

## **Literature List**

### **Skin-Colorimeter**

*T. Zhang, Y. Liu, Y. Xu, Y. Ma, 4-n-butylresorcinol, licochalcone A and glabridin combination and formulation for the enhancement of whitening efficacy on both cellular and consumer panel test, Presentation at 34rd IFSCC Congress, Iguazu, Brazil, 14-17 October 2024*

Nowadays, consumers are more and more eager to require the skin whitening products to be effectively improve the skin darkness while have less tendency of skin irritation. To develop such a product, the active skin whitening ingredients and their combinations are highly required to be selected and further investigated. Herein we have developed an active combination with 4-n-butylresorcinol together with licochalcone A and glabridin targeting for an effective skin whitening with better skin tolerance. 4-n-butylresorcinol is recognized as an effective skin whitening agent for inhibition of the tyrosinase activity. licochalcone A were well-known for its skin inflammation inhibition property while glabridin has both skin whitening and good skin tolerance. The in-vitro experiments allowed us to find out the optimum ratio of 4-n-butylresorcinol, licochalcone A and glabridin to be a molar ratio of 5:1:1 which has the best inhibition effect for both tyrosinase activity and melanin content. The skin whitening formula containing 5:1:1 molar ratio of 4-n-butylresorcinol, licochalcone A and glabridin can inhibit the melanin distribution caused by UVB in 3D skin model and suppressing pigmentation based on the zebrafish test. In addition, a new clinical model with panelists from China with skin Fitzpatrick type III - IV was constructed by exposing to both UV and blue light to introduce skin tanning. The clinical efficacy of the skin whitening formulation containing the 5:1:1 molar ratio of 4-n-butylresorcinol, licochalcone A and glabridin combination was further evaluated. After 4 days of product usage, the UVA plus blue light induced skin pigmentation can be prevented significantly. In addition, via the sensitive skin patch test, all the 33 panelists showed in negative reaction which proved that the skin whitening formulation containing the combination is safe to use even on the sensitive skin. What's more, the skin whitening efficacy test for the long-term product usage of 56 days for 31 panelists were also investigated. All the 31 panelists showed improvement in terms of skin whitening effect without noticing any irritation or stinging effect. In conclusion, our skin whitening composition and formulation solution have powerful whitening efficacy without any noticing of skin irritation which can be potentially applied to treat skin pigmentation.

*Z. Zhou, Q. Meng, S. Xi, Q. Zhou, H. Meng, F. Yi, H. Ren, Y. Du, New thinking on the Facial Skin aging stage in a Chinese female population aged 18-60, Presentation at 34rd IFSCC Congress, Iguazu, Brazil, 14-17 October 2024*

Background: Facial skin is exposed to the environment, which is characterized by obvious signs of aging. Based on multi-dimensional non-invasive evaluation data, female facial skin can be characterized. However, there are few studies on the general aging rules of facial skin that changes with age. Moreover, most studies divide the aging age group according to 5/10 years old, which lacks dynamic matching with facial skin aging. Aim: Explore facial skin aging rules, discuss the main parameters of facial skin aging, propose an unequal-distance aging division method with age based on the main parameters, and study the skin characteristics of different aging stages. Methods: We comprehensively described the skin status from five dimensions (24 non-invasive skin parameters) including skin wrinkles, texture, stain, color and barrier, and performed polynomial fitting on 21 skin parameters that were significantly related to age, and got the rules of aging in different dimensions. Based on the wrinkle dimension, the facial skin aging process was divided into four stages, and the skin characteristics of different stages were analyzed. Results: Skin wrinkles increased, texture deteriorated, acne decreased, pigment spots increased, skin tone darkened, and sebum secretion decreased with age based on polynomial fitting. The aging stage was divided into incubation period (18-30 years old),

aging occurrence period (31-42 years old), rapid aging period (43-47 years old), and stable aging period (48-60 years old) according to wrinkles. And different aging stages have different skin characteristics. Conclusions: The incubation period is the critical period for the appearance of stains; the skin texture gradually deteriorates during the aging occurrence period; the rapid aging period is a critical period for the aging of skin parameters; skin status during the stable aging period is the worst.

*C.R.A. Malafaia, M.B. Berlim, S. Fanan, N.C.C.Silva, D.W. Barreto, Non-Clinical and Clinical Evaluation of the Anti-Inflammatory and Sebum-Regulating Effects of Algae on Scalp Health*, Presentation at 34rd IFSCC Congress, Iguazu, Brazil, 14-17 October 2024

Seaweeds are among the most sustainable vegetables globally, as they do not compete with food crops, do not consume water or fertilizers, require no pesticides, and have a high biomass production capacity. *Kappaphycus alvarezii* and *Fucus vesiculosus* are rich in sulfated polysaccharides with immunomodulatory activity. This study aims to prove the anti-inflammatory and sebum-regulating effects of these seaweeds on the scalp. In vitro assays were conducted using human cells such as macrophages, dermal papilla cells, fibroblasts, keratinocytes, and sebocytes at different concentrations. A clinical trial with 40 volunteers was conducted over 90 days. The M1 macrophage profile showed increased gene expression for IL-6 and IL-1 $\beta$  and a reduction for IL-10 and TGF- $\beta$ , while M2 exhibited decreased IL-6 and IL-1 $\beta$  and increased IL-10 and TGF- $\beta$ . Dermal papilla cell assays stimulated the synthesis of  $\beta$ -catenin, IGF, EGF, and TGF- $\beta$ . The mechanism of action for sebum regulation showed a 58.41% decrease in total lipid production. Regarding 5-alpha-reductase gene expression, the sample showed a 517.61% reduction compared to the insulin-treated group. Fucoidan, a polysaccharide in *Fucus vesiculosus*, may compete with LPS to form a complex with TLR4 during sebocyte treatment. The results indicate that this aqueous extract effectively reduces sebum production and redness while increasing scalp hydration, demonstrating its potential in skincare applications.

*L. Kakuda, A.J.F Garcia, W.P Oliveira, P.M.B.G Maia Campos, Nanoencapsulation of pequi oil: an investigative approach for hair care by reflectance confocal microscopy*, Presentation at 34rd IFSCC Congress, Iguazu, Brazil, 14-17 October 2024

The cosmetic market has experienced growth due to consumer demand for natural products, leading to research into natural ingredients. In this context, this study proposes encapsulating pequi oil (PO) (*Caryocar brasiliense* Cambess) and evaluating its efficacy through instrumental measurements and imaging analysis on standardized hair tresses. PO was encapsulated in liposomes, characterized by dynamic light scattering and evaluated its stability for 49 days. The nanoparticles were freeze-dried and incorporated into hair conditioner formulations, with or without PO or liposomes. Six hair tresses, five bleached, were treated. Instrumental measurements pre/post-standardized protocol evaluated combability, softness, tensile strength, and cuticle morphology using Reflectance Confocal Microscopy. The liposomes PdI showed minimal variation with constant Zeta potential. After the treatment protocol with liposome added with PO it was observed an alignment of the cuticle. This provides deep nourishment and helps to strengthen the hair structure. Additionally, the emollient properties of PO can lubricate the hair shaft and coat flaky or dry hair fibers. The small size of the liposome helps PO penetrate the hair cuticles, showing a tendency to increase hair strength. Finally, these findings contribute to the development of stable, technological, and effective raw materials to improve hair conditions, adding high value that promotes Brazilian biodiversity.

*Y. Zhu, Q.-N. Zhou, Y.H. Kim, Study on Anti-Aging Potential of “Gold Flower” Fungi Fermented Camellia Sinensis Extract*, Presentation at 34rd IFSCC Congress, Iguazu, Brazil, 14-17 October 2024

Ultraviolet B (UVB) radiation induces the generation of free radicals, which in turn leads to inflammation and ultimately causes skin ageing. The signs of skin ageing include wrinkles, pigmentation, loss of skin moisture, and disruption of the skin barrier. The objective of this study was to develop a novel fermented *Camellia sinensis* extract (FCE) and to compare its composition with that of traditional *Camellia sinensis* extracts (TCE). The analysis revealed no significant changes in polyphenols, flavonoids, and saponins between FCE and TCE. However, there was a notable increase in amino acid content from 0.02% to 0.07% and polysaccharide content from 0.36% to 0.48% in FCE. In vitro cell assays demonstrated that the FCE effectively scavenges reactive oxygen species (ROS), inhibits fibroblast  $\beta$ -galactosidase activity, promotes the secretion of type I collagen and hyaluronic acid by fibroblasts, and suppresses the secretion of inflammatory factor iNOS and COX-2 by keratinocytes.

Furthermore, human efficacy tests revealed improvements in skin hydration, trans-epidermal water loss (TEWL), skin elasticity, and skin brightness, along with reductions in wrinkles and erythema.

*J. Zhang, S. Liu, W. Guo, Y. Huang, Combating neurosensitivity and inflammation in sensitive skin: A novel soothing complex containing 4-t-butylcyclohexanol*, Presentation at 34rd IFSCC Congress, Iguazu, Brazil, 14-17 October 2024

Sensitive skin, characterized by hypersensitivity to external stimuli, is a prevalent global concern attributed to neurosensory dysfunction and immune-mediated hypersensitivity reactions. While current active ingredients for sensitive skin, such as 4-t-butylcyclohexanol, target sensory discomfort, they often fail to address underlying inflammation caused by hypersensitivity reactions. To address this gap, the present study introduced Simpcare1609, a novel soothing complex comprising 4-t-butylcyclohexanol, *Tephrosia purpurea*, and *Schisandra sphenanthera* seed extracts. In a capsaicine-induced reconstructed human 3D epidermal model, the expression of nociceptor TRPV1 (transient receptor potential vanilloid-1) was significantly decreased with Simpcare1609 treatment ( $P < 0.05$ ). The results of ELISA and immunofluorescence assays showed that Simpcare1609 reduced the secretion of inflammatory factors including IL-1 $\beta$ , IL-6, IL-8 and TNF- $\alpha$ , and decreased the expression of NF- $\kappa$ B signaling in LPS-induced RAW264.7 cells ( $P < 0.05$ ). Moreover, in a randomized, double-blind, placebocontrolled clinical trial, Simpcare1609 effectively reduced skin redness induced by tape stripping and capsaicine, without any significant adverse events, outperforming 4-t-butylcyclohexanol alone. Collectively, these results underscored the potential of Simpcare1609 as a promising skincare option for individuals with sensitive skin.

*B. Aral, Testing Tactics in Skin - Evaluating Radiance and Texture*, Cosmetics & Toiletries Magazine, Vol. 139, No.9, October 2024

The K-beauty trend for flawless, “glass” skin aims to achieve a complexion so smooth, clear and luminous that it resembles a sheet of glass. The hydrated, even-toned skin with natural glow, all indicators of health, is now more desired than ever: Makeup looks of admired celebrities such as Jennifer Lopez, Hailey Bieber and Bella Hadid reflect these radiant, fresh and minimalistic qualities. As such, this article explores the meaning of skin radiance, its relationship to texture, and various ways to measure this desired attribute.

*J. Zhang, F. Wu, J. Wang, Y. Qin, Y. Pan, Unveiling the Metabolomic Profile of Oily Sensitive Skin: A Non-Invasive Approach*, Int. J. Mol. Sci. 2024, 25, 11033

Skin barrier impairment is becoming increasingly common due to changes in lifestyle and modern living environments. Oily sensitive skin (OSS) is a condition that is characterized by an impaired skin barrier. Thus, examining the differences between OSS and healthy skin will enable a more objective evaluation of the characteristics of OSS and facilitate investigations of potential treatments. Initially, a self-assessment questionnaire was used to identify patients with OSS. Biophysical measurements and LAST scores were used to determine whether skin barrier function was impaired. Epidermal biophysical properties, including skin hydration, transepidermal water loss (TEWL), sebum content, erythema index (EI), and a\* value, were measured with noninvasive instruments. We subsequently devised a noninvasive D-square sampling technique to identify changes in the skin metabolome in conjunction with an untargeted metabolomics analysis with an Orbitrap Q Exactive<sup>TM</sup> series mass spectrometer. In the stratum corneum of 47 subjects, 516 skin metabolites were identified. In subjects with OSS, there was an increase in the abundance of 15 metabolites and a decrease in the abundance of 48 metabolites. The participants with OSS were found to have the greatest disruptions in sphingolipid and amino acid metabolism. The results revealed that an impaired skin barrier is present in patients with OSS and offers a molecular target for screening for skin barrier damage.

*M. Roohaninasab, A. Jafarzadeh, A. Sadeghzadeh-Bazargan, S. Zare, M. Nouri, M.A. Nilforoushzadeh, E. Behrangi, Evaluation of the efficacy, safety and satisfaction rates of platelet-rich plasma, non-cross-linked hyaluronic acid and the combination of platelet-rich plasma and non-cross-linked hyaluronic acid in patients with burn scars treated with fractional CO2 laser: A randomized controlled clinical trial*, Int Wound J. 2024;21:e70065, September 2024

Skin scarring can result from burns, injuries, stretch marks and acne, leading to cosmetic and functional difficulties. Treatments for burn scars encompass a range of options, such as lasers,

corticosteroid injections, surgery and regenerative techniques such as platelet-rich plasma (PRP). Hyaluronic acid-based products offer skin hydration and shield against aging effects. A study is being conducted to evaluate how effective PRP injection, hyaluronic acid and their combination improve burn scars and their effects on quality of life and potential disabilities. In our study, PRP and non-cross-linked hyaluronic acid treatments were compared in 10 individuals with burn scars between 2022 and 2023. Patients received CO2 fractional laser treatment followed by injections in scar areas. Evaluations included the Vancouver scar scale (VSS), biometric assessments, ultrasounds and satisfaction ratings. Two therapy sessions were conducted at 1-month interval, and assessments were done before treatment, 1 month after the first session, and 3 months after the first session. Biometric assessments showed significant improvements in various parameters (tewametry, corneometry, erythema index, melanin index, cutometry, thickness and density) in the intervention groups compared to the placebo group ( $p < 0.05$ ). PRP-non-cross-linked hyaluronic acid, PRP and non-cross-linked hyaluronic acid treatments exhibited the best clinical responses with significant differences between groups ( $p < 0.05$ ). Dermal thickness did not show significant improvement during treatment sessions, and changes among subjects were not significantly different. The colorimetry parameter improved in all groups except the placebo group, with no significant difference between intervention groups. The VSS significantly decreased in all treatment groups except the placebo group. PRP, non-cross-linked hyaluronic acid and especially the combination of these two treatment options are very effective in treating burn scars.

