Literature List

**Tewameter®**


The different reactivity of black and white skin after exposure to sodium lauryl sulphate (SLS) has been investigated. 9 white and 10 black male volunteers entered the study. The tests were performed on the back at 3 sites: untreated skin, skin pre-treated with occlusion and skin pre-delipidized. Irritant reactions were elicited applying 0.5% and 2.0% SLS via Finn chamber patch tests and monitored by means of laser Doppler velocimetry (LDV), transepidermal water loss (TEWL) and stratum corneum water content (WS). Higher TEWL, LDV, and WC values were recorded for 2.0% SLS when compared to 0.5% SLS and baselines. Pre-treatment with short-term occlusion generally increased values, while delipidization produced flattening of the data more detectable in whites than in blacks. Significant TEWL differences for two concentrations were recorded in whites for the occluded site (P<0.02) while in blacks in the untreated (P<0.04) and delipidized (P<0.03) sites. LDV revealed significant changes in the untreated and pre-occluded white skin (P<0.05 and 0.01, respectively). In blacks, the values were significantly different only in the pre-occluded skin (P<0.01). Water content correlated with the visual score and was greatly increased in sites with strongly positive reactions (P<0.01). It appears that there are significant differences in the modulation of irritation, in the behaviour of water barrier function and of the erythematous response between blacks and whites. Clinical correlations are discussed.


The influence of eccrine sweating on transepidermal water loss (TEWL) was investigated. TEWL was simultaneously measured on both forearms, with and without topical inactivation of the eccrine sweat glands by 0.3 ml of 0.5% aqueous scopolamine hydrobromide (HBr), applied under 1 h occlusive patches. The degree of sweat inhibition, after exercise was measured at 2,3 and 4 h after patch removal. In 42 out of 44 subjects, complete sweat inhibition (on exercise) was achieved only at 4 h after removal. After a 15-min rest in a room at 20 degrees C, the pre-exercise TEWL values (at 4 h) on the treated and untreated sites were not different (P>0.05), in 38 out of 44 subjects.


Even though various experimental methods have been proposed for in vitro testing of detergents such as SLS (sodium laurylsulfate) no absolutely relevant clinical information can be inferred from them as to the irritancy of a given compound. In particular the relative importance of pH needs further assess-
ment. This study reports on in vivo evaluation of skin function changes under given experimental conditions with SLS applied at 3 different pH values. There is a dramatic increase of transepidermal water loss (TEWL), i.e. a substantial reduction in the barrier function of the skin, when SLS is applied under occlusion for 48 H. The alkaline control solution (NaOH pH 9) induced low-grade, but significant TEWL increases, as compared to the other controls (distilled water pH7; HCl pH5), which had no influence on TEWL. The changes obtained with the controls were much lower than those observed with SLS. The barrier-function changes induced by the surfactant SLS could, however, promote transepidermal passage of acid and/or alkaline molecules, hence increasing toxic damage of the skin; yet no such effects could be observed, indicating that the main effects are due to detergency. Assessment of cutaneous blood flow values (CBFV) by laser Doppler velocimetry showed increased values after SLS. When pH-adjusted SLS solutions were compared, there was neither a difference in relation to pH nor did the control solutions induce any significant CBFV change. This study reveals that TEWL and CBFV are probably the most reliable methods to investigate acute irritancy by SLS. Accordingly, pH cannot be considered as a major contributive factor of irritancy when SLS solutions are applied under occlusion (48H). The current level of sebaceous secretion and the electrical properties of the skin surface were not parameters to evaluate acute SLS-induced skin damage, but longitudinal studies are presently being conducted in order to assess their significance in monitoring epidermal repair after SLS insults.

D. van Neste, In-vivo evaluation of unbound water accumulation in stratum corneum. The influence of acute skin irritation induced by sodium laurylsulfate, Catholic University of Louvain 1990

In a series of previous experiments, we showed that the inflammatory response associated with skin barrier function damage induced by sodium laurylsulfate (SLS) was correlated with the concentration of SLS and with the duration of application under occlusion of the surfactant.

