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Literature List

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M.N. Patel, N.K. Patel, A.M. Merja, S. Patnaik, Clinical Evaluation of the Efficacy, Safety, and In-Use Tolerability of a Diacnemide™-Containing Acne Kit (Facial Serum and Cleanser) Regimen for the Synergistic Management of Facial Acne in Adults, Cureus, 2024 Sep 23;16(9):e69968

Introduction: Acne is a common inflammatory condition characterized by comedones, papules, and pustules, often resulting from increased sebum production influenced by hormones such as insulin-like growth factor-1 and androgens. Factors like Cutibacterium acnes, medications, sun exposure, cosmetics, and genetics exacerbate acne. This study aims to assess the safety and effectiveness of a novel acne treatment regimen, including a cleanser and serum containing Diacnemide™ (manufactured by Beaucience India Private Limited, Faridabad, India), in improving acne symptoms in adults. Methods: This prospective, interventional, open-label, single-center, single-arm clinical study was designed to evaluate the safety, efficacy, and in-use tolerability of the test treatment regimen (serum + cleanser) for facial acne. Ethical approval was obtained from the Independent Ethics Committee, and all participants provided written consent. The study assessed changes in the severity of acne by dermatological assessment using the Investigator's Global Assessment (IGA) scale, changes in inflammatory and noninflammatory lesions, skin hydration, sebum levels, and facial blemishes using various bioinstrumentations from Courage+Khazaka Electronic GmbH, Germany - Visiopor® PP34N, Corneometer® CM 825, Sebumeter® SM 815, and Mexameter® MX 18, respectively. Evaluations were conducted at baseline, T15 minutes, day 8, and day 15 post-usage. Statistical analyses were performed using SPSS (version 29.0.1.0) and Microsoft® Excel 2019 software, with results reported using p-values and confidence intervals at a 5% significance level. Results: Porphyrin measurements showed significant reductions over time, with a 27.18% decrease in quantity and a 39.86% reduction by day 15 ($p < 0.0001$). Porphyrin values dropped by 2.61% after 15 minutes and 7.82% by day 15 ($p < 0.05$). Skin hydration increased significantly, with a 97.54% increment after 15 minutes and a 102.74% increment by day 15 ($p < 0.0001$). Sebum levels were restored to normal levels with the dry skin observed at baseline, showing a 34.45% improvement on day 8 and 75.75% by day 15 ($p < 0.0001$). Facial dark spots were reduced by 10.66% by day 8 and 14.64% by day 15 ($p < 0.0001$), and erythema levels decreased significantly. Acne severity showed notable improvement, with 50% of the subjects having moderate acne at baseline, reduced to 20.69% with mild acne, and 79.31% with almost clear skin by day 15. Subject responses indicated high satisfaction, with 100% agreeing on the test treatment's effectiveness in reducing acne, oiliness, and inflammation and improving hydration and skin texture. Conclusion: The ThriveCo acne regimen (serum + cleanser) manufactured by Anveya Living Private Limited, India, is both effective and safe for treating facial acne in healthy adults with acne. It significantly reduces porphyrin size and quantity, indicating a strong inhibition of P. acnes, and visibly improves dark spots and skin hydration. The components - Diacnemide™ and zinc pyrrolidone carboxylic acid - in the cleanser regulate sebum production and provide anti-inflammatory benefits, while the serum, containing Diacnemide™ and niacinamide, enhances skin barrier function and balances lipids. The synergistic effects of the ThriveCo Goodbye Acne Cleanser and Serum in this regimen effectively target surface bacteria like C. acnes and deeper follicular issues, promoting healthier skin and reducing acne-related symptoms.

C. Fogelgesang, S. Mac-Mary, X. Wang, J.-M. Sainthillier, C. Monastier, Y. Souccar, M. Verbraeken, L. Li, Assessment of the efficacy and the remanence of a cosmetic serum on skin imperfections, Poster presentation at the 33rd IFSCC congress, Barcelona, September 4-7, 2023

The aim of this study was to evaluate the efficacy of a cosmetic serum containing "Crithmum maritimum native cells", Bixa orellana seed extract and ectoin on skin imperfections linked to various external factors (exposome) and skin quality, as well as its remanence effect. The study was conducted

on the facial skin of 91 healthy Asian women, aged 20-35, with mild acne, uneven skin tone but also “stressed”. They applied the tested serum twice a day for 2 months, then for the next 2 months half of them continue to apply it whereas the other half applied a neutral moisturizing cream. Assessments (performed on D0, D28, D56, D84 and D112) consisted on skin lesions counting, clinical scoring, self-assessment, sebumetry and Visiopor®. Significant results were measured as early as 7 days of treatment on the total number of lesions and the skin greasiness and an improvement of the skin quality was observed on most of the studied items over the first 2 months of applications. A remanence of the efficacy was observed for 2 months on retentional lesions, highlighting the regulation of the biological mechanisms involved in this skin disorder while continuing the treatment was essential to treat inflammatory lesions.