*M. Pelizzari, A. Mesfin Asrat, G. Bifulco, F. Rastrelli, G. Rastrelli, Olive oil upcycled ‘surf-active’ for skin and hair, PERSONAL CARE MAGAZINE, Volume 28, Issue 8, September 2024, p. 25-28*

The use of common surfactants exposes well-known environmental issues such as low biodegradability and possible toxicological effects for human, animal and aquatic life, and adverse effects for skin and eye. Studies have shown the ecological impacts of commercially available surfactants, including anionic and cationic ones (quaternary ammonium compounds) due to their bioaccumulative properties and toxicity behaviour. The widespread and daily use of skin care and cleansing products has led over the years to concerns about water contamination by surfactants contained in cosmetic products.

*R. di Lorenzo, V. di Lorenzo, T. di Serio, A. Marzocchi, L. Ricci, E. Vardaro, G. Greco, M. Maisto, L. Grumetto, V. Piccolo, E. Morelli, S. Laneri, Phenylalanine Butyramide: A Butyrate Derivative as a Novel Inhibitor of Tyrosinase, Int. J. Mol. Sci. 2024, 25, 7310*

Metabolites resulting from the bacterial fermentation of dietary fibers, such as short-chain fatty acids, especially butyrate, play important roles in maintaining gut health and regulating various biological effects in the skin. However, butyrate is underutilized due to its unpleasant odor. To circumvent this organoleptic unfavorable property, phenylalanine butyramide (PBA), a butyrate precursor, has been synthesized and is currently available on the market. We evaluated the inhibition of mushroom tyrosinase by butyrate and PBA through in vitro assays, finding IC<sub>50</sub> values of 34.7 mM and 120.3 mM, respectively. Docking calculations using a homology model of human tyrosinase identified a putative binding mode of PBA into the catalytic site. The anti-aging and anti-spot efficacy of topical PBA was evaluated in a randomized, double-blind, parallel-arm, placebo-controlled clinical trial involving 43 women affected by photo-damage. The results of this study showed that PBA significantly improved skin conditions compared to the placebo and was well tolerated. Specifically, PBA demonstrated strong skin depigmenting activity on both UV and brown spots (UV: −12.7% and −9.9%, Bs: −20.8% and −17.7% after 15 and 30 days, respectively,  $p < 0.001$ ). Moreover, PBA brightened and lightened the skin (ITA<sup>∞</sup>: +12% and 13% after 15 and 30 days, respectively,  $p < 0.001$ ). Finally, PBA significantly improved skin elasticity (Ua/Uf: +12.4% and +32.3% after 15 and 30 days, respectively,  $p < 0.001$ ) and firmness (Uf: −3.2% and −14.9% after 15 and 30 days, respectively,  $p < 0.01$ ).

*Y. Yang, Z. Lv, Q. An, D. Xu, L. Sun, Y. Wang, X. Chen, X. Shao, T. Huo, S. Yang, J. Liu, H. Luo, Q. Quan, Tricholoma matsutake polysaccharides suppress excessive melanogenesis via JNK-mediated pathway: Investigation in 8-methoxypsoralen induced B16–F10 melanoma cells and clinical study, Heliyon 10 (2024) e29363*

Skin hyperpigmentation is a worldwide condition associated with augmented melanogenesis. However, conventional therapies often entail various adverse effects. Here, we explore the safety range and depigmentary effects of polysaccharides extract of *Tricholoma matsutake* (PETM) in an *in vitro* model and further evaluated its efficacy at the clinical level. An induced-melanogenesis model was

established by treating B16–F10 melanoma cells with 8-methoxypsoralen (8-MOP). Effects of PETM on cell viability and melanin content were examined and compared to a commonly used depigmentary agent,  $\alpha$ -arbutin. Expressions of key melanogenic factors and upstream signaling pathway were analysed by quantitative PCR and western blot. Moreover, a placebo-controlled clinical study involving Chinese females with skin hyperpigmentation was conducted to measure the efficacy of PETM on improving facial pigmented spots, melanin index, and individual typology angle (ITA $\angle$ ). Results demonstrated that PETM (up to 0.5 mg/mL) had little effect on the viability and motility of B16–F10 cells. Notably, it significantly suppressed the melanin content and expressions of key melanogenic factors induced by 8-MOP in B16–F10 melanoma cells. Western blotting results revealed that PETM inhibited melanogenesis by inactivating c-Jun N-terminal kinase (JNK), and this inhibitory role could be rescued by JNK agonist treatment. Clinical findings showed that PETM treatment resulted in a significant reduction of facial hyperpigmented spot, decreased melanin index, and improved ITA $\angle$  value compared to the placebo-control group. In conclusion, these *in vitro* and clinical evidence demonstrated the safety and depigmentary efficacy of PETM, a novel polysaccharide agent. The distinct mechanism of action of PETM on melanogenic signaling pathway positions it as a promising agent for developing alternative therapies.

A. Trehan, R. Anand, G. Chaudhary, H. Garg, M. Kumar Verma, **Efficacy and Safety of Skin Radiance Collagen on Skin and Hair Matrix: A Placebo-Controlled Clinical Trial in Healthy Human Subjects**, Clinical, Cosmetic and Investigational Dermatology 2024;17, p. 581–591

Purpose: Collagen supplements are rising in the market as collagen has been demonstrated to be an important protein in the human aging process. Also, it is safe and easily absorbed in the body. Hence the aim of this study was to examine the effectiveness and safety of a collagen and antioxidant-rich treatment compared to a placebo in relation to various skin and hair indicators in healthy adult human subjects. Patients and Methods: Forty healthy adult non-pregnant/non-lactating women (aged 38–50 years) provided their informed consent in writing before their participation. Skin Radiance Collagen (SRC) treatment and a placebo were assessed for efficacy before application on Day 1, and post-application on Days 28 and 56, to measure changes in skin elasticity, hydration, brightness, pigmentation; texture, wrinkles, dryness, smoothness, fine lines, changes in the crow's feet region; as well as hair strength and hair fall. Results: It was observed after 56 days that therapy with SRC, compared to placebo, produced a substantial effect on reduction of wrinkle depth and fine lines by 48.11% and 39%, respectively, with  $p$ -value  $<0.01$  in the test group. There was a 15.69% improvement in skin hydration observed and 28% reduction in hair fall with  $p$ -value  $<0.01$ . Conclusion: SRC, a combination of collagen with hyaluronic acid (HA), biotin, and vitamins C and E, showed a significant improvement in skin and hair health, including improvements in skin elasticity, skin hydration, reduction in crow's feet area wrinkles and fine lines, hair fall, and decrease in roughness, leading to improved skin texture. Vitamin C in the formulation also acts as a collagen builder for the body and helps in preventing oxidative stress in the body. The test treatment SRC was found to be efficacious and safe in healthy human adult subjects.

Y. Hao, W. Song, L. Qu, **Effects of a combination of *Poria Cocos*, *Ziziphus spinose*, and gamma-aminobutyric acid (GABA) on sleep quality and skin health: A randomized double-blind placebo-controlled clinical trial**, Food Sci Nutr. 2024;12: p. 3883–3892

Sleep is crucial for preserving both physical and mental health, including skin health. Presently, there is a burgeoning interest in the use of herbal and natural ingredients to mitigate the adverse effects of sleep disorders. In this 4-week, randomized, double-blind, controlled trial, 70 subjects with sleep disorders were randomly assigned to receive either a placebo or a *Poria cocos*, *Ziziphus spinose*, and GABA (PZG) supplement (10 mL per day). Total sleep duration was detected by wrist actigraphy, and sleep quality was assessed by the Pittsburgh Sleep Quality Index (PSQI). Skin conditions were evaluated based on assessments of skin hydration, glossiness elasticity, color, severity of wrinkles, and skin roughness. After 4 weeks, the total sleep duration significantly increased by 12.96% ( $p = .006$ ) and the PSQI score notably decreased by 59.94% ( $p = .000$ ) compared to the baseline. Notably, compared to the baseline conditions, skin hydration, radiance, elasticity, firmness, wrinkle severity, and roughness were significantly improved in the PZG group. In addition, the PZG group demonstrated significantly greater improvements than the placebo group in terms of changes from baseline in total sleep duration, PSQI score, skin hydration, wrinkle severity, and skin roughness. The present results demonstrated that the combined intake of herbs and GABA can improve sleep quality and enhance skin health without

adverse effects.

*F. Huang, X. Wang, M. Zhang, L. Wang, Y. Wang, Y. Hu, T. Dong, P. Wie, Correlating facial skin parameters with age and gender in population of Shaanxi Province, China, J Cosmet Dermatol. 2024;23: p. 1386–1395*

**Objective:** This study was designed to comprehensively evaluate the changes in facial skin biophysical parameters with age, as well the influence of gender differences in populations of Shaanxi Province, China. **Methods:** Fourteen skin parameters, including stratum corneum hydration (SCH), transdermal water loss (TEWL), erythema, melanin, R0, R2, R5, R7, F4, gloss, skin surface pH, skin erythema index ( $a^*$ ), wrinkle length, and sebum, were measured by noninvasive instruments in 481 volunteers from Shaanxi Province. Spearman correlation analysis was performed to analyze the relationship between skin parameters and age. Additionally, skin parameters were analyzed for different age groups and different genders. **Results:** The results of the study showed a linear decrease in skin surface pH and sebum content with age, and the skin elasticity parameters R0, R2, R5, and R7 decreased significantly at the age of 54–65 years. Wrinkle length showed a linear and increase with age. R5 showed a weak negative correlation with age, R2, R7, and sebum content showed a moderate negative correlation, while wrinkle length showed a strong positive correlation. Considering the effect of gender on skin parameters, the results showed that SCH and gloss were lower in men than in women, while TEWL, erythema, melanin, wrinkle length, and sebum were higher than in women. However, there was no difference in skin elasticity between them. **Conclusion:** The facial skin parameters, especially for the wrinkle length, exhibited the strong correlation relationship with ages in Shaanxi Province. Meanwhile, most skin parameters show significant differences with gender, which can provide a reference for future research and development in the field of cosmetics.

*M. Roohaninasab, F. Khodadad, A. Sadeghzadeh-Bazargan, N. Atef, S. Zare, A. Jafarzadeh, S.T. Rahimi, M. Nouri, M. Ali Nilforoushzadeh, E. Behrangi, A. Goodarzi, Efficacy of fractional CO2 laser in combination with stromal vascular fraction (SVF) compared with fractional CO2 laser alone in the treatment of burn scars: a randomized controlled clinical trial, Stem Cell Research & Therapy (2023) 14*

**Background:** The appearance of skin scars is known as one of the main side effects of skin burns. Stromal vascular fraction (SVF), as a rich source of cell populations with tissue regeneration properties, plays an important role in the healing of skin lesions. Fractional CO2 lasers have occupied a special place in treating skin lesions, particularly skin scars, since their introduction. Our study aimed to compare the combination of SVF and fractional CO2 laser with fractional CO2 laser alone in the treatment of burn scars. **Method:** This double-blind clinical trial study was conducted on ten patients with burn scars that were treated three times with a fractional CO2 laser at site of burn lesions, and one of the two areas studied was randomly injected with SVF. Two months after completion of the procedure, patients' scars were assessed using the Vancouver scar scale (VSS), biometric criteria, and physician and patient satisfaction ratings. **Results:** The results confirmed a significant improvement in VSS, cutometry, R7 criteria, complete density sonography, and skin density sonography in the fractional CO2 laser-treated group. The VSS criteria, epidermal thickness sonography, complete density sonography, and skin density sonography in the group treated with the combination of fractional CO2 laser and SVF also showed significant improvement. The VSS criteria and melanin index of Mexameter in the group treated with SVF in combination with fractional CO2 laser were significantly better than the group treated with fractional CO2 laser alone. Also, physician and patient satisfaction in the group treated with SVF injection in combination with fractional CO2 laser was significantly higher than the other group. **Conclusion:** The results confirm the efficacy of SVF injection in combination with fractional CO2 laser in the treatment of burn scars and can be considered as a treatment option for better management of these lesions.

*M.A. Nilforoushzadeh, M. Heidari-Kharaji, T. Fakhim, E. Torkamaniha, S. Tehrani, S. Delavar, S. Rafiee, M. Nouri, N. Najar Nobari, M. Shahverdi, Treatment of periorbital hyperpigmentation using subablative fractional radiofrequency (SFR), Skin Research & Technology, Volume 29, Issue 9, September 2023*

**Background:** Periorbital hyperpigmentation (POH) is a common cosmetic concern. Numerous techniques of treatment have been assessed with variable results. **Aim:** The purpose of this research is to assess the efficacy of non-ablative radiofrequency, Subablative fractional Radiofrequency (SFR) on



POH treatment. Methods: In this research study, nine patients with POH and the age range of 25–57 years, were enrolled. The patients were treated by non-ablative radiofrequency SRF. The outcomes were assessed by biometric assessment. The skin lightness and melanin content of the periorbital skin were assessed by colorimeter and Mexameter. Skin elasticity was assessed by Cutometer. The skin ultrasound imaging system was used to evaluate the diameter and density of the epidermis and dermis. Visioface was used to evaluate the skin color and wrinkles. Also, patient's satisfaction and physician's assessment were assessed. Results: The results showed that the lightness and elasticity of the periorbital skin were significantly increased after treatment. Also, the melanin content of the skin was decreased. The denser skin layers were seen in both dermis and epidermis. The Visioface results displayed the reduction in the percent change of the skin color and wrinkle ( $p < 0.05$ ). Similarly, the physician and patients' assessment confirmed the outcomes. No serious adverse effect was reported. Conclusion: In conclusion, the SFR technique is an effective and satisfactory therapeutic choice for treatment of POH.