A. Teglia, G. Mazzola, G.F. Secchi, Relationship between Chemical Characteristics and Cosmetic Properties of Protein Hydrolysates, 17th IFSCC Congress, Yokohama/Japan, 10/92

More than 20 protein hydrolysates, taken from the market or especially prepared for the test, of animal and vegetable origin and with significantly different molecular characteristics were tested and compared with respect to three cosmetic properties: substantivity to hair, reduction of sodium laurylsulfate (SLS) irritation and foaming. Peptide adsorption on hair was evaluated on virgin and damaged tresses after incubation with 2.5% hydrolysate solutions, re-extraction with 50°C hot water and high ionic strength solution and quantification after fluorescamine reaction. Inhibition of induced SLS skin and eye irritation was evaluated by visual scoring, moisture content of the horny layer (Electric Capacitance, EC) and transepidermal water loss (TEWL) measurements after skin chamber application and by Eytex methodology. Foaming properties were evaluated by standard Ross-Miles method. Molecular size, net charge and hydrophobicity were studied as important parameters affecting these cosmetic properties and were related to the origin of hydrolysates and the characteristics of the manufacturing process.

P.J. Frosch, A. Schulze-Dierks, M. Hoffmann, I. Anselm, Efficacy of Skin Barrier Creams, Contact Dermatitis, 1993

An improved human model for the quantification of skin barrier creme (BC) is described. In contrast to the previously published procedure the back instead of the forearm and a total of 4 irritants are used. Due to the larger area 3 BC formulations can be simultaneously compared to the control field which received the irritant only without BC-pretreatment. On 10 human volunteers the irritants 10% sodium lauryl sulfate (SLS), 1% sodium hydroxide (NaOH), 30% lactic acid (LA) and undiluted toluene (TOL) were applied via large Finn chambers for 30min, 5x during the first week and 4x during the second one. Taktosan Salbe (water-in-oil emulsion) and RAWI speerschutzcreme (oil-in-water emulsion) had been applied 30 min before contact with the irritants. In order to assess reproducibility and interindividual variation the BC RAWI was tested in duplicate. Irritant cutaneous reactions were quantified by 4 parameters: erythema score, transepidermal water loss, blood flow volume and stratum corneum hydration by measuring capacitance. The results showed marked differences in efficacy. Taktosan suppressed significantly the irritation of SLS, NaOH and LA, apparent in nearly all parameters. RAWI caused significant
inhibition of the SLS irritation and a positive trend against NaOH and LA was observed. Both BC failed against TOL. The results of the suplicate testing with RAWI showed a good reproducibility. The dogma that oil-in-water emulsions are primarily effective against lipophilic irritants and water-in-oil emulsions against hydrophilic ones needs to be re-evaluated on the basis of our findings. This model seems to have potential for further studies on BC and might elucidate the complex interaction of BC with irritants.


Bei 279 Mitarbeitern wurde der Atopie-Score bestimmt, an vier verschiedenen Körperstellen (Unterarmstreckseite, Unterarmbeugeseite, Handrücken und Handfläche) wurde der Transepidermale Wasserverlust (TEWL) gemessen. Es zeigt sich, daß der Atopie-Score und der TEWL unabhängige Größen sind.

A.O. Barel, P. Clarys, Study of the Stratum Corneum barrier function by Transepidermal water loss (TEWL) measurements. Comparison between two commercial instruments: Evaporimeter® and Tewameter®, (Studio sulla funzione barriera dello strato comeo per mezzo della perdita di umidità per traspirazione cutanea (TEWL). Confronto tra due strumenti: Evaporimeter® e Tewameter®), Cosmetics & Toiletries Ed.It.n. 1/94