V. Couturaud, M. Le Fur, M. Pelletier, F. Granotier, Reverse skin aging signs by red light photobiomodulation, Skin Research & Technology, Volume 29, Issue 7, July 2023

Background: Photobiomodulation is a process by which the absorption of red light energy produces a series of physiological effects at the cellular level such as the enhancement of mitochondrial Adenosine Triphosphate (ATP) production, cell signaling and growth factor synthesis, and the reduction of oxidative stress. Light emitting diodes (LEDs) photobiomodulation is an increasingly popular therapy for treating skin problems, especially for reversing the signs of skin aging. Objective: The objective of this study is to demonstrate the effectiveness of a photobiomodulation treatment using red LEDs on the facial skin at a rate of two sessions per week for 3 months. The LED mask used is the Skin Light Dior x Lucibel mask diffusing a cold red light with a wavelength of 630 ± 10 nm and a power of 15.6 J/cm^2 for a duration of 12 min. Method: In order to demonstrate the effectiveness of the mask in reversing the signs of skin aging, a clinical study was conducted on 20 healthy Caucasian women: the antiwrinkle effect by measuring the depth of the crow’s feet wrinkle, the relaxation of the oval of the face by clinical scoring, the firmness and elasticity of the skin by cutometric measurement, the density of the dermis by ultrasound analysis, the smoothness of the skin by measuring the roughness at the cheek, the homogeneity of the complexion by chromametric measurement, the diameter of the pores by macrophotographs and finally the sebo-regulating effect by measurement of the rate of sebum and quantification of the number of pores containing porphyrin in the subjects presenting a mixed to oily skin. The satisfaction of the volunteers was also evaluated at the end of the study via a self-questionnaire. Results: The efficacy results measured after 1, 2, and 3 months of use are progressive and confirm the interest of LED photobiomodulation to reverse the visible signs of skin aging. All the volunteers observed an overall improvement in skin quality. Conclusion: All the results observed confirm the interest of using photobiomodulation to reverse the visible signs of aging. These results last for up to 1 month after stopping the use of the mask, which is a sign of lasting structural and functional rejuvenation of the skin.

P. Perugini, C. Grignani, G. Condrò, H. van der Hoeven, A. Ratti, A. Mondelli, A Colpani, M. Bleve, Skin Microbiota: Setting up a Protocol to Evaluate a Correlation between the Microbial Flora and Skin Parameters, Biomedicine 2023, 11, 966

The concept of skin microbiota is not really clear and more accurate approaches are necessary to explain how microbial flora can influence skin biophysical parameters in healthy individuals and in pathology patients with non-infectious skin disease. The aim of this work is to provide a suitable, fast and reproducible protocol to correlate skin parameters with the composition of skin microbiota. For this purpose, the work was split into two main phases. The first phase was focused on the selection of volunteers by the administration of a specific questionnaire. The skin microbiota was then collected from the forehead of selected volunteers as a test area and from the shoulder as control area. On the same skin area, the biophysical parameters, such as transepidermal water loss (TEWL), sebum level (SL), porphyrin intensity, keratin content and stratum corneum water content were taken. All parameters were taken at t_0 and after 15 days without changes in the volunteers’ lifestyle. A strong correlation was found between forehead and shoulder area for porphyrin intensity, pH and TEWL parameters, and between *Cutibacterium acnes* and some biophysical parameters both in the forehead and the shoulder area. The procedural setup in this work represents the starting point for evaluating problematic skins and the efficacy of cosmetic products or treatment against skin dysbiosis.

J. Pavlačková, H. Pecháčková, P. Egner, P. Mokrejš, R. Gál, M. Janalíková, The Effect of Cosmetic Treatment and Gel Laser Therapy on the Improvement of Comedogenic Skin Type, Gels 2023, 9, 370

Comedogenic skin care receives little attention compared to the care or treatment of more serious acne manifestations. Traditional therapies may have limited success with potential side effects. Cosmetic care supported by the effect of a biostimulating laser may offer a desirable alternative. The aim of the study was to evaluate the biological effectiveness of combined cosmetic treatment with lasotherapy on comedogenic skin type using noninvasive bioengineering methods. Twelve volunteers with comedogenic skin type underwent a 28-week application of Lasocare Basic 645[®] cosmetic gel containing *Lactoperoxidase* and *Lactoferrin* in combination with laser therapy (Lasocare[®] method). The effect of treatment on skin condition was monitored using noninvasive diagnostic methods. The parameters were the amount of sebum, the pore count, the ultraviolet-induced red fluorescence assessment of comedonic lesions (percentage of the area and quantification of orange-red spots), hydration, transepidermal water loss, and pH. A statistically significant decrease in sebum production was observed on the skin of the treated volunteers, as well as a decrease in porphyrins, indicating the presence of *Cutibacterium acnes* populating comedones and causing enlarged pores. The balance of epidermal water in the skin was regulated adjusting the acidity of the skin coat in individual zones, which decreased the presence of *Cutibacterium acnes*. Cosmetic treatment in combination with the Lasocare[®] method successfully improved the condition of comedogenic skin. In addition to transient erythema, there were no other adverse effects. The chosen procedure appears to be a suitable and safe alternative to traditional treatment procedures known from dermatological practice.

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.

C. Uhl, G. Khazaka, Ins Bild gesetzt – Bilddiagnostische Testverfahren in der Dermatologie, Medical by Beauty Forum, 2, 2023

Hautveränderungen sind für Dermatologen mit dem bloßen Auge gut erkennbar. Die Unterschiede über einen gewissen Zeitraum objektiv zu erfassen und die Gründe für Hautveränderungen sind es meist nicht. Dafür gibt es verschiedene bilddiagnostische Testverfahren, die wir hier vorstellen.

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 ± 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 ≥ 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.