*J.A. Cita, N.H.A. Indiarto, S.T. Pangestu, D. Pratiwi, H. Damayanti, M. Christianti, M. Neelam, Comprehensive Assessment to Evaluate Cleansing Power Efficacy of Make-Up Remover by Image Analysis and Skin Colorimeter*, Poster presentation at the 33rd IFSCC congress, Barcelona, September 4-7, 2023

Nowadays many color cosmetics promise longlasting, transfer-proof, smudge-proof and water-proof formulas due to high demand of the consumer then the products are challenging to be cleaned after usage. Conventional cleansing power assessment only used visual and scoring evaluation can lead to inconsistent results. The aim of this study is to develop quantitative in-vitro and in-vivo methods to objectively evaluate oil cleansing power. We conducted a comprehensive cleansing power assessment on several make-up products: foundation, mascara, and lip cream with isododecane and octyl palmitate as the cleansers. In-vitro evaluation was conducted using a data color and image analysis software to measure values of  $L^*$  from the covered area on the PMMA plate before application, in application, and after cleansing then analyze the correlation with visual assessment. In-vivo evaluation measured the values of  $L^*$  by colorimeter on skin. The result of in-vitro evaluation using the  $L^*$  value of image analysis is in-line with in-vivo evaluation that uses the  $L^*$  value of the colorimeter. The comprehensive procedure to calculate cleansing power which is proposed by this study can be a guidance in materials selection when formulating the most suitable make-up remover for each make-up product.

*S. Zhao, Y. Mao, Y. Li, M. Zhang, X. Wie, In-vitro and in-vivo evaluation on the anti-oxidation and anti-glycation efficacy of a formulation*, Poster presentation at the 33rd IFSCC congress, Barcelona, September 4-7, 2023

Oxidation and glycation are prominent factors contributing to skin aging, characterized by clinical manifestations such as diminished skin elasticity, wrinkles and skin yellowing. Consequently, there is an urgent demand for the development of products that possess dual, antioxidant and anti-glycation properties. In this investigation, we examined the efficacy of a formulation EBE consisting of astaxanthin, sulfuraphane, dimethylmethoxy chromanol, decarboxylated peptides, niacinamide, and *Salvia miltiorrhiza* extract in alleviating skin manifestations associated with oxidation and glycation. To assess the effectiveness of EBE, we utilized flow cytometry to evaluate the in vitro scavenging activity of reactive oxygen species (ROS), performed immunohistochemical analysis carboxymethyl lysine (CML) in methylglyoxal (MGO) stimulated glycation models, and conducted clinical studies. The results revealed that EBE exhibited superior ROS scavenging activity in comparison to positive control (alpha-tocopherol). Furthermore, EBE impeded CML induced by MGO, showing a good antiglycation effect in vitro. Human efficacy tests involving 32 Chinese female participants corroborated significant improvements in skin yellowness, wrinkle appearance, elasticity, and proportion of pigmentation area to the application of EBE. The essence EBE developed in this study, incorporating a scientifically balanced amalgamation of antioxidant and anti-glycation ingredients, demonstrates effective mitigation of skin issues attributable to oxidation and glycation.

*F. Yi, X.-J. Kuang, G.-X. Lin, Y.-H. Liu, L. Geng, S.-Y. Zhu, H. Liang, The Chinese female facial skin database construction and utilization: Deciphering the Ageing status of Chinese sensitive females*, Poster presentation at the 33rd IFSCC congress, Barcelona, September 4-7, 2023

Objective: This study aimed to compare the Bowman questionnaire and the lactic acid tingling test for studying facial aging characteristics of sensitive skin in Chinese women. Additionally, it analyzed

differences in facial skin characteristics and aging patterns between sensitive and tolerant populations using a database of 4 million non-invasive facial indicators. Methods: 1000 women aged 20-45 years participated in the study across 7 Chinese cities. The Bowman questionnaire and lactic acid tingling test were administered, and non-invasive instruments quantified all biophysical parameters. Detailed characterization of female facial skin was achieved through multidimensional non-invasive assessment data. Results: The Bowman questionnaire effectively determined sensitive skin and yielded more statistically significant skin indicators compared to the lactic acid tingling test. The sensitive population exhibited lighter skin tone, higher total acne prevalence, and fewer pores and total pigmentation than the tolerant population. Aging trends classified the sensitive population into latent aging (20-28 years old), abrupt aging (29-33 years old), and accelerated aging (34-45 years old), each displaying distinct skin characteristics. Conclusions: These findings on sensitive skin aging will inform the development of personalized and precise skincare product customization.

*L. Du, P. Ma, Y. Zhou, X. Cai, L. Shen, G. Huo, **Insights into the inhibition performance of glabridin against melanin via a clinical and in vitro study***, Poster presentation at the 33rd IFSCC congress, Barcelona, September 4-7, 2023

Melasma is a common skin disorder characterized by alterations in normal skin pigmentation. Glabridin has been confirmed to have anti-melanogenesis activity in skins. However, the clinical whitening effects of glabridin still remain to be investigated. The present work aimed to elucidate the clinical whitening performance in melasma and non-melasma areas by the whitening serum containing glabridin. Furthermore, the inhibitory mechanisms on melanogenesis of the whitening serum containing glabridin was also evaluated by 3D skin model. The whitening serum effectively improved apparent chromaticity of the melanin model, increased the  $L^*$  value and regulated the content and distribution of melanin. A 56 day clinical experiment showed that glabridin effectively improved the skin glossiness and ITA value in both melasma and non-melasma areas. Meanwhile, a remarkable reduced melasma area proportion and the melanin content was observed in melasma area and non-melasma area, respectively. This work suggested that a formula containing glabridin could effectively improve pigmentation by 3D skin model and clinical results.

*Y. Ying, L. Sun, Y. Li, W. Xiaolan, H. Jingru, **The study of permeability, tolerability, and efficacy of a serum containing 12.5% L-ascorbic acid***, Poster presentation at the 33rd IFSCC congress, Barcelona, September 4-7, 2023

Ascorbic acid is a powerful antioxidant ingredient due to its biological functions in maintaining and improving skin health. Maintaining the stability and facilitating percutaneous absorption of ascorbic acid remains the biggest challenge in cosmetics. We designed a serum containing 12.5% pure L-ascorbic acid in powder-liquid separation ampoules with low pH to provide maximum stability and efficacy, and carried out the following experiments: the permeability of L-ascorbic acid in serum was determined by a Franz diffusion cell; the safety and tolerance of serum were tested by 48-hour closed patch test and a 4-week safety evaluation; a 4-week clinical research was finally conducted to verify the efficacy of serum. The ampoules which separated L-ascorbic acid powder from the solution to ensure stability before application, and the low pH of serum after mixing to help percutaneous absorption. The permeation results showed that the serum had better permeability, the serum passed the 48-hour closed patch test and safety evaluation, indicating it was safe and well tolerated. Clinical research demonstrated that 12.5% L-ascorbic acid provided a significant improvement in skin texture, wrinkles and skin color, shown by an increase in skin glossiness, whiteness, elasticity parameters, as well as a decrease in wrinkle parameters.

*M. Jiménez Sáez, L. Rubio, **Evaluation of water resistance of cosmetic products applying COLIPA guidelines***, Poster presentation at the 33rd IFSCC congress, Barcelona, September 4-7, 2023

The aim of this study is to quantify the colour intensity variation ( $L^*$  value) of a decorative cosmetic product on human skin after immersion in water, following the COLIPA [1] guidelines for determining the water-resistance efficacy of sunscreen products. For this purpose, the study was conducted on a panel of 22 healthy adult subjects who had the investigational product applied to the back of their hands and were then subjected to four consecutive immersions of 20 minutes each, with a natural drying period in between. Skin colour measurements at each point of the study were made using the Skin-Colorimeter CL-400TM instrument (Microcaya). From the  $L^*$  values obtained it was possible to determine the Waterproofing Removal Percentage (WPR%) [2] and whether the colour variation was



statistically significant. The results of this study showed a statistically non-significant \*L value increase and a waterproofing reduction of less than 50 % demonstrating a water resistance efficiency of the investigational product. The application of the guidelines for the determination of the water-resistance of sunscreen products in decorative cosmetics allows standardisation of the study conditions and increases its reproducibility, in addition to opens a new horizon for the evaluation of the water resistance of other types of cosmetics.

Y. Yu, S. Li, S. Ding, K. Yang, C. Liu, **Study on the effect of facial mask preparation of sulfated fucan combined with sodium hyaluronate on sensitive skin**, Poster presentation at the 33rd IFSCC congress, Barcelona, September 4-7, 2023

Objective: To study the efficacy of the mask prepared by sulfated fucan and sodium hyaluronate on sensitive skin. Methods: In vitro experiments, L929 Mouse Fibroblasts Cells scratch method, HaCaT cell viability assay and inhibition of inflammatory factors release induced by LPS from RAW264.7 cell. In humans, a single-center open, 4-week continuous before and after control experiment was conducted. 32 sensitive skin subjects used the facial mask three times a week. After 4 weeks, the repair efficacy can be verified by means of instrument test and before and after control. Results: After 24h of cell scratch culture, 0.1% and 1% sample groups all had a certain effect on promoting the healing of the scratch area. The 0.01%, 0.1% and 0.5% sample showed no toxicity to HaCaT cell, and 0.5% concentration had the best effect on cell proliferation. 0.001% of the samples had a better effect on inhibiting the release of inflammatory cytokines IL- $\beta$  and IL-6. After 4 weeks, compared with before use, the increase rate of skin moisture content in the test area was 13.87% ( $P < 0.001$ ), the reduction rate of TEWL value was 16.21% ( $P = 0.001$ ), the reduction rate of a\* value was 10.20% ( $P < 0.001$ ) and the reduction rate of EI value was 8.13% ( $P < 0.001$ ). More than 90% of the subjects were satisfied with improvement of skin redness, itchiness, tightness, stinging, hot and dry, agreed that the test samples were mild and non-irritating. Conclusion: The facial mask has a good effect of anti-inflammatory, moisturizing, promoting skin barrier repair and relieving facial redness.

Y. Zhou, P. Ma, X. Cai, L. Du, L. Shen, G. Huo, **A Clinical Study on the Efficacy of a Cosmetic Serum Containing Five Active Whitening Ingredients**, Poster presentation at the 33rd IFSCC congress, Barcelona, September 4-7, 2023

Facial pigmentation disorders and dull, dark skin tone are common complaints of women. Various whitening cosmetic products are developed to treat these problems. This study was conducted to evaluate the efficacy of a cosmetic serum containing five active whitening ingredients: glabridin, Cystoseira tamariscifolia extract, hydrolyzed conchiolin protein, phenylethyl resorcinol and niacinamide. Thirty-five healthy Chinese females, aged 25-55 years old, with mild-to-moderate pigmentation were enrolled in the 12-week, double-blind, single centre clinical study. Instrumental assessments, clinical evaluation and self-assessment were obtained at baseline, 2 weeks, 4 weeks, 8 weeks and 12 weeks. Thirty-three subjects completed the entire study. After 12-week treatment, Mexameter MX18 results demonstrated a statistically significant decrease in melanin index (MI) value ( $p < 0.001$ ), and Colorimeter CL400 results demonstrated a statistically significant increase in L\* value and ITA° value ( $p < 0.001$ ). VISIA-CR photographs demonstrated a statistically significant decrease in spots area ratio ( $p < 0.001$ ). Clinical evaluation results showed a statistically significant decrease in brightness score ( $p < 0.001$ ) after 2 weeks and the score continued to decrease throughout the 12-week treatment. In addition, self-assessment showed a good satisfaction of the whitening efficacy. All these results proved the cosmetic serum has a good whitening efficacy in lightening skin tone and improving facial pigmentation.

M.A. Nilforoushadeh, M. Heidari-Kharaji, M. Shahverdi, M. Nouri, R. Enamzadeh, N. Najari Nobari, T. Fakhim, S. Rafiee, **Microneedle fractional radiofrequency in the treatment of periorbital dark circles**, J Cosmet Dermatol. 2023;22: p. 2218–2224

Background: Periorbital hyperpigmentation (POH) is a common disorder in the patients. Women are more upset with POH in compare to males. Several methods have been used to the POH, with different efficacy and adverse reactions. Aim: The aim of the present study is to evaluate the efficacy of microneedle fractional radiofrequency (MRF) in treating POH. Methods: So, nine patients with POH and the age range of 25–57 years, were treated by microneedle fractional radiofrequency (MRF). The outcome was evaluated via biometric assessment. The colorimeter was used to assess the skin lightness. Mexameter was used for evaluated the amount of Melanin in the periorbital skin. Cutometer

was used for skin elasticity assessment. The skin ultrasound imaging system was utilized to estimate the epidermis and dermis diameter and density. Furthermore, Visioface was applied to assess the skin color and wrinkles. Also patient's satisfaction and physician's assessment were evaluated. Results: The results displayed that the periorbital skin lightness  $32.38\% \pm 5.67$  and elasticity of the R2:  $40.29\% \pm 8.18$ , R5:  $39.03 \pm 5.38$  and R7:  $42.03\% \pm 14.16$  were significantly improved after treatment ( $p < 0.05$ ). Also the melanin content of the skin was decreased ( $49.41\% \pm 9.12$ ). The skin layers were denser in the dermis and also in the epidermis (skin density:  $30.21\% \pm 10.16$  and skin thickness:  $41.12\% \pm 13.21$ ) ( $p < 0.05$ ). The results revealed the decrease in the percent change of the skin color ( $30.34\% \pm 9.30$ ) and wrinkle (area:  $25.84\% \pm 6.43$  and volume:  $30.66\% \pm 8.12$ ) ( $p < 0.05$ ). Similarly, the physician and patient's assessment were confirmed the obtained outcomes. Conclusion: In conclusion, the microneedle RF technique is practicable, effective and safe method for periorbital dark circles treatment.