The measurement of Trans Epidermal Water Loss (TEWL) is an important non invasive method for assessing the efficiency of the skin as a protective barrier. As a consequence, the measurement of TEWL provides information concerning the integrity of the epidermis in normal, irritated and diseased skin situations, concerning the effects of chemicals on the surface of the skin and concerning the objective evaluation of occlusive pharmaceutical and cosmetic preparations. In the past different non invasive methods and instruments have been developed to measure TEWL. Until recently, the only commercial available TEWL instrument was the Evaporimeter® made by Servomed, Sweden, based on the open chamber evaporation gradient method. This widely used instrument, measures the water evaporation gradient developed from the skin surface in an open chamber system. Hygrosensors coupled with thermistors measure at two different distances from the skin surface, the water evaporation at the skin surface. Recently a new instrument based on the same principle of measurement of the water evaporation gradient in an open chamber, was developed and became commercially available: Tewameter TM 210® made by Courage+Khazaka, Germany. It is the purpose of this chapter to compare the two commercial instruments under identical experimental conditions. The following parameters will be comparatively analyzed and described: general technical description of the probes and the instruments, evaluation of the accuracy, reproducibility and range of TEWL measurements and a comparative study of some typical applications of TEWL measurements in dermato-cosmetic research. TEWL-measurements were carried out with both instruments after stripping, occlusion and the treatment with irritant detergents.

J. D. Johansen, D. Ramsing, G. Vejlsgaard, T. Agner, Skin barrier properties in patients with recessive x-linked ichthyosis, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

Recessive X-linked ichthyosis (RXLI) is scaling disorder of the skin with the biochemical abnormality known to be steroid sulphate deficiency. In epidermis levels of cholesterol are decreased and levels of cholesterol sulphate increased. The influence of this disturbed lipid composition of the epidermis with respect to skin barrier function was examined in the present study. Skin response to patch testing with sodium laurel sulphate (SLS) 0.5% for 24 hours was evaluated in 13 patients with RXLI and 15 age- and sex-matched controls. Basal skin properties and skin response to SLS were studied by measurement of transepidermal water loss (TEWL), skin hydration (electrical capacitance), and erythema index. No statistically significant difference in basal TEWL was found between RXLI patients and controls. Skin hydration, as reflected by electrical capacitance of the skin, was significantly decreased in patients with RXLI. After exposure to SLS TEWL was significantly increased in control subjects as
compared to ichthyosis patients (p=0.047). Increase in TEWL after SLS-exposure was statistically less for RXLI patients than for controls (p=0.0049). No statistically significant difference in erythema index was found between the two groups in basal values or in values obtained after SLS-exposure. The implication of the study is a better understanding of the skin barrier function in scaly disorders.

A.M. Grunewald, M. Gloor, Value of barrier creams against skin damage due to repeated washings, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

The aim of our study was to evaluate the protective effect of barrier creams onto irritant contact dermatitis. Therefore the following skin function parameters were evaluated: corneal lipids (sebumetry), water content of the corneal layer (corneometry), transepidermal water loss (TEWL), pH of the skin, skin reddening (colorimetry) and skin blood flow (laser doppler flow). We did standardized washings of both arms on the first and the 8th day. The subjects were asked to wash 5 times daily for one week. In a first study we evaluated the irritating effect of repeated washings with 0.01 mol/l sodium lauryl sulphate solution on 20 subjects. We were able to show that there is a more than 12 hours lasting change in skin function parameters after one week of repeated washings. Concerning corneometry, corneal lipids, tewl, pH and laser doppler flow there were highly significant differences before and after repeated washings (p<0.01). In a second study we evaluated the irritation reducing effect of 3 barrier creams on 15 subjects for each cream. Using the same method as in our first study, one selected arm was additionally treated with a barrier cream 5 times daily. Barrier creams had a highly significant (p<0.01) effect on laser doppler flow, corneometry and tewl. Nevertheless they were not able to offer complete protection. The different barrier creams showed significant differently positive effects onto skin function parameters.

A. Kurte, P.J. Frosch, What is the optimal time course of application for barrier creams?, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