C. Uhl, **How to Prove the Concept of Microbiotic Skin Care**, EURO COSMETICS 1-2 2023, p. 18-22

When the Human Genome Project 1 was launched in autumn 1990 with the aim of identifying and mapping all of the genes of the human genome, no-one would have thought that we would discover a new microcosmos revolving around and mingling with our human cells. Of course, already long before this project, it was well-known that our body is not sterile and there are many bacteria living within and on it. These bacteria were however mainly classified as being malicious, threatening our health and causing problems. Until the 70s of the last century, a germ-free personal environment was considered as most desirable, and strong cleaning products became quite popular. Only starting in the early 1980s, these ideas and information were carefully reevaluated.

A. Charpentier, **Skin microbiota and claims substantiation**, PERSONAL CARE MAGAZINE, September 2021

The evaluation of the effect of dermocosmetics or active products on the skin microbiota is evolving into more and more complex models. And yet, these never reach the sophistication of the ecosystem of the bacterial biofilm of the skin. In addition, it is now known that the skin microbiome is subject to intra-individual variations depending on the body areas and inter-individual according to genetic, intrinsic, and environmental factors.

A. Ayatollahi, A. Samadi, A. Bahmanjahromi, R.M. Robati, **Efficacy and safety of topical spironolactone 5% cream in the treatment of acne: A pilot study**, Health Sci Rep. 2021

Background: Spironolactone is an effective treatment for female patients with acne vulgaris. However, topical spironolactone could be a valuable treatment option in both male and female acne patients due to the less possibility of systemic side effects with its topical formulation. Objective: To evaluate the efficacy and safety of 5% spironolactone cream in the treatment of mild to moderate acne vulgaris. Methods: In this pilot clinical trial, topical spironolactone 5% was evaluated to treat patients with mild to moderate acne twice a day for 8 weeks. The rate of improvement as any alterations in the number of open and closed comedones, facial inflammatory papules, and acne global grading scores were assessed. Moreover, skin biometric characteristics including skin hydration, erythema, transepidermal water loss (TEWL), pH, sebum, and Propionibacterium acnes bacteria activity were also assessed following the treatment. Results: Fifteen patients participated in our study with a mean age of 25 ± 4.87 years old. A total of 66.6% (n = 10) were female and 33.4% (n = 5) were male. The number of acne papules, open and closed comedones, and acne global grading score decreased significantly 4 and 8 weeks after the beginning of treatment ($P < .05$). No considerable side effect was reported. Moreover, there was no significant difference between the skin hydration, melanin, erythema, TEWL, pH index, sebum, and P acnes bacteria activity before, 4, and 8 weeks after the treatment with topical spironolactone cream ($P > .05$). Conclusion: The topical 5% spironolactone cream seems to be an effective and safe treatment of acne vulgaris in both male and female patients.

C. Uhl, D. Khazaka, **Skin sensitization in pandemic times**, PERSONAL CARE MAGAZINE, June 2021

For almost a year and a half, an unprecedented pandemic has had us in its grip worldwide, forcing us to abandon many cherished activities and realign our entire daily lives. It is particularly important in these times to prevent the spread of the pandemic through protective measures, distance and significantly increased requirements for hygiene measures such as the wearing of protective mouth-nose masks and the frequent use of sanitisers on all kinds of surfaces and naturally also on the skin.

J.M. Crowther, A. Davies, **Beyond the Visible: UV, IR and Fluorescence Imaging of the Skin**, in: P. Pasquali (ed.), Photography in Clinical Medicine, Springer Nature Switzerland AG 2020

Our world is typically an abundance of colour, from which we derive a vast amount of information about it. Even within the range of human vision, there are some individuals who can see only in black and white (achromatopsia) and, at the other end of the spectrum, some (tetrachromats) who see millions of colours. Despite these apparent differences in how human eyes operate, we are still only sensitive to a relatively narrow range of wavelengths between approximately 390 and 720 nm.

M.G. Almeida Leite, P.M.B.G. Maia Campos, **Correlations between sebaceous glands activity and porphyrins in the oily skin and hair and immediate effects of dermocosmetic formulations**, J Cosmet Dermatol. 2020;00: p. 1–7

Background: Oily skin and hair not only contain a large amount of sebum, but also exhibit other

changes that compromise their physiology. The immediate effects of dermocosmetics are very important for adherence to treatment. Aim: The aim of the present study was to characterize oily skin and scalp, to evaluate the correlation of sebum production with porphyrin counts and the immediate effects of topical formulations for sebum control. Patients/Methods: A total of 100 women aged 18-49 years were recruited. Sebaceous gland activity, sebum amount, stratum corneum water content (SCWC) transepidermal water loss (TEWL), skin gloss, amount of porphyrins and pores were determined in the face and SCWC, sebum amount, porphyrin count, and TEWL were also determined in the scalp. The immediate effects of formulations containing a guarana extract were determined after 2 hours of application. Results: A correlation between sebaceous gland activity and presence of porphyrins in the frontal region of the face was detected. Low gloss values and large amounts of pores in the malar region were related to lower skin uniformity. High sebum values and low SCWC and porphyrin count were also observed in the vertex region. The studied formulations reduced the sebum content of face and scalp after 2 hours of application. Conclusion: Oily skin and hair showed high sebum values, which were correlated with porphyrin count and with the activity of sebaceous glands. Finally, the studied formulations had immediate reducing effects on sebum amounts on the skin and scalp.