*C. Uhl, D. Khazaka, A. Pouladi, Is hair care the new skin care? Use of "classic" biophysical methods for hair & scalp measurement. A review, EURO COSMETICS, 4-2023*

Hair diversity (style, shape, growth pattern or color) is one of the most important features to define us physically. Therefore, it is no surprise that the market of hair care products with a value of 93-5 billion US \$ 1 (Statistica, September 2020) is one of the most important sectors in the complete area of cosmetic products. Hair care products for women are the most frequently bought and used cosmetic products of all. Shampoos and conditioners are leading the field. For men, hair care is the most important and favored sector of all cosmetics.

*M.N. Takuathung, P. Klinjan, W. Sakuludomkan, N. Dukaew, R. Inpan, R. Kongta, W. Chaiyana, S. Teekachunhatean, N. Koonrunsesomboon, Efficacy and Safety of the Genistein Nutraceutical Product Containing Vitamin E, Vitamin B3, and Ceramide on Skin Health in Postmenopausal Women: A Randomized, Double-Blind, Placebo-Controlled Clinical Trial, J. Clin. Med. 2023, 12*

Skin aging is one of the most concerning issues that occur after menopause. The Genistein Nutraceutical (GEN) product, containing genistein, vitamin E, vitamin B3, and ceramide, has been formulated as a topical anti-aging product for improving the health of postmenopausal women's facial skin. This study aimed to investigate the efficacy and safety of the GEN product on postmenopausal women's facial skin. This randomized, double-blind, placebo-controlled trial randomly assigned 50 postmenopausal women to receive either the GEN product ( $n = 25$ ) or the placebo (PLA) product ( $n = 25$ ), topically applied twice daily for 6 weeks. The outcome assessments included multiple skin parameters related to skin wrinkling, color, hydration, and facial skin quality at baseline and week 6. The percentage mean changes or absolute mean changes, where appropriate, in skin parameters were compared between the two groups. The mean age of the participants was  $55.8 \pm 3.4$  years. For skin wrinkling and skin color parameters, only skin redness was significantly higher in the GEN group when compared to the PLA group. Following the application of the GEN product, skin hydration increased while fine pores and their area decreased. Subgroup analysis of older women (age  $\geq 56$  years) with adequate compliance found significant differences between the two groups in the percentage mean changes of most skin wrinkle parameters. The GEN product has benefits for the facial skin of postmenopausal women, particularly those who are older. It can moisturize facial skin, lessen wrinkles, and enhance redness.

*V. Rego Moraes, M. Oliveira Melo, P.M.B.G. Maia Campos, Evaluation of Morphological and Structural Skin Alterations on Diabetic Subjects by Biophysical and Imaging Techniques, Life 2023, 13, 579*

Diabetes causes increased production of advanced glycation end products (AGEs), which may lead to irreversible damage to collagen fibers, and early and more accentuated signs of skin aging. Thus, the objective of this study was to evaluate diabetic skin's mechanical and morphological characteristics and compare these to healthy skin. Twenty-eight female participants aged between 39 and 55 years were enrolled: half had type 2 diabetes, and the others were healthy. Wrinkles, transepidermal water loss (TEWL), stratum corneum water content, skin color, elasticity, morphological and structural characteristics of epidermis and dermis echogenicity were evaluated using biophysical and skin imaging techniques. Higher TEWL values were observed in participants with diabetes, who also showed lower skin elasticity and wrinkles with greater volume, area, and depth. In addition, the Reflectance Confocal Microscopy (RCM) imaging analysis showed that all participants with diabetes

presented polycyclic papillae and deformed and amorphous collagen fibers. The obtained data showed significant differences between healthy and diabetic skin and could help develop more specific topical treatments to improve the treatment of skin conditions in people with diabetes. Finally, RCM is an advanced imaging technique that allows for a more profound analysis of diabetic skin, which could assist in the evaluation of dermocosmetic treatments to improve the skin alterations caused by this disease.

*G. Bifulco, F. Rastrelli, G. Rastrelli, Bioactive peptides for hair restructuring and hair plex, PERSONAL CARE MAGAZINE, January 2023, p. 33-9*

Faced with the continuous evolution of the global cosmetic market, the hair care industry continues its growth supported by a marked extension and diversification of claims and consumer needs, as well as by the growth of expanding economic realities

*F. Yi, X.-X. Yang, R.-Y. Yang, M.-M. Zhao, Y.-M. Dong, L. Li, Y.-F. He, M.-M. Guo, J. Li, X.-H. Zhang, Z. Lu, J. Gu, J.-L. Bao, H. Meng, A cross-sectional study of Chinese women facial skin status with environmental factors and individual lifestyles, Scientific Reports, (2022) 12:18110*

Geographical, environmental and pollution conditions affect facial skin health, but their effects on skin appearance have not been elucidated. This study aimed to describe the skin barrier and skin tone characteristics of Chinese subjects according to lifestyle and environmental conditions using in vitro measurements. In total, 1092 women aged 22–42 years were recruited from 7 representative Chinese cities. Eight skin parameters (hydration, sebum, pH, transdermal water loss, individual type angle, melanin index, erythema index, yellowness) were measured using noninvasive instruments; individual lifestyle data were also collected. Data on four meteorological factors (air temperature, relative humidity, sunshine duration, wind speed) and seven air pollution indicators (air quality index, fine particulate matter, breathable particulate matter, sulfur dioxide, nitrogen dioxide, carbonmonoxide and ozone) were collected in each city from the China Meteorological Administration. Facialskin characteristics differed significantly between cities. Facial skin barrier characteristics and skin tones showed regional differences, with a better skin barrier associated with the western region, as indicated by high skin hydration and sebum secretion and a low pH value. According to the value of transdermal water loss, lighter and darker skin tones were found in the western and southern regions, respectively. Environmental conditions affected facial skin status. Air pollution induced facial skin issues, with fine particulate matter and nitrogen dioxide contributing the most. Individual lifestyles affected the facial skin barrier and skin tone.

*L. Celleno, A. D'amore, W.K. Cheong, The Use of Urea Cream for Hand Eczema and Urea Foam for Seborrheic Dermatitis and Psoriasiform Dermatoses of the Scalp, Clinical, Cosmetic and Investigational Dermatology 2022:15 2445–2454*

Purpose: Urea as an ingredient in topical skin applications can aid skin integrity and hydration and have keratolytic, anti-fungal, antibacterial, and anti-pruritic effects. Skin conditions that urea-containing formulations have been utilized to treat include hand eczema/ dermatitis, seborrheic dermatitis and psoriasiform dermatoses of the scalp. Two monocentric, simple blind, observational studies were carried out in healthy participants to examine the efficacy and safety of two urea-containing products in these skin conditions. Patients and Methods: Study 1 tested the actions of a commercially available 30% urea topical cream on hand eczema. The product was applied  $\geq 2$ /day for  $28 \pm 2$  days. Transepidermal water loss, skin redness, skin hydration, and participant ratings of efficacy and qualities were assessed prior to first product application and on days 14 and 29. Study 2 tested the actions of a commercially available foaming product containing 10% urea on seborrheic dermatitis and scalp psoriasiform dermatoses. The product was applied  $\geq 2$ /day for  $28 \pm 2$  days. Desquamation index and surface occupied by squames, analysis of extracted squames, microscopic assessment of scalp photos and participant ratings of product efficacy and qualities was carried out prior to first product application and on days 14 and 29. Results: In Study 1 ( $n = 20$  females), results showed a significant ( $p < 0.05$ ) decrease in transepidermal water loss, with an increase in hydration level of the upper skin layers, and a decrease in skin redness. In Study 2 ( $n = 13$  females, 7 males), product use led to significant ( $p < 0.05$ ) decreases in desquamation measures and dryness. In both studies, the majority of participants “agreed” or “slightly agreed” that the product had good efficacy and was easy to apply. No adverse reactions were reported. Conclusion: These findings point to the utility of urea in topically applied vehicles for hand eczema, seborrheic dermatitis, and psoriasiform dermatoses.

*H. Damayanti, J. Cita, F. Devitama, S. Komara, Reflectance-Based Elastic Polymer Test: A Novel*

**Fast-Screening Method for Predicting Skin Adhesion Performance of Liquid Foundation, 32<sup>nd</sup> IFSCC Congress London, September 2022**

Background: Long lasting effect has become a basic requirement for foundation products in which consumers would like to look flawless throughout the day. To achieve that property, the products must have proper spreadability and wettability on the skin, creating high quality of skin-foundation bond that brings good skin adhesion. Therefore, it is crucial to develop reliable adhesion tests to provide faster and objectively quantified results, especially during the formulation stage. Methods: PMMA plate and Bioskin was chosen as the candidate for foundation attachment substrate, which are compared with the water contact angle result on in-vivo volar forearm. Quantitative in-vitro foundation adhesion test was developed through an elastic polymer tape test by measuring the color intensity using a skin-colorimeter and further calculated into Tape Removal Ratio (TPR). Results: Water contact angle in PMMA plate has a greater correlation ( $\rho=0.8$ ,  $p=0.331$ ) with in-vivo result, compared with Bioskin ( $\rho=0.2$ ,  $p=0.985$ ). These results confirmed that the PMMA plate is a more suitable substrate for in-vitro adhesive test. TPR results from in-vitro tape test on PMMA plate showed a strong positive correlation against the in-vivo adhesion test ( $\rho=1.0$ ,  $p=0.2$ ) and successfully differentiate foundation samples attachment quality to the substrate. Conclusion: This study showed preliminary insights about the in-vitro foundation adhesion test using PMMA plate that can reduce observational bias by TPR calculation and quantification of foundation attachment using color intensity value.

*R. Darlenski, P. Menzel, R. Schwarzer, B. Kaestle, M. Arens-Corell, L. Praefke, N. Tsankov, D.G. Nikolaeva, L. Miséry, J.W. Fluhr, Acidic skin care promotes cutaneous microbiome recovery and skin physiology in an acute stratum corneum stress model, ISBS Congress Berlin, June 2022*

Background context: skin microbiome and skin physiology are important indicators of the epidermal homeostasis status. Stress models are able to reveal pathological conditions and modulating effects. Purpose: we investigated the cutaneous microbiome (16S-rRNA-gene amplicon sequencing) in relation to skin physiology (barrier function, stratum corneum hydration, surface-pH) after mild tape stripping (TS) without treatment compared to two cosmetic leave-on lotions (pH5.5 vs. pH9.3) in 25 healthy volunteers. Results: TS reduced the alpha-diversity with a recovery over 7 days without treatment. Both lotions significantly accelerated the recovery of the alpha-diversity after 2 days with a slightly higher rate for lotion pH5.5. After TS, the relative abundance of Proteobacteria was increased, whereas Actinobacteria were reduced. TS reduced the relative abundances of skin-associated genera. Taxa compositions normalized after 7 days in all treatment groups. Both lotions accelerated the normalization. Lotion pH9.3 induced a significant increase of skin-pH. Both lotions induced an increase in stratum corneum hydration. Conclusion: The study proved the suitability of an experimental stress model to assess skin surface microbiome in relation to skin physiology. The positive effect of an (acidic) skin care on cutaneous microbiome in relation to skin physiology has a significant modulatory effect on exogenous stress-induced epidermal alterations.

*S. Alavi, A. Goodarzi, M.A. Nilforoushzadeh, P. Mansouri, M.A. Jafari, S. Hejazi, Z. Azizian, Evaluation of Efficacy and Safety of Low-Fluence Q-Switched 1064-nm Laser in Infra-orbital Hyperpigmentation Based on Biometric Parameters, J Lasers Med Sci 2022;13*

Introduction: Dark circles and wrinkles under the eyes are common cosmetic problems, caused by various conditions, especially aging and overproduction of melanin in the epidermis or dermis of the skin. In addition to the application of topical lightening agents, different types of lasers, especially the Q-Switched ND:YAG laser, have been used for the treatment of cutaneous hyperpigmentation. Because of a high prevalence of idiopathic eye dark circles (EDCs) or periorbital melanosis and a poor response to available therapies, we decided to evaluate the efficacy and safety of the Fractional QS 1064 nm ND:YAG Laser through a before-after trial. Methods: 18-65-year-old patients with skin Fitzpatrick phototype of I-V and without any usage of a topical or systemic therapeutic regimen (2-4 weeks before the trial) were enrolled in the study. Each patient was treated with 6 sessions of the Fractional QS 1064 nm ND:YAG Laser at 2-week intervals and assessed for response and possible side effects or recurrences through 4 outcome measures, including Visoface-based color and erythema, melanin index and lightness (Before the fourth and sixth sessions of the therapy; also 1 week and 3 months after finishing the trial). Results: The changes of Visoface-based color and erythema, the melanin pigment amount by the Mexameter (melanin index) and the degree of lightness by the Colorimeter of patients after 6 months of intervention were statistically significant ( $P<0.001$ ). Conclusion: The fractional QS 1,064 nm ND:YAG Laser is an effective and safe therapy in EDCs since objective outcomes like the

reduction of the melanin index and improving lightness and subjective ones like the reduction of darkness and erythema were confirmed.

