher who could make the same level of evaluation. "Dirt from cheek/nostril pores" were rated on a 5-point scale (1. worsened, 2. slightly worsened, 3. unchanged, 4. slightly improved, 5. improved). Skin moisture was evaluated based on the measured values of moisture content, and skin firmness based on the measured values of skin elasticity and moisture loss. Using questionnaires self-completed by the subjects, 7 items (crow's feet, dirt from pores, enlarged pores, skin lightening, skin firmness, skin dryness, and flawless makeup application) were rated on a 5-point scale (1. bad, 2. relatively bad, 3. average, 4. relatively good, 5. good).

Statistical analysis

The data were summarized with descriptive statistics. Paired *t*-test was performed to compare temporal changes before and after application. Unpaired *t*-test was performed for comparison between the groups. Significance level was set at 5%.

Research ethics

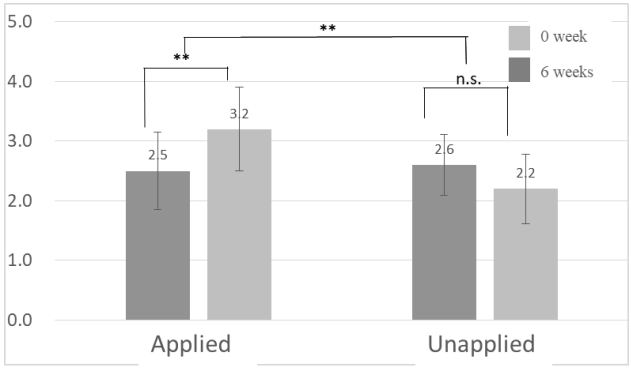
This study was conducted in accordance with the Helsinki Declaration and after informing the subjects of the purpose and method of this study and receiving their written informed consent under the approval of the ethical review committee of Jikoukai Fukuzumi Medical Clinic (Chairman: Fumitake Hata).

Results

All 14 participants completed their course of study (mean age: 45.0±4.8). As they neither experienced any adverse events nor became ineligible for subsequent assessment, the results from all the 14 participants were subjected to analysis. Change in objective indexes of skin condition are shown in Table 4. The 6-week intervention significantly lowered crow's feet score (1.8 to 1.4) in the applied group. Moreover, significant improvement was observed in cheek pore condition (3.0 to 3.4), nostril pore condition (3.0 to 3.5), and skin elasticity (0.6 to 0.8). Meanwhile, the other group with no product application did not show statistically significant changes in crow's feet score, cheek pore condition, and skin elasticity. Furthermore, nostril pore condition became worse; the applied group showed improvement while for the unapplied group it remained unchanged or became worse. There was a statistically significant difference in the scores between the groups.

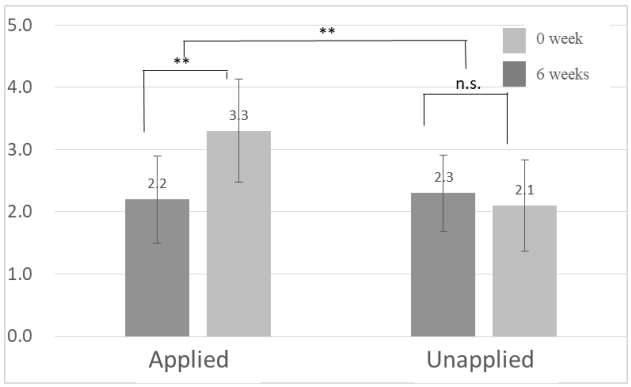
No statistically significant difference was found in moisture content during the study period for the applied group, while moisture content dropped significantly in the unapplied group. With regards to moisture loss, the intervention caused neither within-group variation nor inter-group differences.

Change in subjective indexes of skin conditions are demonstrated in Table 5, and Figs. 3 to 9. Crow's feet score in the applied group showed improvement (2.5→3.2) while its score in the unapplied group decreased; the change in this score significantly differed between the two groups (Fig. 3). In the applied group, the score for each item increased significantly, showing improvement in the corresponding skin conditions [dirt from pores (2.2→3.3), enlarged pores (1.9→3.0), skin lightening (2.4→3.2), skin firmness (2.3→3.2), skin dryness (1.8→3.5), and flawless makeup application (2.2→3.6)]. In the unapplied group, those scores showed little change before and after the intervention. Intergroup comparison revealed that all the subjective indexes in the applied group were significantly improved compared to those in the unapplied group.