I. Budi Putra, N.K. Jusuf, N. Kumala Dewi, The Role of Digital Fluorescence in Acne Vulgaris: Correlation of Ultraviolet Red Fluorescence with the Severity of Acne Vulgaris, Hindawi Dermatology Research and Practice, Volume 2019

Background. Colonization of *Propionibacterium acnes* (*P. acnes*) and increased sebum production play important roles in the pathogenesis of acne vulgaris. Severity of acne vulgaris correlates with the lesion counts both non-inflammatory and inflammatory. Digital fluorescence has been found useful in pathogenesis investigation and treatment evaluation. Ultraviolet-induced red fluorescence (UVRF) was found to be correlated with sebum and porphyrin production that can be synthesized by *P. acnes*. Therefore, UVRF assessment could be useful for the evaluation of the degree and extent of acne vulgaris. Objective. To evaluate the correlation of UVRF with the severity of acne vulgaris using the digital fluorescence tool. Methods. Forty-five patients were diagnosed with mild-to-severe acne vulgaris according to Lehmann classification. Lesion counts both non-inflammatory and inflammatory and UVRF assessment using Visiopor PP34 camera were done to all participants in 5 divided facial areas (forehead, nose, right and left cheeks, and chin). Clinical assessment for each patient was done by 3 dermatologists. Determination of correlation between UVRF with acne lesion counts was done using Pearson test and with acne severity using Spearman test. Results. From 45 participants, majority had moderate acne (64.4%), followed by severe (24.5%) and mild acne (11.1%). Mean number of UVRF spots was 39.98 ± 11.45 and percentage area covered with UVRF was 4.39 ± 1.72 . There was no correlation found between acne lesion counts, including non-inflammatory and inflammatory with the number and percentage area covered with UVRF spots. Severity grade of acne vulgaris was found to be uncorrelated with the number of UVRF spots ($r = 0.27$, $p = 0.073$) and percentage area covered with UVRF spots ($r = 0.173$, $p = 0.256$). Conclusion. The severity of acne vulgaris has no correlation with spot counts and percentage area covered with UVRF. Digital fluorescence might be helpful in investigating further of the interrelated pathogenesis factors of acne.

H. Dobrev, Value of non-invasive bioengineering investigations of the human skin in vivo, Dissertation in Dermatology and Venerology at the University of Plodiv, 2019, Bulgaria

The skin is the largest organ of the human body. It has a surface area of about 2 m² and a weight of about 16% of the body weight. Skin is a great visual field. Most of the changes that occur in it are visible and accessible to dermatologists. For centuries, the dermatologist's eyes and fingers have been his main diagnostic tools. Old physicians are known to describe the rash elements with great love, diligence and methodicality, especially with regard to morphological details. Today, this descriptive phase in the evolution of dermatology has lost its dominance. According to Prof. J. Serup, "*The dermatologist's eyes and hands are already becoming archaic diagnostic tools.*" With the introduction of modern skin bioengineering methods, there has been a transition from the "visible" to the "invisible". From the "visual" field, dermatology is increasingly becoming an "instrumental" field. The advantage of the new research methods created is that they enable the detection of invisible changes in skin functions, as well as their objective and quantitative measurement. This dissertation is devoted to the new methods of skin functional diagnostics. It illustrates the practical application of some of them in the field of dermatology and cosmetic science based on the experience of the sector of "Functional diagnostics of the skin" at the Department of Dermatology and Venereology, University Hospital "St. George", Plovdiv, Bulgaria. The literature review part provides an overview of current bioengineering methods for functional skin diagnostics. The apparatus used to carry out the present work is described in detail. Additionally, two little-known aspects of skin bioengineering research are presented - protocol and research ethics. Data on Bulgarian experience in the field of skin functional diagnostics have also

been reported.

D. Khazaka, C. Uhl, In-house tests complement CRO final product testing, PERSONAL CARE EUROPE. September 2019

Before a cosmetic product is offered on the market, final tests are obligatory for the manufacturer to prove its safety and to substantiate the various claims on the products, e.g. reduces wrinkles up to 20%, increases skin hydration for 24 h. There are no limits to modern claims. All over the world, contract research organisations (CROs) varying from small laboratories to vast multinational institutes offer their services to the cosmetic manufacturers to perform all kind of tests and compile the final necessary product documentation.

C. Uhl, Claim support for Microbiome Skin Care, happi, July 2019

Since the dawn of mankind, humans have struggled to understand why they were struck by disease. Many theories have been established, most of them discarded now. In the first century BC, Roman medical author Cornelius Aulus Celsus mentioned the term "virus", the Latin term for "poison". He used it to describe the phlegm that transmits rabies. Until the 17th Century, this term was used for all infectious diseases.

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.

C. Uhl, G. Lanzendörfer-Yu, How effective is your anti-acne product?, SPC December 2018

For assessing, treatment analysis and documentation, acne has to be either graded or lesion scoring has to be done. Both methods strongly depend on the skills of the examiner and bear high inter-individual deviations. Biophysical measurements using sebumetry, porphyrin fluorescence, and standardized photographic images of the face can overcome these disadvantages. Additionally, they can be used for comprehensive evaluation of the treatment protocol.