There is no scientific data on the optimal timing of barrier creams (BC) regarding the contact with the irritant. Most of all it is totally unclear whether the application before contact with the irritant is more effective than afterwards. Therefore we studied a popular BC (Atrix Handcreme, Beiersdorf) in our recently described Repetitive Irritation Test on human volunteers with four standard irritants and changed the mode of BC application as follows: 30 min before the irritant, 30 min before and 30 min after the irritant, and 30 min after the irritant only. On normal back skin of 10 volunteers the 4 irritants were applied via large Finn chambers for 30 min: 10% sodium lauryl sulphate (SLS) 1%, sodium hydroxide (NaOH), 30% lactic acid and undiluted toluene. Control fields received the irritant only. Cutaneous irritation was quantified by use of non-invasive bioengineering techniques (TEWL), blood flow volume, capacitance for stratum corneum hydration) and a clinical score for erythema. The results showed marked differences regarding the 3 types of application of BC. Overall, best protection was observed when the BC was applied before and after the irritants; significant differences vs control were found for nearly all parameters. The application before the irritant was almost as effective as before and after for SLS and NaOH, but markedly less effective for lactic acid. For the latter irritant the third mode of BC application (only afterwards) showed striking efficacy, but was least efficacious for the other irritants. The results demonstrate that the degree of inhibition of irritancy depends on the time sequence of BC application. Usage before and after the irritant may be more effective than only one application. For some irritants the application after the irritant may be just as effective as the application before. This observation may have important implications for work places where BC cannot be used before or during working hours.

C. Münzberger, U.F. Haustein, U. Elefant, Effects of UVA- and UVB-radiation on transepidermal water loss, water content of the horny layer and skin surface lipids, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

In the last year many studies have provided important new knowledge concerning the benefits and risks of skin exposure to sunlight and ultraviolet radiation, among them the acute and chronic effects on damage of the skin barrier. We examined the transepidermal water loss, the water content of the horny layer and the amount of skin surface lipids in relation to low dose UV-radiation. The transepidermal water loss was measured with the TEWAMETER TM 210, the water content of the horny layer with the
The aim of the present study was to assess the cutaneous response to repetitive applications of subthreshold concentrations of the same irritant or a combination of irritants, using objective non-invasive measurements as well as visual scoring. Ten subjects were patch-tested to determine the minimal irritant dose (MID) to dilutions of aqueous sodium lauryl sulphate and lactic acid. Each subject was then patch-tested for a period of 24 h with half of MID of each chemical (10 patches of each). At 25 h additional patches were applied over the same sites, containing five successive twofold dilutions of each irritant, starting with half of MID. Each chemical was thus applied onto itself and onto the other chemicals as well. In addition, combinations of half the MID of each substance and twofold dilutions of the other were also applied for two consecutive periods of 24 h. At 25 and 49 h the cutaneous changes were monitored by using the non-invasive methods of laser Doppler flowmetry and reflectance spectrophotometry, in addition to visual scoring. No visual changes were detected, whereas significant differences between the various patch-testing combinations were detected by the instrumentation. Cutaneous blood flow over sites treated with half the MID of one substance increased upon an additional 24 h period of occlusion with half the MID of the other substance (p<0.05), and in several occasions even with a quarter of the MID. Repeated application of certain combinations of the substances resulted in an elevated blood flow as well. Reflectance spectrophotometric measurements gave similar results, with the additional finding of an elevation upon reapplication of the same substance (p<0.05). These results may provide initial insight into the interaction between the skin and irritants. Although no visual alterations could be detected, the noninvasive instruments were able to detect cutaneous responses to consecutive applications of subthreshold concentrations of various combinations of two chemical irritants. The detectable changes obtained with the addition of a quarter of the MID on top of half of it suggest an augmentation of the response.


Complaints about "allergies to dental alloys" encounter frequently the dermatologists or dentists office. "Standardised patch tests" may then be performed on the patients back. However, the stratum corneum provides a barrier against transepidermal water loss (TEWL) as well as unlimited penetration of chemicals. The quality of the barrier varies between the different regions of the body (oral, back, arm). In this context, we posed the question, whether the current standardised patch test procedure of dental alloys on the back is optimal. Therefore, we performed triplicate patch tests on 30 patients with "oral complaints to dental alloys". Patch tests were applied on the back and the insides of both upper arms. The skin surface of one arm was pre-treated with acetone wipes in order to disturb the stratum corneum barrier prior to the application of the patch test. The individual TEWL was measured prior and after to the acetone wipes. The patch test procedure was performed according to the recommendations of the German contact dermatitis group. Of the 30 patients tested, 15 patients revealed reactions to dental alloys. Thereof, 5 (33%) patients reacted in triplicate, 8 (53%) reacted only on their arms (duplicate) and 2 (13%) reacted only on the acetone-pre-treated arm. Reactions to benzoylperoxide (7), cadmiumchloride (6), sodiumthiosulfatoaurate (4) and zincchloride (4) were observed. We conclude, that patch testing of dental alloys may better be performed on the upper arm, where the physiological stratum corneum is