W. Liu, L. Jie, D. Liu, E.T. Makino, J. Krutmann, R.C. Mehta, **Protective effects of a day/night dual-antioxidant serum on skin: A randomized, regimen-controlled study in Chinese women exposed to air pollution**, J Cosmet Dermatol. 2022

Background: Chronic exposure to air pollution can negatively affect skin health. Aims: To assess the efficacy of the LUMIVIVE® System (LVS), a skincare system consisting of individual day and night serums, in Chinese women exposed to air pollution. Patients/Methods: In this single-center, vehicle-controlled study, eligible females (mean age, 49.02 years) were randomized 1:1 to treatment group (LVS plus basic moisturizer) or control group (basic moisturizer). Skin color, sebum content, barrier function, elasticity, and texture were measured at baseline and at each follow-up visit (days 28, 56, and 84). Air pollution parameters were collected throughout the study. Results: Air pollution levels, including PM2.5 and NO2, were consistently high during the study. The treatment group showed significantly higher skin color L\* ( $p \leq 0.0001$ ) and lower a\* values ( $p \leq 0.05$ ) at all follow-up visits compared with the control group, indicating lower skin pigmentation and redness, respectively. Skin color L\* and a\* values remained unchanged over time for the control group but were significantly different at all follow-up visits compared to baseline ( $p \leq 0.0001$  and  $p \leq 0.05$ , respectively) for the treatment group. There was an increasing trend for sebum content in the control group, which was not observed in the treatment group. Both groups showed improvements over time in other skin physiology parameters. Conclusions: The current analysis demonstrates the efficacy of LVS plus basic moisturizer compared with basic moisturizer alone to reduce skin pigmentation and redness, as well as to mitigate sebum production, in Chinese women exposed to air pollution.

Y. Ye, Y. Li, T. Bi, L. Jiang, **Improvement of urban eye skin in Chinese female by supramolecular retinol plus acmella oleracea extract-containing product**, J Cosmet Dermatol, November 2021

Background: Studies on the anti-wrinkle effects of retinol have been widely reported, but there are few reports on the infraorbital dark circles reducing effects. Objective: To evaluate the efficiency and tolerance of one novel formulation containing supramolecular retinol plus acmella oleracea extract in Chinese urban eye skin. Methods: Thirty-three women with dark circles and visible fine wrinkles around the eyes, aged 20-45 years, were enrolled and instructed to use the formula for 6 weeks. Instrumental measures and subject assessment were obtained at baseline and at 3-week intervals. Results: After 6 weeks, Mexameter MX18 results demonstrated a statistically significant 13.8% decrease in MI (melanin index) value, and Colorimeter CL400 results demonstrated a statistically significant 0.5% increase in L\* (lightness) value, which proved the efficacy of reducing dark circles. Primos-Lite data showed that the wrinkles parameters of Ra, the wrinkle area %, and number of the wrinkles under the eyes and crow's feet revealed significant reduction to varying degrees. Cutometer results showed that R2 value increased significantly by 13.0%, indicating the benefits of firmer skin. In addition, subject assessment revealed that at the end of 6 weeks, the eye skin was noticeably improved. Conclusions: By clinical evaluation and subject assessment, the novel formulation containing supramolecular retinol plus acmella oleracea extract can effectively diminish the collective signs of stressed urban eye skin for Chinese female in terms of dark circles, fine wrinkles, and sagging skin with good tolerance.

I. Micek, J. Nawrot, A. Seraszek-Jaros, D. Jenerowicz, G. Schroeder, T. Spizewsk, A. Suchan, M. Pawlaczyk, J. Gornowicz-Porowska, **Taxifolin as a Promising Ingredient of Cosmetics for Adult Skin**, Antioxidants 2021, 10, 1625

Active substances, effective in the reduction in or delay of skin changes caused by aging occurring in natural compounds, are desirable. Taxifolin (TXF), a flavonoid of strong antioxidant activity found in the plant *Stizolophus balsamita* (*S. balsamita*), has been tested for its biological effects on adult human skin. The aim of the study was to investigate the effects of two creams: 3% *S. balsamita* extract and 3% TXF on the function of adult skin. In total, 97 Caucasian women with clinical signs of skin aging were investigated. The biophysical and biomechanical skin parameters were measured before and after applying the creams, using Colorimeter CL400, Mexameter MX16, Skin-pH-Meter PH900, Skin-Thermometer ST 500, Glossometer GL200, and Cutiscan SC100. Patch tests were performed with the investigated products to assess their potential irritant properties. The percutaneous penetration of creams was examined with the use of electrospray ionization mass spectrometry (ESI-MS) and confocal Raman spectroscopy. The 3% *S. balsamita* extract cream reduced hyperpigmentation, erythema, and

elevated pH. All the tested preparations were proven to be nonirritant. A higher penetration rate was revealed for the 3% TXF cream than for the 3% *S. balsamita* extract cream. A total of 3% TXF cream improved skin viscoelasticity. The obtained results suggested that *S. balsamita* extract and TXF may be considered as ingredients of skincare products for adults.

*M.A. Kim, Y.C. Jung, E. Kim, Correlation between various skin biophysical properties and erythral response to ultraviolet radiation*, Poster at the IFSCC conference, Cancun, Mexico, October 18-28 2021

Ultraviolet (UV) radiation induces acute and long term damages on human skin, such as sunburn, photocarcinogenesis and photoaging. As an indicator of individual skin response to UV radiation, minimal erythema dose (MED) is commonly used. MED is defined as the lowest erythral effective radiant dose that produces the first perceptible unambiguous erythema with defined borders appearing over more than 50% of exposure subsite, 16 h to 24 h after UV exposure. MED has been known to be affected by various factors including Fitzpatrick skin types, skin color, pigmentation, anatomical body sites, and so on. A number of studies found that individuals with the lower skin type and with the lighter skin color showed the lower MED, indicating the higher sensitivity to UV radiation. However, studies on the relation between skin biophysical properties and erythral response to UV radiation remain rare. Therefore, the aim of this study was to investigate various skin biophysical properties determining individual skin sensitivity to UV radiation.

*Y. Ye, Y. Li, A. Liu, L. Jiang, Evaluation of the efficacy of an eye cream on the specific early aging eye problems, including periorbital hyperpigmentation, eye bags and fine lines*, Poster at the IFSCC conference, Cancun, Mexico, October 18-28 2021

Staying up late and staring at mobile phones and computer screens for long time can cause a variety of eye skin problems of some young modern women, including periorbital hyperpigmentation, eye bags and fine lines. Besides physiological characteristics and its natural aging, UV light, environmental pollution, lack of sleep, and stress would accelerate aging progress and contribute to the development and deterioration of aging signs around the eyes.

*Y. Pan, X. Ma, Y. Song, J. Zhao, S. Yan, Questionnaire and Lactic Acid Sting Test Play Different Role on the Assessment of Sensitive Skin: A Cross-sectional Study*, Clinical, Cosmetic and Investigational Dermatology 2021:14, p. 1215–1225

Background: Questionnaires and lactic acid sting test (LAST) are two widely used methods to identify sensitive skin. However, the self-perceived sensitive skin by questionnaires was not consistent with the determination of LAST. Objective: The aim of the study was to measure the biophysical properties noninvasively of sensitive skin evaluated by questionnaire and LAST and to investigate their correlations with the scores of questionnaire and LAST. Methods: A total of 209 healthy Chinese females completed the study. Self-assessment questionnaire and LAST were both performed to identify sensitive skin. Epidermal biophysical properties, including skin hydration, transepidermal water loss (TEWL), sebum content, erythema index (EI),  $a^*$  value,  $L^*$  value, skin elasticity, and skin pH, were measured with noninvasive instruments. Results: The frequency of sensitive skin was 50.2% and 66.0% by questionnaire and LAST, respectively. Subjects with self-assessed sensitive skin had a slightly higher LAST positive rate. Skin hydration, sebum content,  $a^*$  and EI values were significantly higher in the self-assessed sensitive skin group, while TEWL,  $a^*$  and EI values increased but  $L^*$  value decreased with significance in the LAST positive group. The LAST stingers among sensitive skin subjects had higher EI but not in the healthy skin subjects. In addition, questionnaire scores positively correlated with skin hydration, sebum content,  $a^*$  and EI values, while a positive relationship of LAST scores with TEWL,  $a^*$  and EI values was observed. The scores of questionnaire and LAST both negatively related to  $L^*$  value. Conclusion: Self-assessed questionnaire is associated with sensitive skin featured by oily and red face without impaired barrier function, whereas LAST is suitable to identify fragile skin barrier and enhanced blood flow on the face. Combination of both methods to diagnose sensitive skin might be more reliable.

*N. Kaul, Clinical testing for a booming men's sector*, PERSONAL CARE Magazine, September 2021, p. 25-28

The male grooming industry is growing at a rapid pace. Entire aisles of drug stores are dedicated to men's grooming products. Product demand in the skin care, hair care, and fragrance industries has grown dramatically and is expected to keep pace in the coming years. Whether this growth stems from



celebrity advertising or social media influence, one thing is clear: men have come a long way from the days of merely using a soap bar as face and body wash. The modern man stands ready and willing to invest in skin and hair products that maintain their health and youth. Globe News Wire reports the men's grooming market worldwide will reach \$183.2 Billion by 2027, with the U.S. market alone estimated at \$38 Billion, and China Forecast to grow at 6.9%.<sup>1</sup> As men continue to open their wallets for new and improved grooming products, brands catering to this market are stepping up to meet those needs by expanding offerings to include anti-ageing, SPF and antiacne products. Customisation of products is proving equally important, such as specialized regimens for every combination of skin and hair.

*M.A. Nilforoushzadeh, M. Heidari-Kharaji, S. Alavi, M. Nouri, N. Nikkhah, F. Jahangiri, M. Mahmoudbeyk, A. Peyrovan, B. Baiat Tork, E. Torkamaniha, S. Zare, Transplantation of autologous fat, stromal vascular fraction (SVF) cell, and platelet-rich plasma (PRP) for cell therapy of atrophic acne scars: Clinical evaluation and biometric assessment, J Cosmet Dermatol, 2021 Jul*

Background: Scarring is an unfortunate result of acne because it causes the psychological and cosmetic problems for the patients. Unfortunately, no single treatment is suitable, and using multiple methods may have a better result. The autologous fat and stromal vascular fraction (SVF) cells and their secretory factors can enhance the angiogenesis, collagen synthesis, and migration of fibroblasts, therefore regenerate hurt tissues. Moreover, other treatments for acne scarring, such as platelet-rich plasma (PRP), induce the increase in scarring. Aims: This study aimed to verify the effectiveness of transplantation of autologous fat, SVF cells, and PRP as cell therapy techniques on atrophic acne scars. Patients/methods: This study included 9 adult patients with atrophic acne scars on face. All patients received the transplantation of autologous fat, stromal vascular fraction (SVF) cells, and PRP. The treatment outcome was measured by biometric assessment (VisioFace 1000 D, Colorimeter, multi-probe adapter Cutometer, Tewameter, Mexameter, and skin ultrasound imaging system), and also, the satisfaction of patients was evaluated. The patients were followed 6 months after the treatment. Results: There was a significant improvement in the skin pores, spots, skin lightness and melanin content of skin, skin elasticity, and TEWL (transepidermal water loss) after 6 months of the treatment. Furthermore, denser skin layers were observed both in the epidermis and in the dermis. Moreover, 66.6% of patients showed good satisfaction after the treatment. Conclusion: In brief, the transplantation of autologous fat, SVF cells, and PRP is an effective cell therapy for atrophic acne scars.

*M.A. Nilforoushzadeh, S. Zare, S. Farshi, M. Mahmoudbeyk, M. Nouri, F. Jaffary, N. Nikkhah, Clinical, biometric, and ultrasound assessment of the effects of the autologous fibroblast cells transplantation on nasolabial fold wrinkles, J Cosmet Dermatol., 2021 Apr 27*

Background: Feeling beautiful and staying young have always been important to the people. Therefore, an extensive body of research has focused on the efforts made to remove the skin problems, especially wrinkles. Fibroblast cells of the skin are the various autologous cells currently used in repairing several wounds, scars, and skin aging. Thus, the present study was conducted to assess the efficacy of the transplantation of the fibroblast cells in eliminating the facial wrinkles using the biometric assessment and to optimize the application of this technique in this treatment. Methods: The present study was conducted on 22 male and female patients aged between 35 and 60 years old. Samples were collected from the retro-auricular region, and the fibroblast cells were isolated and cultured. Subjects received three injections with autologous fibroblasts at 2-week intervals. The patients were followed up for 6 months, and structural changes in their wrinkles were assessed by the sonography and the VisioFace software, cutometer, tewameter, and colorimeter. Results: The results obtained using the VisioFace software showed the significant phenotypic changes in the patients after the nasolabial injections ( $81.42 \pm 23.97$  vs.  $60.91 \pm 21.91$ ,  $p = 0.0001$ ). The results showed a significant increase in the total skin density ( $13.73 \pm 6.30$  vs.  $26.27 \pm 7.93$ ,  $p = 0.0001$ ), dermis density ( $11.28 \pm 5.21$  vs.  $31.88 \pm 7.96$ ,  $p = 0.0001$ ), epidermis density ( $27.68 \pm 23.15$  vs.  $49.21 \pm 45.68$ ,  $p = 0.046$ ), and dermis thickness ( $798.09 \pm 133.51 \mu\text{m}$  vs.  $905.59 \pm 240.67 \mu\text{m}$ ,  $p = 0.036$ ) compared to pre-treatment. Conclusion: The findings of the study revealed that the injection of autologous fibroblasts can be effective in restoring the aging skin, especially in the nasolabial region, and can be used as a safe rejuvenating strategy.