M. Gabarra Almeida Leite, P.M. Berardo Gonçalves Maia Campos, Evaluation of Oily Hair and Skin: Comparison between Self Perception and Clinical Analysis Using Biophysical and Imaging Techniques, Poster Presentation at ISBS Conference San Diego, May 2018

Introduction: Excess of oiliness can cause skin changes such as acne and compromise the cutaneous physiology, affecting of both skin and hair. Thus, the aim of this study was to evaluate skin and hair alterations due to excessive amount of sebum using biophysical and imaging techniques. Methodology: 100 participants (18 - 49 years), with oily skin and hair, were recruited. Skin was evaluated in terms of stratum corneum water content, TEWL, activity of the sebaceous glands, amount of porphyrins and pores. Scalp was evaluated in terms of sebum content. Results and Conclusions: Participants were divided 4 groups: 1- Oily skin and hair (45,23%), 2- Oily skin and normal hair (10,71%), 3- Normal skin and oily hair (34,52%) and 4- Normal skin and hair (9,52%). The participants with oily skin presented activity of the sebaceous glands of 9.1 ± 1.1 surface (%), high amount of pores and presence of porphyrins, and scalp amount of sebum of $330,6 \pm 9,8$ $\mu\text{g}/\text{cm}^2$. Although all the panelists considered their hair and skin oily, they were classified differently, showing that the tropical weather can influence the self-perception and lead to a wrong treatment without the correct evaluation.

M.L. Vazquez-Gonzalez, M. Cocerra, J. Nestor, G. Rodriguez, R. Saldana, L. Barbosa-Barros, O. López, **Innovative approach to control acne-prone skin**, PERSONAL CARE ASIA PACIFIC, March 2018, PERSONAL CARE EUROPE, April 2018, p. 153-156

Excessive sebum production can give rise to oily skin, shiny appearance, enlarged pores and favour the development of acne lesions. The care of acne-prone skin involves the use of harsh molecules, wash out and multi-step products that irritate the skin and limit user compliance. This study describes the development of a bicosome system that targets the epidermis and follicles to effectively deliver a sebostatic active compound and potentiate its effects on sebum production and acne lesion prevention. This is an alternative approach to that offered by current products, which can be included in the daily care of acne-prone skin.

J.P. Andrade, T.A.L. Wagemaker, D.G. Mercurio, P.M.B.G. Maia Campos, **Benefits of a dermocosmetic formulation with vitamins B3 and a B6 derivative combined with zinc-PCA for mild inflammatory acne and acne-prone skin**, Biomed Biopharm Res., 2018; (15) 2: p. 214-223

Acne is a chronic inflammatory disorder of the pilosebaceous follicles that affects 80% of the population. As topical agents for acneic skin treatment are often irritants, dermocosmetics, may improve therapy. Thus, we developed cosmetic formulations with nicotinamide (vitamin B3), pyridoxine tris-hexyldecanoate (a vitamin B6 derivative) and zinc- pyrrolidone carboxylic acid (PCA) in association, and evaluated their clinical efficacy, skin compatibility, and sensory properties. The formulation (vehicle) added with vitamin B3, the vitamin B6 derivative and zinc-PCA in combination was applied twice daily for six weeks on the forehead, malar and chin skin regions of sixteen subjects. Before (pre-treatment) and after treatment, these regions were evaluated using biophysical and skin imaging techniques. Inflammatory acne lesions were reduced by 60% after application of the complete formulation. Porphyrine reduction was shown in the majority of volunteers. The results shown an improvement of inflammatory acne lesions based on porphyrine reduction, lesion counts, skin compatibility and comedogenicity testing. The skin barrier function was not impaired by the experimental formulation, which demonstrates its efficacy in acne treatment without undesirable effects. The combination of Zn-PCA and vitamins B3 and B6 vehiculated in an adequate topical formulation can be considered as a safe and effective alternative treatment for mild inflammatory acneic skin.

C. Uhl, D. Khazaka, **Test equipment supports anti-pollution claims**, PERSONAL CARE ASIA PACIFIC, May 2017, p. 27-29 and PERSONAL CARE EUROPE, September 2017, p. 74-76

Pollution and its impact on the skin have recently become the main topic at all important cosmetic events, and products claiming to protect the skin from pollution effects are a major trend in the cosmetic and personal care industry.

V. Bicard-Benhamou, J. zur Lage, L. Heider, D. Kleefeld, S. Eisenberg, F. Pfluecker, **Evaluation of the potential of a cyclohexyloxy derivative targeting impure skins**, 42th SICCC National Congress & 1st IPCE Conference June 2017, Stresa, Italy

Butyl hydroxycyclohexane carboxylate (BHCC, structure shown on Figure 1, a cyclohexyloxy derivative is an adequate innovative solution to an issue well-known from our teenage years and yet more rarely associated with adulthood: oily skin and its impact on the appearance of acne formation. At all ages impure skin issues may lead to a real aesthetic problem considering that in nowadays life, image resulting from own appearance matters more and more and because it appears on body parts most exposed to view like for instance forehead, nose and chin. Oily skin may result in skin especially prone to open pores, blackheads, spots and pimples, skin appearing greasy and coarse and skin looking uneven. Most people associate oily skin with teenage years, but oily skin can persist long beyond adolescence and for some people it might last a lifetime. Nevertheless, acne most often begins in puberty when androgens level increases causing sebaceous glands to become more active resulting in increased sebum production. *Propionibacterium acnes* (*P. acnes*), mainly colonized in the pilosebaceous unit, plays a crucial role in the development of acne. Acne patients demonstrate marked increases of this microorganism (1), *P. acnes* and its metabolites, the porphyrins, are also associated with inflammation processes in the skin. The perception of the skin as an ecosystem can advance our understanding of the delicate balance between host and microorganism. Disruptions in the balance on either side of the equation can result in skin disorders or infections (2) and non-beneficial bacteria are associated with them. On the other way beneficial bacteria helps preventing pathogenic microorganisms from colonizing the surface of the skin and preserving them is essential. A healthy and balanced microflora is therefore crucial. BHCC helps relieving skin from susceptibility to acne development and supporting skin health. BHCC provides a triple effect: it Regulates Sebum, it Reduces inflammation, and