The ultraviolet radiation of 25 healthy adults was performed with UVA (Philips TL-K 40W/09N) and UVB (Philips TL 20W/01). One time radiation with UVA as well as with UVB did not show significant changes on all measured biophysical parameters. Transepidermal water loss, the water content of the horny layer and the amount of skin surface lipids were not different before radiation and 5 minutes, 1, 2 and 24 hours after radiation. On the contrary cumulative radiations 4 times per week resulted in damage of the skin barrier and showed changes of the biophysical parameters measured.
thinner, yet disruption of the epidermal barrier with acetone wipes in general, is not necessary to prevent false negative results on the back.

V. Rogiers, D. Roseeuw, TEWL measurements in patch test assessment: The need for standardisation, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

When soap, shower and shampoo formulations are brought in contact with skin, irritation may occur which can be assessed by TEWL measurements. Of utmost importance is that the methods involved are well standardised. The aim of this study was to develop such standardised conditions for TEWL measurements and patch testing. For TEWL measurements the TEWA-meter was used. Several of the factors studied play an important role: the measuring probe should be warmed up to body temperature (30.9 ± 1.0°C) before measurements are carried out; the pressure on the measuring probe must be kept constant; a shielding box should only be used when excessive air turbulence can occur; the location of the measurements site on the body is a variable. Corresponding places on the right left forearm exhibit the same TEWL; the environmental temperature and relative humidity must be kept constant; cleaning procedures of the skin may affect TEWL measurements. Factors of minor importance seem to be age and sex of the volunteers. Under standardised conditions the reproducibility of the TEWL measurements on the forearm of 20 female volunteers between 23-27 years old during one month was high: CV = 5% at the individual level and 10% at the group level. For patch testing different methods were compared taking into account the factors that affect TEWL measurements. When aqueous detergent solutions (1% sodium laurylsulfate (SLS) in desionised water was taken as a reference) were patch tested, factors affecting TEWL measurements were found to be the volume of the detergent solution on the patch, the occlusiveness of the dressing, the use of an appropriate blank, the occlusion time and the reading time after air exposure. When under these standardised conditions the irritancy potential of two new non-ionic surfactants, capryl/capryl glucoside and decyl glucoside, was measured on the forearm of 13 volunteers (female between 20-29 years old) versus the amphoteric surfactant cocamidopropylbetaine and the anionic SLS, the following ranking was found: water < alkyl glucosides < beta-ine < SLS.

S.M. John, U. Gödecke, H.J. Schwanitz, Bioengineering of the skin as a tool for primary prevention of occupational skin disease? A nine-months experience, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

Introduction: Which factors influence individual susceptibility to develop dermatitis in wetwork? Little is known so far, even less has been incorporated in legal requirements. To date, in Germany, youths at risk are presently - if at all - screened for irrelevant disorders like acne. An objective instrument for efficient pre-employment counselling in wetwork is needed. Methods: Prospective studies are the only valid study design when the role of endogenous factors such as "skin sensitivity" is to be investigated. A prospective cohort study in hairdressers’ apprentices was designed correlating anamnestic and clinical findings (e.g. Erlangen atopy score) with bioengineering methods (transepidermal water loss [TEWL], microcirculation [LDF], pH, sebum, temperature). The intended observation period is to be three years (full educational cycle), the observation intervals were 3 months in the first year of training, and will then be 6 months. Results: The results of the first nine months of the study are now available, including 4 investigations in 3-months-intervals in the first year of training, and will then be 6 months. Results: The results of the first nine months of the study are now available, including 4 investigations in 3-months-intervals. So far 92 junior apprentices were investigated, 62 within the first 20 days of professional training. Within the observation period 25 (27%) developed moderate or severe occupational dermatitis at any one stage, 39 (43%) developed mild dermatitis, 28 (30%) apprentices did not develop dermatitis (yet). 6 of 92 left the profession for reasons other than the skin, 7 (8%) had to give up for occupational skin disease. Clinical parameters (Erlangen atopy-score) so far do not significantly correlate the development of contact dermatitis, nor do the investigated bioengineering parameters (including TWL) compared to unaffected controls. However, there was a significant increase of RWL within
the first six months of training in "cases" and controls, which afterwards normalized in unaffected individuals. Conclusion: The aim of this study is to develop a skin sensitivity score (SSS) as an objective and predictive parameter in network by combination of (a) clinical and (b) non-invasive bioengineering parameters. This aim has not yet been reached. More epidemiological data is needed. Work-related monitoring using bioengineering methods may become of importance for early diagnosis of occupational contact dermatitis.