*K. Goldie, M. Kerscher, S. Guillen Fabi, C. Hirano, M. Landau, T.S. Lim, H. Woolery-Lloyd, K. Mariwalla, J.-Y. Park, Y. Yutskovskaya, Skin Quality – A Holistic 360° View: Consensus Results, Clinical, Cosmetic and Investigational Dermatology 2021;14, p. 643–654*

Introduction: Skin quality is an important component of human attractiveness. To date, there are



no standardized criteria for good skin quality. To establish a consensus for good skin quality parameters and measurement and treatment options, a virtual skin quality advisory board consisting of a global panel of highly experienced aesthetic dermatologists/ aesthetic physicians was convened. Methods: A total of 10 dermatologists/aesthetic physicians served on the advisory board. A modified version of the Delphi method was used to arrive at consensus. Members accessed an online platform to review statements on skin quality criteria from their peers, including treatment and measurement options, and voted to indicate whether they agreed or disagreed. Statements that did not have agreement were modified and the members voted again. Consensus was defined as: strong consensus = greater than 95% agreement; consensus = 75% to 95% agreement; majority consent = 50% to 75% agreement; no consensus = less than 50% agreement. Results: There was strong consensus that good skin quality is defined as healthy, youthful in appearance (appearing younger than a person's chronological age), undamaged skin and that skin quality can be described across all ethnicities by four emergent perceptual categories (EPCs): skin tone evenness, skin surface evenness, skin firmness, and skin glow. The EPCs can be affected by multiple tissue layers (ie, skin surface quality can stem from and be impacted by deep structures or tissues). This means that topical approaches may not be sufficient. Instead, improving skin quality EPCs can require a multilayer treatment strategy. Conclusion: This global advisory board established strong consensus that skin quality can be described by four EPCs, which can help clinicians determine the appropriate treatment option(s) and the tissue or skin layer(s) to address. Skin quality is important to human health and wellbeing and patients' perception for the need for aesthetic treatment.

*E. Peters, P. Moortgat, **Electronic Micro-needling on Mature Burn Scars: A Case Series Report**, Poster 2021*

Previously scars were treated with a stamp from the dermaroller, which despite the pain, caused the scars to heal. However improvement of this method was needed. This started a desire for a better machine that has more power and better patient interaction/effect. This resulted in a Cheyenne Classic, which is normally used for tattoos.

*C. Uhl, D. Khazaka, A. Pouladi, **"Classic" biophysical methods for hair & scalp**, PERSONAL CARE, March 2021, p. 23-26 and **Métodos biofísicos 'clásicos' de análisis capilar**, Revista técnica de la Industria Cosmética, Perfumería e Higiene Personal, Primavera 2021 No. 018, p. 34-37*

Hair is not only strands of horn made mainly of keratin. Hair indicates someone's personal beliefs or social status. The matter of hair care / grooming is not entirely all about women. For men, a well-kept, thick head of hair brings added good looks. However, there is more to it. Nowadays, social media, most of all Instagram, influences different generations. Besides skin, hair is the characteristic attribute for health, youth and attraction. Hair can even be a communication and political instrument. Just take as an example the men who let grow a moustache of their own style every November of a year, the so called Movember, to raise funds for men's health. Plenty of products and treatments are ready to fit the modern hair care market for thin, thick, curly, dry, oily, blonde, coloured, ethnic, young, or old hair. Imagine a claim, the product is already invented. As hair is unique, personalised products flood the hair care market. Respectively, a great number of claims around the various products exists. Hair care rituals can be complemented with food supplements and treatment devices.

Además de la piel, el cabello representa un atributo social característico de la salud, la juventud y la atracción. Multitud de productos y tratamientos están listos para ser adaptados al nuevo mercado de cuidado del cabello, específicamente para tratar cabellos finos, gruesos, rizados, secos, grasos, coloreados, jóvenes, envejecidos... Existe un gran número de afirmaciones en torno a los distintos productos existentes en el ámbito del cuidado capilar.

*S. Leoty-Okombi, F. Gillaizeau, S. Leuillet, B. Douillard, S. le Fresne-Languille, T. Carton, A. de Martino, P. Moussou, C. Bonnaud-Rosaye, V. André, **Effect of Sodium Lauryl Sulfate (SLS) Applied as a Patch on Human Skin Physiology and Its Microbiota**, Cosmetics 2021, 8, 6*

In this study, we assessed the change in skin microbiota composition, relative abundance, and diversity with skin physiology disruption induced by SLS patch. Healthy women declaring to have a reactive skin were submitted to a 0.5% aqueous sodium lauryl sulfate solution application under occlusive patch condition for 24 h. Skin properties were characterized by tewametry, corneometry, and colorimetry and bacterial diversity was assessed by 16S rRNA sequencing. Analysis before and one day after SLS patch removal revealed an increase of skin redness and a decrease of stratum corneum

hydration and skin barrier function. The relative abundance of taxa containing potential pathogens increase (Firmicutes: Staphylococcaceae; Proteobacteria: Enterobacteriaceae, Pantoea) while some of the most occurring Actinobacteria with valuable skin protection and repair capacities decreased (Micrococcus, Kocuria, and Corynebacterium). We observed an impaired skin barrier function and dehydration induced by SLS patch disturb the subtle balance of skin microbiota towards skin bacterial community dysbiosis. This study provides new insights on the skin bacterial composition and skin physiology simultaneously impaired by a SLS patch.

C. Uhl, D. Khazaka, **Pomiar Rzeczywistego Wieku Skóry**, CHEMIA I BIZNES. 1/2021

Nagłówki w czasopismach i blogi coraz częściej ogłaszają, że „50 lat to nowe 30”. Czy to faktycznie prawda? Czy osoby „po pięćdziesiątce” rzeczywiście są dziś bardziej sprawne fizycznie i umysłowo – i wyglądają młodziej – niż kiedyś?

Y. Pan, X. Ma, J. Zhao, S. Yan, Q. Liu, H. Zhao, **The Interaction of Age and Anatomical Region Influenced Skin Biophysical Characteristics of Chinese Women**, Clinical, Cosmetic and Investigational Dermatology 2020:13, p. 911–926

Background: Ageing is an inevitable physiology process of humans, and skin biophysical parameters change owing to genetic and environmental factors in different ethnic populations. Aim: To gain comprehensive data on the skin biophysical parameters of different anatomical regions and to explore the change trend of the skin characteristics associated with age for the indicated regions by generalized additive model. Methods: We measured various skin biophysical parameters on forehead, cheek, chin and inner forearm of 178 Chinese women aged between 20 and 64 years living in Beijing. These parameters comprised skin hydration, transepidermal water loss (TEWL), sebum content, erythema index (EI), melanin index (MI),  $L^*a^*b^*$  values, individual typology angle (ITA) and pH, which were quantified by non-invasive instruments. Results: Comparing the skin parameters among the four test areas, we observed that the hydration, TEWL, EI and  $a^*$  values were significantly higher for the face than for the forearm, but the  $L^*$  and ITA values were just the opposite. The cheek was the lightest and brightest region with lowest sebum content, while the chin was much darker and the forehead was yellowish. Considering the change of the skin parameters with age, TEWL, sebum content and melanin and erythema indices had a linear relationship with age, whereas skin hydration,  $L$ ,  $a$ ,  $b$ , ITA and pH values exhibited a non-monotonic relationship. The turning points of these curves appeared almost at the thirties, showing the lightest and evenest skin color and more hydration, with lower pH values. Conclusion: This study indicates that the skin biophysical characteristics of Chinese women were significantly affected by age and body regions.

L. Téot, T.A. Mustoe, E. Middelkoop, G.G. Gauglitz (Editors): **Textbook on Scar-Management - State of the Art Management and Emerging Technologies** (ebook), Springer 2020

The interest in wound healing goes back to the beginning of history and has not diminished throughout the centuries also because practical implications of wound healing studies have remained very relevant for public health. During the last century, much progress has been made in the understanding of basic mechanisms of skin wound healing, and it has been realized that healing processes evolve similarly in various organs. It has been established that fibrotic diseases are regulated by analogous mechanisms, albeit less controlled, compared to those regulating wound healing. Moreover, many advances, such as the use of antiseptics and, later, of antibiotics, as well as the introduction of skin transplants have facilitated the treatment of wounds. It has been shown that wound healing evolution depends on several factors including the type of injury causing the damage, the tissue and/or organ affected, and the genetic or epigenetic background of the patient. This Compendium has the merit of discussing a broad spectrum of topics, including the general biology of wound healing, modern diagnostic approaches, and therapeutic tools, applied to many different clinical situations. It should be of interest to teachers, students, and clinicians working in different aspects of wound healing biology and pathology. I am sure that it will rapidly become an important reference book in these fields.

Y. Wu, F. Yi, M. Akimoto, T. Tanaka, H. Meng, Y. Dong, **Objective measurement and comparison of human facial skin color in East Asian females**, Skin Research & Technology, Volume 26, Issue 4, July 2020, p. 584-590

Background: Skin color is an important physiological index of human skin that has essential significance in cosmetology and dermatological diagnoses and aesthetics, especially in East Asian culture, where the beauty standard is the whiter the skin, the more beautiful a person is. However, there has been a lack of objective comparisons of facial skin color in East Asian females. Materials and

**Methods:** Skin color at the cheek site was measured in 445 healthy females, including 362 Chinese women in Beijing and 83 Japanese women in Tokyo, all aged 18-50 years. The parameters consisted of  $L^*$ ,  $a^*$ ,  $b^*$ , individual typology angle (ITA°), and hue angle and were determined using noninvasive skin measurement instruments. **Results:** The skin color categories in East Asians ranged from very light (I) to brown (V), and the dark (VI) category was not observed; the main categories were light (II), intermediate (III), and tan (IV). The facial skin color of Chinese individuals was brighter, more reddish, and less yellowish than that of Japanese individuals. With age,  $L^*$  values decreased, and  $a^*$  values and hue angle increased in East Asians with significant differences. Chinese women showed the same differences as Japanese women for all parameters in all age groups. **Conclusions:** This study provides objective skin color measurements and examines significant differences with respect to geographic location and age.

*M.A. Nilforoushzadeh, S. Alavi, M. Heidari-Kharaji, A.R. Hanifnia, M. Mahmoudbeyk, Z. Karimi, F. Kahe, Biometric changes of skin parameters in using of microneedling fractional radiofrequency for skin tightening and rejuvenation facial, Skin Res Technol., Jun 2020*

**Background** Fractional radiofrequency (RF) has been used for skin rejuvenation and tightening by dermatologists and cosmetic surgeons in recent years. **Methods** Twenty female patients (mean age of 51.9 years) with Fitzpatrick III to VI skin phototypes who desired to undergo skin lift/tightening received six sessions of fractional microneedle RF treatment and were assessed at baseline and then 3 months after the last session for biometric characteristics using a Colorimeter, Visioface 1000D, Tewameter, Cutometer, Mexameter, and Sebumeter and a skin ultrasound imaging system to evaluate the transepidermal water loss (TEWL), skin pores, color, melanin content, erythema, sebaceous content, and thickness and density of the epidermis and dermis. Patient satisfaction with visual analog scale (VAS) was also measured. **Results** The results showed that skin pores and spots decreased significantly. TEWL also decreased significantly (by 18.44%). Meanwhile, skin density increased significantly (R7, by 44.41%). The ultrasonographic assessments showed that both the density and thickness of the dermis and epidermis were increased. The changes in the other parameters were not significant. **Conclusion** FR increases the density and thickness of the dermis and thus also increases the collagen content and decreases skin pores and TEWL.

*C. Uhl, D. Khazaka, Measuring skin's "true age", PERSONAL CARE June 2020, p. 66-68*

The human desire to look young is as old as mankind and our skin plays central role in this craving. Even in ancient civilizations, people developed formulations for creams, tonics and bath additives to keep skin young and beautiful. The physiological process of skin ageing involves structural, biochemical and functional changes. Starting at approximately age 25, the content of collagen and other components of the connective tissue, such as elastin or hyaluronic acid, in the skin continuously decreases. This gradually results in a loss of bound water, leading to a deterioration of the water-protein interaction and an alteration of the overall protein stability.

*A. Charpentier, Clinically supporting 'antiage' and 'pro-age' claims, Personal Care Europe, June 2020, p. 1-3*

Claims of personal care evolve following trends and various innovations in the field of the active ingredient development, the finished product formulation and the way both are evaluated, demonstrating their performances. Since 2014, the cosmetics industry is gradually leaving the era of anti-ageing behind. Today, most consumers are more in the mood for a well ageing, slow ageing or pro ageing approach. The philosophy of the 'pro-ageing' movement has sought to remove all 'anti' claims because, according to this concept, women over 50 are not interested in looking younger; they want to look healthy and be honest about their age. Some brands have used the idea of "improves the appearance of skin quality", and "restore the skin comfort", for example. A new vocabulary of renewal, regeneration, plumpness and "glow" now dominates the language of the beauty industry.

*C. Schrammek-Drusio, Anamnese & Hautanalyse, medical skincare, 2019/20*

Eine professionelle Hautanalyse ist die Grundlage jeder zielführenden Anti-Aging Behandlung. Denn jeder Hauttyp und –zustand hat verschiedene Anforderungen. Die Kosmetikerin benötigt dafür fundiertes Detailwissen und natürlich Erfahrung. Zur exakten Analyse ist darüber hinaus auch eine auch eine apparative Grundausstattung unverzichtbar.

*M. Milani, B. Hashroody, M. Piacentini, L. Celleno, Skin protective effects of an antipollution, antioxidant serum containing Deschampsia antarctica extract, ferulic acid and vitamin C: a controlled single-blind, prospective trial in women living in urbanized, high air pollution area, Clinical, Cosmetic and Investigational Dermatology 2019;12, p. 393–399*

**Introduction:** Air pollution causes skin damage and favors skin aging processes such as dark spots and wrinkles, through oxidative stress. Pollutant substances accelerate skin aging through a specific activation of intracellular receptors called AhR (aryl-hydrocarbon receptors). *Deschampsia antarctica* aqueous extract (DAE) has shown to counteract the pollutant-induced AhR activation. Ferulic acid (FA) and vitamin C (VC) are potent antioxidant substances. A serum containing DAE/FA/VC has been recently developed. So far, no clinical data are available regarding the protective actions of this serum against the detrimental effects of air pollution on the skin. **Objective:** We conducted a prospective, single-blind, 28-day study to assess efficacy and protective effects against air pollution skin damage of a new serum containing *Deschampsia antarctica* extract. **Materials and methods:** Twenty, photo type I–III, women (mean age 42 years) with at least three dark spots on the face, living in a homogenous urbanized, high pollution area (Rome) were evaluated. The objectives of the study were to evaluate the effects of treatment on skin barrier function, assessed by transepidermal water loss (TEWL) measurement (Tewameter), the effect on dark spots, evaluated by means of colorimetry (Colorimeter CL 400), and the effect on squalene peroxide (SQOOH)/squalene (SQ) skin ratio assessed with face swabs. **Results:** The trial was conducted between November 20 and December 19, 2018. In comparison with baseline, the product induced a significant improvement of skin hydration (-19% of TEWL), a significant improvement of dark spots (+7%) and a significant improvement of SQOOH/SQ ratio (-16%). The product was evaluated very well by >90% of the treated subjects regarding cosmetic acceptability. **Discussion:** A serum containing DAE/FA/VC has shown to improve skin barrier function, to reduce dark spots and to counteract the skin oxidative stress in women living in high pollution urban area.