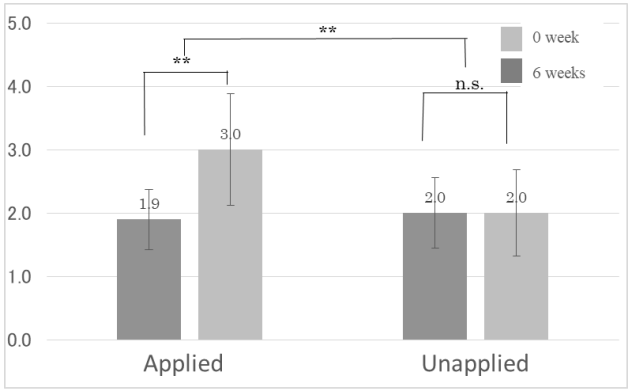
**: $p < 0.01$; n.s.: $p \geq 0.05$.

Figure 3 Crow's feet.



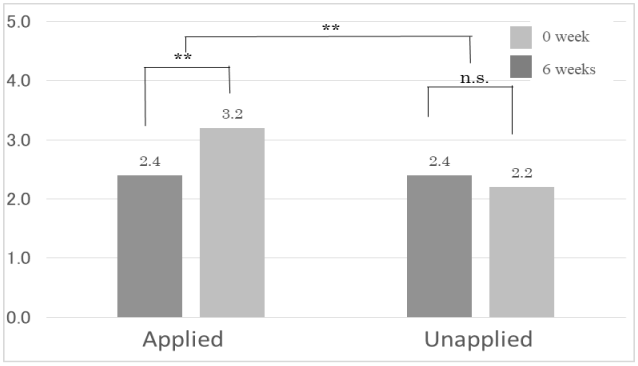
**: $p < 0.01$; n.s.: $p \geq 0.05$.

Figure 4 Dirt from pores.



**: $p < 0.01$; n.s.: $p \geq 0.05$.

Figure 5 Enlarged pores.



**: $p < 0.01$; n.s.: $p \geq 0.05$.

Figure 6 Skin lightening.

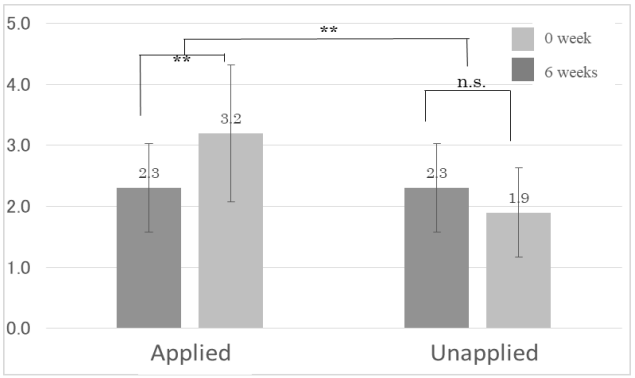
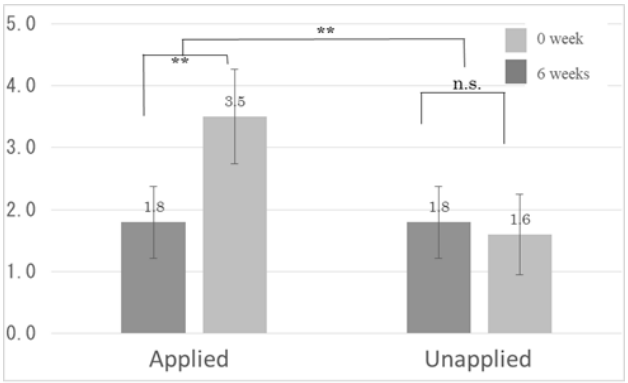


Figure 7 Skin firmness. **: $p < 0.01$; n.s.: $p \geq 0.05$.



**: $p < 0.01$; n.s.: $p \geq 0.05$.

Figure 8 Skin dryness.

Discussion

This study was conducted in the age groups that experience age-related changes in the skin. It has been reported that nearly 90% of women follow anti-aging skin-care practices [1]. "Smile line" and "crow's feet" are especially regarded as a sign of aging that women check for [5]. There is growing demand for cosmetics with anti-aging effects such as skin aging prevention and wrinkle improvement, and functional and medicated cosmetics are highly popular [6]. Development of antiaging cosmetics is also an active area of research [7-9]. Although many women practice lift care, 87% of them do not think they have benefitted from it [5], yet they often continue the care without a tangible effect. Therefore, appropriate choice of skin care products and following correct skincare practices is expected to improve the effects of skin aging.