finally it rebalances skin's microflora and all the results shown here provide a scientific demonstration of these claims.

C. Oliveira, A. Silva, L. Fagundes, N. Raposo, A. Ferreira, M.A.F Brandão, H. Polonini, Development and Preliminary Cosmetic Potential Evaluation of Melaleuca alternifolia cheel (Myrtaceae) Oil and Resveratrol for Oily Skin, J Dermatol Res Ther 2016, 2:032, Volume 2, Issue 4

Background: Oily skin presents shine in excess, as well as increased pores and acne. For this reason, people with oily skin have more difficulty using cosmetics in general. This is the first report in literature to evaluate a multi-purpose dermatological emulsion containing *Melaleuca alternifolia* Cheel (Myrtaceae) (tea tree) oil and resveratrol for oily skin.

C. Richter, C. Trojahn, G. Dobos, U. Blume-Peytavi, J. Kottner, Follicular fluorescence quantity to characterize acne severity: a validation study, Skin Research and Technology 2016; 0: 1-9

Background: Porphyrins are native fluorophores in the follicle openings, visible under ultraviolet-A light. Acne severity might be associated with increased *Propionibacterium acnes* colonization and porphyrin production. Aim of this study was to investigate whether the parameter fluorescence quantity can be used to measure acne severity. Methods: A validation study was conducted in 24 patients with acne using split-face design. Acne severity was measured using Investigator Static Global Assessment scores and lesion counts. Reliability, construct validity and sensitivity to change in fluorescence quantity were investigated. Results: Mean baseline Investigator Static Global Assessment score was 2.7 (SD 0.1). Mean baseline fluorescence quantities were 24.8 (SD 4.0) on the cheek and 20.3 (SD 4.6) on the chin. On day 25, values ranged from 6.0 (SD 6.0) to 18.1 (SD 18.4) on the cheek and from 2.6 (SD 4.4) to 14.7 (SD 16.2) on the chin. The intraclass correlation coefficients of fluorescence quantity ranged from 0.513 to 0.987. Effect sizes for fluorescence measurements were highest on the chin and cheek ranging from 0.24 to 0.77 and 0.32 to 0.75, respectively. Conclusion: Fluorescence quantity indicates acne severity, especially on the inner cheek and chin areas. Fluorescence quantity is reliable but is not as sensitive as manual lesion counting.

S. Eisenberg, H. Hanau, D. Kleefeld, V. Bicard-Benhamou, H. Driller, 3R regulation of oily skin and microflora balance, Personal Care April 2016

There is something many of us remember from our teenage years but only a few associate with adulthood: oily skin. Oily skin is a major issue, because it affects those areas that are the most exposed, like the chin, forehead and nose. Oily and impure skin causes a real aesthetic problem and may lead to higher acne susceptibility. Even in adults, a healthy facial skin and complexion play an important role. Consumers around the world have become very self-conscious of their appearance.

S. Eisenberg, N. Beyer, J. zur Lage, A. Moschner, H. Driller, Regulator for oily skin and balance of skin's microflora, IFSCC Conference, Zurich 2015

In modern life, image matters and consumers around the world have become aware of their appearance. Oily skin is a major issue to some because it affects those areas that are most vulnerable and exposed, like the chin, forehead and nose. Additionally, oily and impure skin causes a real aesthetic problem as it may lead to a higher susceptibility of acne development. Alterations in the pilosebaceous unit, an association of sebaceous glands and hair follicles, are involved in acne development. Causes are increased sebum excretion, induced by e.g., stress and hormonal changes, colonization of the hair follicle by *Propionibacterium acnes*, alterations of lipid composition and its oxidization, and the release of inflammatory mediators into the skin. The skin is a complex ecosystem on its own, about 1.8m² in size, providing diverse habitats for a wide range of microorganisms. A balanced microbiota is usually related to healthier skin. Disruptions in microbial populations, therefore, can be linked to cutaneous pathological states such as acne and atopic dermatitis. Modulating unbalanced populations and their interactions, between microbiome and immune system, may prevent the risk of skin disorders, enabling a healthy and refined skin complexion. A new efficient cosmetic active has been designed to counteract oily skin and its consequences by reducing the sebum level and maintaining the skin's beneficial microflora. Consumers could, therefore, benefit from shine-free, clear skin and would be less susceptible to acne development and skin irritation.