*M.M. Fossa Shirata, G.A.D. Alves, P.M.B.G. Maia Campos, Photoageing related skin changes in different age groups: a clinical evaluation by biophysical and imaging techniques*, International Journal of Cosmetic Science, Volume 41, Issue 3, 2019

**Objectives:** In view of the lack of studies about the morphological and structural changes caused by solar radiation in young people, the aim of the present study was to evaluate the photoageing related changes in the skin of different age groups by biophysical and imaging techniques. **Methods:** Forty four healthy female subjects were divided into two age groups: Group 1 (G1): 18-35 years old and Group 2 (G2): 40-60 years old. The skin of malar region of the face was evaluated in terms of mechanical properties, disorder in the pigmentation pattern, morphological and structural changes using the Cutometer®, Colorimeter®, Visioface® and Dermascan C® devices and reflectance confocal microscopy (Vivascope®). **Results:** The results showed that the main changes in the skin of G1 were related to the pigmentation pattern, the papilla format and depletion of thin collagen fibres. These alterations were also observed in the skin of G2, but with more pronounced effects. **Conclusion:** The knowledge about the skin changes caused by photoageing obtained in this study is very important for the development of dermocosmetic products for more effective treatments particularly focused on this type of skin. Finally, objective characterization of photoageing showed the importance of photoprotective habits since the first years of life in order to retard the appearance of skin changes caused by solar radiation.

*L. Xiao, B.Che, H. Lu, J. Li, G. Zhou, Y. E, Evaluation of a Scalp Essence on Human Scalp Health and Subclinical Conditions Based on Multiple Dimensions Physiological and Biological Approaches*, presentation at the 25<sup>th</sup> IFSCC Conference Milan, October 2019

Varieties of methods have long been considered to evaluate cosmetic efficacies and health benefits on hair care and scalp care products. In general, scalp health and its conditions are normally determined at the following dimensions including scalp hydration level, scalp oil level, dandruff scale, scalp micro-organism conditions, and scalp sensations such as itching, stinging, burning, pain, numb, and other related scalp sensational issues. It is believed that scalp health conditions are influenced by hair cleansing habits, scalp microorganism environment, inflammatory lesions such as psoriasis, and hair follicle health status. On the other hand, scalp health and its conditions are also well documented and determined by Traditional Chinese Medicine (TCM) theories and clinical diagnosis. This is because TCM practitioners consider most of the symptoms such as scalp conditions through an integral grading system as Qi-Blood, of which represents functions of vital energy and nutritional supporting mass respectively, range from balance to stagnation and to deficiency including the deficiency of vital energy, stagnation of the circulation of vital energy, weakness of vital energy, deficiency of blood, stasis of Blood, cold in Blood, heat in Blood, to stagnation of vital energy and Blood stasis, and both Qi-Blood deficiency, etc. Here, we considered to measure hair follicle hydrocortisone level one of the TCM Qi-Blood markers. This presented study focused on evaluation of a commercial scalp essence with an integrated quantification method on human subject scalp moisture, dandruff, redness, acidity, sensations, hair quality, as well as Qi-Blood based on TCM categorized as Blood balance, stagnation and deficiency.

*S. Laneri, R. di Lorenzo, A. Sacchi, I. Dini, A New Protocol to Evaluate Waterproof Effect of Lip*



**Gloss**, Biomed J Sci & Tech Res 19(5)-2019

A new method to evaluate lip gloss and lipstick waterproof level according to the COLIPA Guidelines for Evaluating Sunscreen Product Water Resistance in 2006 is proposed, moreover the changes in color ( $L^*$  value) by Skin Colorimeter® CL 400 Courage & Khazaka was measured. Tests were carried out on 20 volunteers validating the efficiency of the used method by comparing non-waterproof lip gloss/lipstick and waterproof product results. The results indicated that the lip gloss/lipstick were waterproofs when their mean % WPR was lower than 50% and they were removed after two successive immersions in water for 20 minutes at  $29^{\circ}\pm 2^{\circ}\text{C}$ . Methods used to evaluate lip gloss and lipstick waterproof level has proved effective for assessing the desired goals.

*Y. Song, Y. Pan, H. Wang, Q. Liu, H. Zhao, Mapping the face of young population in China: Influence of anatomical sites and gender on biophysical properties of facial skin*, Skin Res Technol. 2019;25: p. 333-338

Background: Facial skin exhibits unique biophysical properties, which are influenced by anatomical regions and genders. The aim of this study was to comprehensively assess the regional and gender differences in facial skin biophysical parameters among Chinese population. Materials and Methods: The 12 skin biophysical parameters at four distinct facial skin sites (forehead, cheek, canthus and chin) were measured in a normal population ( $n = 212$ ) with 42 males and 141 females aged 18-29 years living in Beijing. These parameters consisted of skin hydration, transepidermal water loss, sebum content, erythema/melanin indices,  $L^*a^*b^*$  color, skin gloss and elasticity, all quantifying with non-invasive instruments. Results: The results demonstrated that the characteristics of the facial skin were significantly different between the regions and genders. The forehead had weaker skin barrier function but secreted the most sebum content, while the cheek was the driest and brightest region on the face. The canthus was the most hydrated area and the chin displayed higher sebum secretion, darker skin color and less elastic. The females showed more hydrated, less oil, lighter and more elastic facial skin compared with males. Conclusion: This study indicates that the young Chinese facial skin significantly varies with face anatomical regions and differs between genders.

*C. Uhl, Efficacy testing of microbiome skin care*, PERSONAL CARE EUROPE, April 2019, p. 41-45, PERSONAL CARE ASIA, May 2019, p. 51-55, косметолог 2 [94] 2019 (in Ukrainian), Cosmetics & Toiletries Brasil, Vol. 31, Mai-June, 2019, p. 22-27 (in Portuguese)

For years now, we have accepted the idea that we can nourish our intestinal tract with dedicated bacterial ingredients from food supplements and thereby improve our general health. Books written on this subject have become bestsellers. But why should we focus only on our intestinal tract? There are so many different microbial communities that can be found on and inside our body. Especially the colonization of the skin being our largest organ, tangible to the hands, visible to the eye, and in constant contact with the outside environment has moved to the front of cosmetic research. The idea of being a complex ecosystem is adding to the existing trend of personalised cosmetics, and will confirm the customer in their feeling of uniqueness.

В течение многих лет мы принимали идею о том, что можем обогащать наш кишечный тракт специальными бактериальными ингредиентами из пищевых добавок и тем самым улучшать общее состояние здоровья. Книги, написанные на эту тему, стали бестселлерами. Но можем ли мы сосредотачиваться только на нашем кишечном тракте?

O microbioma cutâneo é a população de microrganismos que habita a pele. Neste trabalho, o autor apresenta uma breve descrição da importância da atividade do microbioma e dos meios analíticos instrumentais para medir a eficácia de produtos cosméticos de interesse do microbioma cutâneo.

*M.L. Vazquez-Gonzalez, G. Rodriguez, L. Rubio, J. Nestor, E. Fernandez, L. Barbosa-Barros, O. López, Intelligent ageing repair with skin superfoods*, PERSONAL CARE EUROPE, April 2019, p. 157-162

The many environmental factors related to modern lifestyle generate a skin imbalance that leads to premature ageing. In this study, we evaluate the capacity of a new skin delivery system based on bicosomes (named bicosome-xanthin) to provide intense detox and revert the signs of ageing. This system was specially designed to incorporate, stabilise and deliver microalgae extract into deep skin layers. Bicosomexanthin proved to be effective in protecting the skin against pollution particles and to prevent 90% of the damage caused by blue light. This extraordinary ingredient also proved *in vivo* to boost the skin's antioxidant capacity and barrier function, to accelerate epidermal cell renewal, improve skin brightness and firmness, and visibly reduce wrinkles.

*J.I. Yablonski, D.R. Winne, Beginner's Guide to Natural Organic – Product Safety, Claims Support*

**and Preservation**, *Cosmetics & Toiletries*, Volume 134, No. 2, February 2019, p. 18-31

Browsing a cosmetic counter, searching online or tuning into home shopping networks, one cannot help but notice the ever-increasing number of cosmetic and personal care products purporting to be *green*, *natural* or *organic* that are obviously targeting the rapidly growing environmentally conscious consumer and spa markets. Entire sections of exhibitions and trade shows have been dedicated.

*D. Cobiella, L. Archer, M. Bohannon, D. Santoro, Pilot study using five methods to evaluate skin barrier function in healthy dogs and in dogs with atopic dermatitis*, *Vet. Dermatology*, January 2019

Background: Atopic dermatitis is associated with skin barrier defects. In people, noninvasive techniques are used to quantify the skin barrier functionality. In dogs, transepidermal water loss (TEWL), stratum corneum hydration and pH have been used to assess skin barrier function. However, few studies have determined their repeatability. Objective: To assess the repeatability of measurements of skin hydration, TEWL, pH, skin absorbance and erythema in healthy and atopic dogs. Animals: Fifteen healthy and 15 atopic privately owned dogs. Methods and materials: Three repeated measurements using Corneometer®, Skin-pH-Meter®, Colorimeter® and VapoMeter® were obtained from inguinal, axilla, pinna and interdigital space by three investigators. Intra- and interobserver variability (coefficient of variation, correlation coefficients and intraclass correlation coefficients) and difference between the two groups (*t*-test or Mann–Whitney U-test) were determined. Results: High repeatability and low variation were observed both intra- and interobservers for all devices except the VapoMeter®. The most repeatable device was the Skin-pH-Meter®, whereas the VapoMeter® was the device with the highest intra- and interobserver variability. Atopic dogs had a significantly increased pH (inguinal *P* = 0.03; axilla *P* = 0.02) and erythema (inguinal *P* = 0.01; axilla *P* = 0.02) compared to healthy dogs. No differences between the two groups were detected using the Corneometer®, VapoMeter® or Colorimeter® (tartrazine absorption). Conclusion and clinical significance: The results of this pilot study support the use of Corneometer®, Skin-pH-Meter® and Colorimeter® in the assessment of skin barrier function in dogs; further investigations to optimize measurements and confirm these results are needed.

*M. Portugal-Cohen, Z. Ma'or, M. Oron, Full Scale Customization*, *Cosmetics & Toiletries*, Vol 133, No. 9, September 2018

The drive for personalized consumer products is no longer a passing fad. Personalization stems from deep motivations. The emotional wish to purchase products created "especially for me" comes across with an understanding of diversity between individuals and the prospects for more effective solutions to meet each individual's special needs. However, efforts to introduce personalized skin care—i.e., for unique skin with distinctive characteristics — on an industrial scale means products formulated for generalized needs, which could not be as effective.

*D. Khazaka, C. Uhl, Nails: more than just skin extensions*, *PERSONAL CARE ASIA*, May 2018, p. 33-35

The horn-like envelopes covering the tips of our fingers and toes are called nails. They are highly specialised epidermal appendages. Finger- and toenails are made out of a tough fibrous protein, the alphakeratine. The nail consists of the nail plate, the nail matrix and the nail bed below it, and the grooves surrounding it.<sup>1</sup> Apart from the aesthetical aspect, a healthy fingernail has the function of protecting the fingertip and the surrounding skin from injuries and preventing the skin at the end of fingers and toes from rolling backwards over the distal phalanx. The nail helps to improve sensitivity and the grip of the fingers and also enables the precise manipulation of small objects through counter-pressure exerted on the pulp of the distal digits (e.g. pulling out a splinter in one's finger), as well as certain cutting or scraping actions.

*M. Mendes Fossa Shirata, P. Maria Berardo Gonçalves Maia Campos, Evaluation of Young Skin Photoaging Using Biophysical and Imaging Techniques*, Poster Presentation at ISBS Conference San Diego, May 2018

Introduction: Photoaging is associated to an intense solar exposure, thus the photoaging signs can be observed also in the young skin, mainly in countries with high UV incidence, like Brazil. The aim of this study was to evaluate the skin changes resulted from photoaging in Brazilian young skin in comparison to photoaged mature skin. Methodology: Thirty participants were divided in two groups: the first between 18 to 35 years old and the second, 40 to 60 years old. Analyzes were performed on the randomized facial malar region. TEWL, stratum corneum water content, sebum content, high resolution imaging, echogenicity and dermis thickness, skin color and elasticity parameters were analyzed. Results and Conclusions: The obtained results showed that sun exposure can cause changes even in the young

skin, with the appearance of spots and the reduction of the echogenicity of the dermis, besides there were no significant differences between young skin and mature skin in most parameters. In conclusion, signs of photoaging may be frequent even in young skin.