In this study involving 14 healthy Japanese women aged between 35 and 59, change in skin condition following the combined use of product A and product B for six weeks was measured through the half-face method. The intervention improved crow's feet score, pores on cheek and nostril, and skin elasticity compared to those before using the test

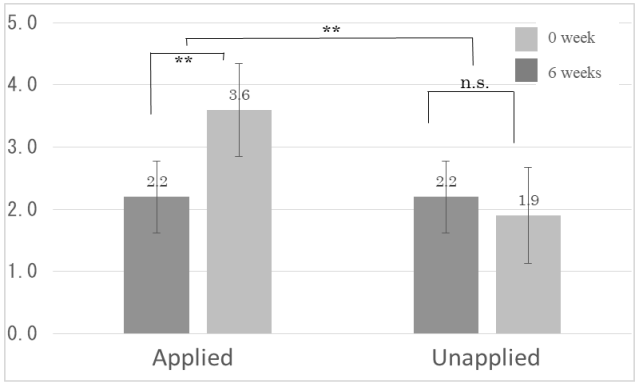


Figure 9 Flawless makeup application

products. The scores for different skin conditions showed a statistically significant difference compared to those for the unapplied skin. This indicates that the intervention helped in the alleviation of wrinkles and enlarged pores and improved skin elasticity, thereby controlling the effects of age-related changes to the skin. In addition, while moisture content decreased in the unapplied group, it was unchanged in the applied group, suggesting that the moisture content of skin was also maintained by the application.

According to the answers in the questionnaires self-completed by the subjects, they consider that their crow's feet, dirt accumulation in pores and enlarged pores improved compared to those before using the test products. Wrinkles and pores, which are regarded as signs of aging, were alleviated. The respondents also feel that skin lightening, skin firmness, and skin dryness were better than those before using the test products. They also acknowledged flawless makeup application as an effect of the intervention. It was confirmed that the reported changes were statistically significant between the two groups. Therefore, we believe that the intervention worked effectively. This indicates that the combined use of the product A "milk cleansing" and the product B "all-in-one serum" would result in the reduction of dirt accumulation in pores, enlarged pores, improve crow's feet, moisture content, elasticity, and lightness. According to the subjective survey among the subjects, they clearly detected the changes. Therefore, it is believed that the test products are skin care items which are healthy on the skin and will achieve customer satisfaction.

Conclusion

We suggest that the combined use of the milk cleansing and the all-in-one serum for six weeks reduces dirt accumulation in pores, enlarged pores, improves crow's feet, skin moisture content, elasticity, and lightness in healthy Japanese women.

Conflict of interest

Collaborating research institutes, contractors, and implementing agency involved in this study declare no conflicts of interest.

References

1. Oragepage Life Forecast "Skin Problems" survey. News Release on January 16, 2018. The Orangepage Inc. http://ww.orangepage.net/attachments/uploads/top_informations/attachment/0000000163/20180111154501.pdf (Latest access: February 14, 2019).

2. Konishi N. Treatment of dilated pores in the ladies clinic of the department of dermatology in Kinki university hospital," J. Soc. Cosmet Chem Jpn. 42:89-93, 2008. (Increasing pore complex and importance of skin care)

3. Guideline for Evaluation of Anti-wrinkle Products. Task Force Committee for Evaluation of Anti-aging Function. Journal of Japanese Cosmet Sci Soc 30:316-332, 2006.

4. Hayashi S, Takiwaki H. Establishment of Anti-wrinkle effect evaluation method and its problems, Fragrance Journal 27: 32-43, 1999.

5. Panasonic's Conscious/Fact-finding Survey on "The mean age to become conscious of facial aging signs." Press release on October 22, 2018. Panasonic Consumer Marketing Co., Ltd. Japan Headquarter. https://prtimes.jp/main/html/rd/p/000000182.000024101.html (Latest access: February 10, 2019)

6. Japan Cosmetic Industry Association. "Cosmetics statistics: Cosmetics and cosmeceuticals" https://www.jcia.org/user/statistics/cosmeceuticals. Latest access: February 14, 2019.

7. Naganohara R. Growing market. Increasing new entrants into anti-aging cosmetics market from other business sectors. Economist 88:42-43, 2010.

8. Horii H. "Anti-aging" cosmetic market—its history as ingredient race and departure from that. Cosmetic Stage 3:23-27, 2009.

9. Maeda K. Research and Development of Anti-aging Cosmetics Learning from Cosmetic Medicine. Fine Chemical 43:6-12, 2014.