P.G.M. van der Valk, G. Zarafonitis, *Horny layer thickness as assessed functionally by sellotape stripping and transepidermal water loss does not predict sodium lauryl sulphate skin irritations*, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

To elicit an irritant or allergic skin reaction a chemical has to penetrate the skin. The horny layer plays an important role as a barrier for most chemicals. Therefore it seems likely that horny layer barrier function is important in preventing allergic and irritant contact dermatitis. Differences in horny layer barrier function may account for differences in susceptibility to irritants. The thickness of the horny layer may be an important factor in barrier function. If it is assumed that by sellotape stripping a layer of corneocytes is removed with a constant thickness both between subjects and within subjects and permeability constants do not vary the thickness of the horny layer can be estimated according to Fick's law by the number of strips needed to increase permeability. Transepidermal water loss (TEWL) has been suggested as an indicator for horny layer barrier function. Stripping the skin with sellotape increases transepidermal water loss according to Fick's law. We studied the correlation between the number of sellotape strips needed to remove a constant functional part of the horny layer as assessed by transepidermal water loss with the response of the skin to a standardised irritant stimulus. In 20 subjects a site on the volar side of the forearm was tapestripped until TEWL was 40 g/m²/h. On the contralateral side of the other forearms skin was patch tested 48 hours to sodium lauryl sulphate (SLS) 3%. Redness of the exposed skin was read semi-quantitatively on a 0-4 scale after the exposure.

A. Hannuksela and M. Hannuksela, *Irritant effects of a liquid detergent in wash and chamber tests*, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

Irritant properties of a detergent can be tested by using patch and chamber tests and various kinds of use tests. The aim of the present study was to compare the results of use and 12 mm Finn Chamber tests.

The study subjects (10 atopic and 11 non-atopic medical students) washed the outer aspects of their upper arm with a liquid detergent for one minute twice daily for one week. 48 h chamber tests with five concentrations of the same detergent in water were concurrently applied to the upper back skin. Transepidermal water loss (TEWL), electrical capacitance and skin blood flow were measured to quantify the reactions on day 0, 2, 5 and 7. Irritant dermatitis developed equally in the atopics and non-atopics in the wash test, whereas in the chamber in the TEWL was significantly higher in the atopics than in the non-atopics. The chamber test results thus predicted poorly the results of the wash test.

P. Treffel, B. Gabard, E. Bieli, *Stratum corneum (SC) dynamical function measurements after irritant and moisturizer application*, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

This study was conducted on the ventral forearm of 6 healthy volunteers. Sorption-Desorption Test (SDT) and Moisture Accumulation Test (MAT) were performed with a Nova ™ DPM 9003. Each test was quantified by 3 parameters. SDT: Pre-Hydration State (PHS), Hygroscopicity (H), Water Holding Capacity (WHC). MAT:PHS, Water Accumulation Velocity (WAV), Water Accumulation (WA).

W. Matthies, *Assessment of skin compatibility of consumer products - Current strategy and methods in industry (exemplified on a dishwashing liquid)*, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