G. Piérard, D. Khazaka, G. Khazaka, Sunscreen remanence on the skin: a noninvasive real time in vivo spectral analysis assessing the quenching of specular ultraviolet A light reflectance, Journal of Cosmetic Dermatology, 15, p. 3-9

Background: Under specific light illumination, particularly ultraviolet radiation (UVR), the skin produces both specular light reflectance and, possibly, specific fluorescent emission. A quenching effect of fluorescence is observed following the application of sunscreens active against UVA radiations. Aims:

To assess noninvasively in a real-time process, the potential sunscreen remanence/substantivity after application on the skin. Methods: The Visiopor[®] device was used in a real-time procedure after application of sunscreens to the skin. A quenching effect of follicular fluorescence due to bacterial porphyrins was evaluated at 30-min intervals. The Visioscan[®] device was used as a distinct UVA emitter in a control procedure of spectral analysis of specular UVR emission and reflectance by dermal fibres. Results: Under UVA-1 irradiations, facial skin produced different patterns of specular UVR reflectance and fluorescent emission as well. The porphyrin-related follicular fluorescence was instantly abated by UVA blockers present in skincare products. The potential sunscreen remanence/substantivity was assessed by the follicular and interfollicular fluorescence recurrence all along the next hours.

R.S. Teixeira, L.A. Araújo, D.G. Mercúrio, P.M.B.G. Maia Campos, Application of biophysical techniques to evaluate the efficacy of a gel with zinc pca, University of Sao Paulo, 2013

The biophysical and skin imaging techniques are effective tools to help characterize the skin type and to evaluate the clinical efficacy of products cosmetics because they are non-invasive methods and enable to evaluate the products directly in human skin.

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.

T. Hermanns-Lê, K. Al Rustom, C. Piérard-Franchimont, G.E. Piérard, S. Piérard, Le "cheetah-look" Le phenotype guépard, face cache de la pigmentation mélanique innée du visage, DERM ACTU No° 131 Mai-Juin 2012

Au niveau du visage, trois types principaux de pigmentation physiologique peuvent être distingués. On identifie d'une part des mélanoses zonales ethniques comme la pigmentation orbitaire. D'autre part, le territoire facial peut comporter des zones mélaniques discrètes limitées par des lignes de démarcation coadjuvées qui donnent un effet de "tigre-look" sous éclairage en lumière ultraviolette. Enfin, des mouche-tures relativement régulières, peuvent parsemer le visage, contribuant à un "cheetah-look" très particulier sous lumière ultraviolette. La lampe de Wood est un outil ancestral permettant des observations dans un spectre relativement étroit de lumière ultraviolette. Cet équipement centenaire a fait l'objet de transformations techniques nombreuses pour aboutir à des cameras de type Visioscan et Visiopor (C+K electronic, Cologne).

G. Mayeux. E. Xhaufaire-Uhoda, G.E. Piérard, Patterns of aluminium hydroxychloride deposition onto the skin, Skin Research and Technology, 2011

The normal stratum corneum (SC) is nearly impermeable except for some small size xenobiotics and a minute amount of water evaporating from its surface. This property supports the concept of a diffusional barrier function that may be weakened in some conditions. The remarkable barrier effect results from the highly organized structure of the SC. The predominant route for water passage is thought to reside in the intercorneocyte path composed of a complex mixture of lipids structured in rigid bilayer arrays. In practice, the measurement of transepidermal water loss (TEWL) is performed at rest in a cool environment in order to assess this physiological process. Under physical or emotional stress, TEWL is severely altered by sweating.

G. Szepetiuk, S. Pierard, C.M. Caucanas, Recent trends in specular light reflectance beyond clinical fluorescence diagnosis, Eur J Dermatol 2011; 21(2): p. 157-61

For centuries the human eye was the only imaging device. Since the introduction of microscopy, technical advances have been progressively brought through instruments. In fact, a considerable

research effort has been launched and rapidly improved new imaging technologies over the past two decades. They have been successfully applied to skin observation, each of them affording new insight into and specific information on cutaneous morphology and physiology. In this field, we are looking at what the eye has never seen before.

G.E. Piérard, C. Piérard-Franchimont, P. Humbert, Bioimpact of EGFR antagonists on the pilosebaceous follicles, Eur J Dermatol 2011, p. 1-4

Cancer patients under targeted chemotherapy to the epidermal growth factor receptor (EGFR) frequently suffer from unusual skin adverse events. In the past, these changes were globally qualified as a rash. Our aim was to assess objectively by non-invasive bioinstrumentation some early structural and functional skin changes associated with EGFR inhibitor treatment. A series of 27 cancer patients aged 58-66 years were assessed using two ultraviolet light emitting CCD cameras, Visioscan and Visiopor. Assessments were performed on the foreheads at inclusion and therefore at weekly intervals for 2 months at most. No topical treatment was applied during the assessment period.

G.E. Piérard, S. Seité, A. Rougier, P. Quatresooz, Analytic assessment under ultraviolet light of actinic lentiginos under bleaching treatment, J Cosmet Dermatol. 2011 Jun;10(2): p. 104-109

Actinic (solar) lentiginos are melanitic tumors frequently developed during photoaging on the dorsum of the hands. Bleaching (whitening) agents are commonly offered to fade their darker aspect. In general, regular colorimetric methods show poor sensitivity to disclose any bleaching effect. The present randomized controlled study on 24 women was designed to objectively assess the clinical efficacy of a combination of bleaching agents on actinic lentiginos. In the endeavour of improving sensitivity. The ultraviolet light-enhanced visualization (ULEV) method was used to derive analytical measurements of lentigo areas and darkness.