*G. Nicoletti, P. Perugini, S. Bellino, P. Capra, A. Malovini, O. Jaber, M. Tresoldi, A. Faga, Scar Remodeling with the Association of Monopolar Capacitive Radiofrequency, Electric Stimulation, and Negative Pressure*, Photomedicine and Laser Surgery, Volume 35, Number 5, 2017

Objective: A study was established to objectively assess the effects of low-intensity electromagnetic and electric stimulation plus negative pressure on mature scars. Background: Radiofrequency plus negative pressure therapy demonstrated a favorable reorganization and regeneration of the collagen and elastic fibers and was proposed for the treatment of cellulitis and skin stretch marks. Methods: Twenty-six mature scars in 20 Caucasian patients (15 females and 5 males) were enrolled in the study. The treatments were carried out with a Class I, BF-type electromedical device equipped with a radiofrequency generator, an electric pulse generator, and a vacuum pump twice a week for 3 months. Corneometry, transepidermal water loss, elastometry, colorimetry, and three-dimensional skin surface pattern were objectively assessed with Multi Probe Adapter System MPA and PRIMOS pico. A subjective assessment was carried out with the VAS and PSAS scales. Each scar was compared before and after the treatment and with the skin in the corresponding healthy contralateral anatomical area at the same times. Results: Reduction of the scar surface wrinkling and overall scar flattening were demonstrated after the treatment. The scar slightly tended to approach the color and elasticity of healthy skin too. Conclusions: The combined local treatment of mature scars with low-intensity electromagnetic and electric stimulation in association with negative pressure might suggest a favorable synergic effect on the scar collagen and elastic fiber remodeling.

*J. Kitsongsermthon, K. Duangweang, J. Kreepoke, A. Tansirikongkol, In vivo cleansing efficacy of biodegradable exfoliating beads assessed by skin bioengineering techniques*, Skin Research and Technology 2017; 23: p. 525-530

Background/purpose: The plastic microbeads, used in many cleansers, will be banned in cosmetic and personal care products within 2017 since they are non-degradable and can disturb the living organisms in water reservoirs. Various choices of biodegradable beads are commercially available, but their efficacy has not been proven yet. This study aimed to compare the cleansing efficacy in dirt and sebum removal aspects of three types of exfoliating beads. Methods: The gel scrubs with polyethylene (PE) beads, mannan beads or wax beads, were formulated and evaluated for their stability. The in vivo evaluation was done in 38 healthy volunteers and the skin irritation, efficacy for dirt and sebum removal were measured by Mexameter®, Colorimeter®, and Sebumeter®, respectively. Results: The selected gel scrubs did not cause an irritation in any volunteers. The differences in dirt residues between before and after scrubbing were not statistically significant among three gel scrubs and the similar result was also reported in the sebum removal study. Conclusion: All gel scrubs demonstrated the comparable cleansing efficacy in term of dirt and sebum removal. Thus, mannan beads and wax beads may be replaced nonbiodegradable PE beads to achieve the similar cleansing effect.

*M. Anthonissen, J.I. Meirte, U. Van Daele, K. Maertens, P. Moortgat, Report: Minolta Chromameter CR-400 & Skin Colorimeter CL 400*, Oscare Scar-Lab, Belgium, 2017

The most commonly used method for color assessment is tristimulus reflectance colorimetry. It represents color in the same way as the human eye does. The level of light is reflected through three broad wavelength filters and the color is described by three values: L\*, the lightness or brightness; a\*, the amount of green or red (redness) and b\*, the amount of yellow or blue (pigmentation). Both the Minolta Chromameter® and the Colorimeter® are tristimulus devices and measure L\*, a\* and b\* values.

*A.C. da Silva Marques, Biometrologic Evaluation of Cosmetic Products*, Dissertation in pharmaceutical sciences at the University of Coimbra, 2016

Given the growing importance that cosmetic products have on human's health and in our daily life, it is important to increase the control of these products, both in terms of safety and effectiveness. Taking into account that conducting animal tests for the production and validation of cosmetic products is prohibited by law, producers of these products have to resort to alternative methods. Biophysical methods have gained an important highlight in the scientific community, in particular the non-invasive methods. They allow a safe and faster evaluation of cosmetics. The purpose of this work is to describe some methods and equipments used at national and European level to test the effectiveness of cosmetic products and correlate the parameters evaluated with the alleged properties in the products. The methods include evaluation tests of the following skin properties: hydration, elasticity, coloring, sebum production and perspiration.



*K.C. Lee, J. Dretzke, L. Grover, A. Logan, N. Moiemien, A systematic review of objective burn scar measurements*, Lee et al. Burns & Trauma (2016) 4:14

**Abstract:** Background: Problematic scarring remains a challenging aspect to address in the treatment of burns and can significantly affect the quality of life of the burn survivor. At present, there are few treatments available in the clinic to control adverse scarring, but experimental pharmacological anti-scarring strategies are now beginning to emerge. Their comparative success must be based on objective measurements of scarring, yet currently the clinical assessment of scars is not carried out systematically and is mostly based on subjective review of patients. However, several techniques and devices are being introduced that allow objective analysis of the burn scar. The aim of this article is to evaluate various objective measurement tools currently available and recommend a useful panel that is suitable for use in clinical trials of anti-scarring therapies.

*C.Y. Wright, M. Wilkes, J.L. du Plessis, A.I. Reeder, P.N. Albers, In multiple situational light settings, visual observation for skin colour assessment is comparable with colorimeter measurement*, Skin Research and Technology 2016; 22: 305-310

**Background:** Finding inexpensive and reliable techniques for assessing skin colour is important, given that it is related to several adverse human health outcomes. Visual observation is considered a subjective approach assessment and, even when made by trained assessor, concern has been raised about the need for controlled lighting in the study venue. The aim of this study is to determine whether visual skin colour assessments correlate with objective skin colour measurements in study venues with different lighting types and configurations.

*G. Nicoletti, F. Brenta, M. Bleve, T. Pellegatta, A. Malovini, A. Faga, P. Perugini, Long-term in vivo assessment of bioengineered skin substitutes: a clinical study*, J Tissue Eng Regen Med, 2015 Apr;9(4): p. 460-468

The aim of the study was an objective in vivo assessment of skin properties after reconstruction with two artificial dermal substitutes, Integra® and Hyalomatrix®. Twenty-seven patients underwent reconstruction of 36 skin-loss sites with full-thickness skin graft, split-thickness skin graft, Hyalomatrix® bioengineered skin substitute and sequential split-thickness skin graft and Integra® bioengineered skin substitute and sequential split-thickness skin graft. Objective assessments were carried out using three instrumental devices: Multi Probe Adapter System MPA; 22 MHz ultrasound skin scan; and Primos Pico for a three-dimensional (3D) skin scan. The skin parameters under study in our sample were: corneometry, transepidermal water loss, elastometry, colorimetry, skin thickness and 3D skin surface pattern. A skin reconstruction with Hyalomatrix seemed to most closely approach the hydration, transepidermal water loss and skin surface 3D pattern of normal skin. A skin reconstruction with Integra seemed to demonstrate the best skin colour feature and elastic properties. Although no statistically significant differences were observed, the descriptive analysis of the outcomes might suggest a better cell regulation, regenerated extracellular matrix and neoangiogenesis with the use of Hyalomatrix, and the formation of a more elastic regenerated dermis, with overall better physical, mechanical and optical properties, with the use of Integra.

*M. Wilkes, C.Y. Wright, J.L. du Plessis, A.I. Reeder, Fitzpatrick skin type, Individual Typology Angle and melanin index in an African population: taking steps toward universally applicable skin photosensitivity assessments*, JAMA Dermatol., 2015 Aug;151(8): p. 902-903

Calculation of Individual Typology Angle (ITA) based on spectrophotometric measurements has been used to classify skin types into physiologically relevant groups,<sup>1</sup> ranging from very light to dark skin.<sup>2</sup> This study directly compares ITA values with melanin index (MI), the latter frequently used in assigning Fitzpatrick Skin Type (FST),<sup>3</sup> in order to improve understanding of how these measurements correlate when used in a study that consists, primarily, of FST V and VI. **Methods:** Participants ( $n=556$ ) were drawn from the Council for Scientific and Industrial Research campus in Pretoria, South Africa, from October 6-22, 2014. All participants provided written consent, spoke English, cleaned their non-dominant arm with a wet wipe, and answered a short questionnaire, self-identifying their population group and skin reaction to sunlight. Courage+Khazaka Skin Colorimeter CL 400 and Mexameter® MX 18 objectively determined ITA and MI respectively, by being held against the upper, inner non-dominant arm. ITA was categorized as previously described.

*O. Freis, G. Perie, A. Rathjens, Correlating Aging with Skin's Mechanical and Optical Properties*, Cosmetics and Toiletries, April 21, 2014

The evolution of skin's biomechanical and optical properties as a function of aging and/or photoaging is one of the main targets of cosmetic and dermatological research. Many noninvasive

devices to measure skin's biomechanical properties have been developed using alternative methods such as stretching, torsion, indentation and suction. Measurements of skin deformation after suction or torsion are the most widely used techniques in cosmetic research. The skin's optical properties play an important role as well, and devices measuring these characteristics assess reflected light after illumination of the skin surface. Different noninvasive methods have been proposed for evaluating skin complexion in vivo. These include quantitative measurements of skin color, using colorimetry—i.e.,  $L^*a^*b^*$  and Individual Typological Angle (ITA°); or of the intensity of specular reflection and the back-scattering of light from the skin. The purpose of this study was to demonstrate the evolution of the measured parameters with aging, and to find the correlation between measured mechanical and optical properties of the skin.

*A. Mondelli, G.F. Secchi, Proteins in pre-colouring hair care products: improving hair dyes performance on damaged hair*, Poster In-cosmetics, Paris 2013

The ability of different hydrolysed proteins applied on bleached and with different diameter (Russian and Indian) hair before colouring to improve colour deposition and retention over time after washing cycles was studied. The test showed that application on hair of the hydrolysed proteins before hair colouring can improve colour deposition and retention respect to the control tresses; colour deposition and retention are pre-treatment water solution protein content dependent.

*C. Uhl, D. Khazaka, Techniques for globally approved skin testing*, Personal Care April 2013

In efficacy testing and claim support for cosmetic products, objective measurement systems became indispensable long ago, especially since subjective clinical assessments are often prone to bias and inter-observer variation. Without suitable instrumentation it is close to impossible to determine what a product is really doing for the skin. Those objective measurement methods and subjective evaluations are mutually dependent. No measurement can be performed without the subjective evaluation of the results by the user of such instrumentation. However, a pure subjective evaluation of the skin without appropriate measurement techniques is not able to achieve accurate results either. This relationship becomes clearer when looking for example at skin colour measurements. Subjectively, the human brain cannot process slight changes in colour, especially when the colours are not viewed side by side, but at different points in time. Instrumental measurement however will clearly detect such slight changes. The achieved result must then be interpreted in context with the expected outcome or the hypothesis. For this, you will always need a knowledgeable and experienced person because 'a fool with a tool is still a fool', as the late Albert Kligman used to say. This relationship between objective measurement and subjective evaluation is not only true for the determination of differences in skin colour, but also for all other skin measurement parameters important for the cosmetic industry.

*J.H. Kim, B.Y Kim, J.W. Choi, S.O. Kim, H.S. Lee, K.C. Park, S.W. Youn, The objective evaluation of the severity of psoriatic scales with desquamation collecting tapes and image analysis*, Skin Research and Technology, May 2012; 18: p. 143–150

Background: Assessment of psoriatic scales is important to determine the severity of psoriasis. However, there are very limited numbers of objective, quantitative and observerindependent tools for measuring the severity of psoriasis. Objective: To determine whether the bioengineering parameters of the psoriatic scale can be used to assess the severity of psoriasis instead of the psoriatic severity index of scales (PSIs) score. Methods: Thirty-four patients with psoriasis were included. A representative lesion from each patient was selected and bioengineering parameters were measured using the Corneofixs. Simultaneously, the severity of the scales was assessed by the PSIs score using clinical photographs of the lesions. In addition, skin color and elasticity parameters were also measured using the Colorimeters, the Mexameters and the Cutometers. Results: Statistical differences in the scale parameters were observed between the PSIs 2 and 3 scores. Among the scale parameters, the percent area and area in mm<sup>2</sup> were negatively correlated with the PSIs score. In addition, the Colorimeters a, b parameters and the Cutometers R9 parameters were significantly correlated with the PSIs score. Conclusions: The results of this study showed that the severity of psoriatic scales could be measured objectively using the Corneofixs.

*K. Fritz, Skin physiologic changes before and after laser treatment*, IMCAS, Congress of Plastic Surgery and Dermatology, Lecture number: 5462

The aim of the study was to compare the changes of the biophysical properties and to objectify the effects of treatments with various lasers on skin physiology. Few studies have been reported to compare the effects of various lasers on the skin physiology which could result in a customized skin care post treatment recommendation. The recent development of various biophysical devices has made

it possible to have more accurate and objective assessment methods. The functional properties of the skin are measured by utilizing non-invasive techniques, including the assessments for, skin color, trans-epidermal water loss (TEWL) and skin hydration and pH (Courage and Khazaka).

*P. Humbert, A. Elkhyat, A. Gichard, J.M. Sainthillier, Comparison between Colorimeter CL400 Courage-Khazaka and Chromameter CR400 Minolta*, CERT/Department of Dermatology, Besancon

The aim of this study was to compare 3 colorimetric devices: 2 probes of colorimeter (CK) and Chromameter (Minolta). Therefore, we assessed: ...

*A. del Pozo, M. Solans, C. Fernandez, M. Dolz, F. Corrias, M. Herráez, O. Diez-Sales, Efficacy evaluation and characterization of chitosan nanoemulsions with Spirulina hydro-glycolic extract*, IFSCC Barcelona 2008 (Poster)

Nanoemulsions represent an interesting prospect for use as vehicles in the development of formulations to deliver active ingredients to the human body. Particularly, nanoemulsion formulations have been shown to be superior for transdermal and dermal delivery of hydrophilic and lipophilic compounds, compared to conventional vehicles, such as hydrogels and emulsions [1]. Lecithins (phosphatidylcholines) have been used in several studies as surfactants for topical nanoemulsion vehicles. These surfactants are able to form nanoemulsions without co-surfactants.