Improvement of skin compatibility is a priority task in formulating consumer products. Experience shows, that control of typical skin diseases like desiccation eczema of the hands may be reached by
adequate protection and skin care, but these proportions being not always followed by the consumer. Therefore, it is a special task for industry to optimize products with respect to skin compatibility using milder surfactants, refattening agents, or other caring substances, whenever possible. Decisive instruments for improvement of formulations are standardised test models, which help comparing characterising and quantifying effects of formulations for their differentiation, and generating use related data. Modern laboratories work with in vitro screening, e.g. cell culture techniques, skin explants or physiologic membranes in order to evaluate toxic effects of substances and formulations (Neutral red test, skin culture, HET-CAM Model on the Chorioallantoic membrane of hen's eggs). After generating those screening data, further investigation can be performed directly in human volunteers, if general toxicity for man can be assessed as negligible and local tolerance is foreseeable good. In humans maximal short term exposition (contact with undiluted product) can be tested in an open epicutaneous test after Burckhardt. This model is suitable for classification of products according to their irritation potential, but also for assessment of use conditions, when the product is intended to be used for short time contact with the skin, only. Occlusive patch test techniques are useful for comparison of numerous variants in the same individual regarding primary irritation and kinetics of local toxic effects. Besides primary irritation mainly chapping and dryness reactions give hints for different mechanisms of action of substances on or in the stratum corneum. Assessment of the in-use situation needs test methods, which reflect the foreseeable overuse/misuse or the real home use condition. Measurements of physiologic function with physical methods (Laser Doppler Flow, TEWL, Capacity, pH-value measurement, image analysis etc) enable the investigator to objectify results and to survey studies with larger numbers of participants who are using products under real use conditions. As an example results with a new dishwashing liquid show, that this procedure is suitable to demonstrate improvement of products towards better compatibility which also can be experienced by the consumer condition.

P. J. Frosch, A. Kurte, Efficacy of skin barrier creams (IV). The repetitive irritation test (RIT) with a set of 4 standard irritants, Contact Dermatitis, 1994. 31. 161-168

An improved human model for the quantification of skin barrier creams (BCs) is described. In contrast to the previously published procedure, the back, instead of the forearm, and a total of 4 irritants are used. Due to the larger area, 3 BC formulations can be simultaneously compared to the control field, which receives the irritant only, without BC-pre-treatment. On 10 human volunteers, the irritants 10% sodium lauryl sulfate (SLS), 1% sodium hydroxide (NaOH), 30% lactic acid (LA) and undiluted toluene (TOL) were applied via large Finn Chambers for 30 min, 5 x during the 1st week and 4x during the 2nd week. Taktosan Salbe (water-in-oil emulsion) and RAWI Speerschutzcreme (oil-in-water emulsion) were applied 30 min before contact with the irritants. In order to assess reproducibility and interindividual variation, the BC RAWI was tested in duplicate. Irritant cutaneous reactions were quantified by 4 parameters: erythema score, transepidermal water loss, blood flow volume and stratum corneum hydration by measuring capacitance. The results showed marked differences in efficacy. Taktosan significantly suppressed irritation by SLS. NaOH and LA, which was apparent in nearly all parameters. RAWI caused significant inhibition of SLS irritation, and a positive trend against the NaOH and LA was observed. Both BCs failed against TOL. The results of duplicate testing with RAWI showed good reproducibility. The dogma that oil-in-water emulsions are primarily effective against lipophilic irritants, and water-in-oil emulsions against hydrophilic irritants, needs to be re-evaluated on this basis of our findings. This model seems to have potential for further studies on BCs and might elucidate the complex interaction of BCs with irritants.

M. Ghyczy, J. Greiss T. Kovats, Liposomes from Vegetable Phosphatidylcholine, Cosmetics & Toiletries, July 1994

The structure of the skin, especially the stratum corneum with its important function as a barrier to minimize transepidermal water loss (TEWL), has been extensively studied and reviewed. During the proliferation of epidermal cells and their migration from the basal layer to the upper layer of the stratum corneum, cell differentiation is accompanied by a tremendous change in metabolic activities.
The aim of the study was to data about the distribution and variation of bioengineering parameters in the general population (GP).

We performed two prospective studies to analyse the irritant effects of different water-based cutting fluids (CF) in healthy subjects, atopic and exposed metal industry workers of a German automobile factory.