C. Piérard-Franchimont, P. Quatresooz, G.E. Piérard, Specular light reflectance of flakes in seborrhoeic dermatitis of the scalp: a pilot study; Experimental Dermatology 2011, p. 1-4

Seborrhoeic dermatitis and dandruff are common scalp conditions. In this study, we set out to explore a new method for rating both the severity of the scalp condition and the efficacy of scalp-care compounds. Scalp flakiness was sampled for 40 volunteers using adhesive-coated clear discs, with image analysis used to quantify the specular light reflectance (SLR) of the flakes. Two ultraviolet (UV)-emitting charge-coupled device cameras (Visioscan VC98 and Visiopor PP34) were used. SLR clearly highlighted the flakiness with high contrast against a black background, and the recorded appearance could be conveniently submitted to the image-analysis system for quantification. In conclusion, SLR under UV illumination highlights scalp flakiness, allowing objective measurements.

G. Szepetiuk, S. Piérard, C. Piérard-Franchimont, M. Caucanas, P. Quatresooz, G.E. Piérard, Recent trends in specular light reflectance beyond clinical fluorescence diagnosis, Eur J Dermatol 2011; p. 157-161

Under specific light illumination, particularly ultraviolet (UV) and near-UV light stimulation, the skin produces both specular light reflectance and, possibly, specific fluorescent emission. These properties offer diagnostic clues and disclose some peculiar functions of the skin. A series of superficial infections (erythrasma, some tinea capitis types, tinea/pityriasis versicolor, dermatophytoses, etc.) and pilosebaceous follicles enriched in *Propionibacterium spp* show fluorescence. This latter characteristic is downgraded or lost while on some anti-acne treatments. A quenching effect of fluorescence is observed following the application of sunscreens.

G. Szepetiuk, G.E. Piérard, Scrutinizing the antibacterial effect of acne treatments using the novel Visiopor PP34 camera, Household and Personal Care TODAY – n 3/2010

Acne is a common disorder in adolescents and young adults. It results from alterations taking place in pilosebaceous follicles. These structures are most abundant on the face, chest and upper back. Several sequential biological steps are involved in the initiation, maturation and regression of each acne lesion. At first, during the preadolescent age, hormonal changes progressively lead to increased circulating androgens, both in boys and girls. Androgen receptors are present in the sebaceous gland apparatus. Their stimulation leads to increasing the size of the sebaceous gland, the sebum flow (skin greasiness) and the size of opening of the excretion duct at the skin surface (skin pore, acroinfundibulum).

H. Dobrev, Fluorescence diagnostic imaging in patients with acne, 2010 John Wiley & Sons A/S, Photodermatology, Photoimmunology & Photomedicine

Acne is a chronic inflammatory disorder of the pilosebaceous follicles with a multifactorial etiology and pathogenesis. It typically begins in adolescence when androgen hormones stimulate the production of sebum and proliferation of follicular epidermis. In consequence, the openings of hair follicles become plugged with oil secretion and corneocytes. The follicular impactions develop into initially invisible lesions (microcomedones) and then into clinically evident comedones.

*E. Xhaufnaire-Uhoda, G. Szepetiuk, A. Schreder, F. Henry, G. Piérard, **Tracabilité de la fluorescence folliculaire due à Propionibacterium acnes. Effet d'extinction par certains anti-acnéiques et des crèmes solaires**, Skin, Vol. 13 No. 3, 2010*

Diverses structures cutanées peuvent émettre une fluorescence en réponse à la stimulation lumineuse spécifique d'un fluorophore particulier. En particulier, la fluorescence de porphyrines peut être détectée sous différentes illuminations dans le spectre allant de la lumière bleue aux rayons ultraviolets dont la longueur d'onde est comprise entre 300 et 450nm. La source lumineuse d'excitation peut être la lumière de Wood, celle d'une lampe à arc, d'une lampe au krypton, d'une lampe à mercure avec un filtre adéquat, d'une source lumineuse bleue incohérente ou violette dont la longueur d'onde se situe au pic d'excitation de la fluorescence, ainsi que de lampes diodes particulières et de quelques autres systèmes encore. Sous ces stimulations, la fluorescence des porphyrines apparaît rougeâtre.

*H. Dobrev, **Use of Visiopor to Study Skin Fluorescence in Acne**, 6th Regional Conference of Dermatology and Venerology, 30.04.-02.05.2010, Hisarva, Bulgaria*

Acne vulgaris – Definition: Acne vulgaris is a chronic inflammatory disease of the pilosebaceous units that affects 80% of people between the age of 11 and 30 years. Acne – Multifactorial pathogenesis: Retentional hyperkeratosis; Increased sebum production; Propionibacterium acnes; Inflammation Acne and skin microflora: Acne is not infectious. Cutaneous microflora is an element of acne pathogenesis which contributes to the inflammation. Cutaneous microflora is of secondary importance compared with: sebaceous gland activity; heperproliferation of follicular keratinocytes (significant microbial involvement occuring only after sebum production has increased and comedone formation has become established.

*A. Gianetti, **The European aesthetic guide**, Autumn 2008, S. 43-50*

As in previous years, the congress will be accompanied by a highly impressive industrial exhibition featuring app. 300 companies and a large poster display. Global laser and light technology manufacturers, as well as companies from diagnostic, dermal filler, implant, pharmaceutical and neutraceutical industries will use this opportunity to display product innovations and introduce new clinical results.