The repeated use of anionic-based detergents is reported to induce adverse events on the human skin, such as alteration of the stratum corneum barrier function and increase of roughness. Our investigation focused on quantification and comparison of the protective effects of mild surfactants and protein derivatives in simple and complex tenside systems based on sodium lauryl sulfate, sodium laureth sulfate and sodium C14-16 olefin sulfonate. Cocamidopropyl betaine, cocamidopropylamine oxide and alkyl polyglucoside were used as mild surfactant additives; wheat proteins with different average molecular size were tested. The variations in skin permeability were assessed by TEWL measurements. The changes in skin surface morphology were analysed by three-and two-dimensional roughness parameters of the skin relief. Exposure models were based on the soap chamber test and on standardised washing procedures. Proteins and mild surfactants show comparable efficacy in the one-day occlusion tests, but better results were observed for proteins in the occluded and open repeated exposures.

The cosmetological potential of alpha hydroxyacids (AHA’S) is still evolving. The powerful research in physicochemistry has provided a promising new delivery system, the multiple emulsion W/O/W which could permit a controlled and sustained release of AHA’S, modifying their efficiency and safety. The cosmetological activity and safety of a W/O/W multiple emulsion containing 3% of glycolic acid has been assessed by bioengineering methods using several tests. A six-hour test and 30-days study for comparison of the effects of 3% glycolic acid in two delivery systems W/O/W multiple emulsion and O/W emulsion were conducted. The cutaneous biophysical variables evaluated were electrical capacitance of stratum corneum, skin surface lipids, transepidermal water loss, biomechanical properties, blood flow and skin surface topography. The safety of 3% glycolic acid in the two delivery systems was determined using patch testing and assessment of cutaneous responses by visual scoring and biophysical non-invasive methods (evaporimetry, laser doppler flowmetry, reflectance spectrophotometry).

The aim of our study was to find a correlation between chemical and formulative aspects of different solid detergents and their features of functionality, skin mildness and sensorial properties. Eight different products were chosen for the test: five syndets, two combars and one alkaline soap. Several
cutaneous parameters were investigated in vivo, by using different techniques of measure. The cutaneous innocuity was evaluated on 15 volunteers by means of an occlusive 48 hours patch test. Skin compatibility (respect of pH physiological values, skin barrier functionality and skin roughness) was evaluated on 12 subjects before and after repeated standard washing with the products. Measurements were taken for TEWL, pH skin colorimetry and image analysis. Sensorial performances were assessed, according to the Quantitative Descriptive Analysis method by a panel of 12 well trained evaluators. Results obtained from different methods were then correlated. As far as the cutaneous compatibility is concerned, correlations were found between visual and colorimetric evaluations of acute irritation, and between acute irritation and composition. No correlation was found between repeated wash test results and acute irritation. A good correlation was evidenced by comparing instrumental dryness and roughness evaluations with the correspondent skin sensorial perceptions. Sensorial foam evaluations were well correlated to the composition.


Surfactants are a common cause of irritant contact dermatitis. Their aggressive action on skin structures is well documented even though the complex mechanisms of skin irritation are not fully understood.


Since many skin diseases, especially sexually transmitted may be localized in genital skin, information about the physiological properties of this specialized skin is of importance for the dermatologist.

R.A. Tupker, Prediction of Irritancy, Bioengineering of the Skin: Water and the Stratum Corneum, 1994, Chapter 7

"All substances are damaging to some people under some circumstances." This statement by Kligman stresses the importance of extrinsic and intrinsic factors in skin irritancy. The dichotomy of "extrinsic" and "intrinsic" also appears in the theory concerning the pathogenesis of chronic irritant dermatitis. Whether or not this type of dermatitis will develop depends on the balance between the sum of all harmful influences. (detergents, shampoos, solvents, dry wind, blow heaters, etc.) on the one hand, and the repair capacity of the skin on the other hand. Chronic irritant contact dermatitis is one of the most frequently encountered skin diseases and constitutes the ultimate purpose of performing predictive irritancy testing, division into extrinsic and intrinsic yields two main categories: (1) predictive irritancy testing of various substances aimed to select the least irritating substance and (2) predictive irritancy testing with one or more standard irritant(s) aimed to select a population that is at risk for chronic irritant contact dermatitis. This chapter deals with some methodological considerations in predictive irritancy testing. Animal irritancy tests such as the Draize assay are still commonly used. However, it is known that different species exhibit varying reactivity, especially toward agents with low irritant potency. This chapter focuses therefore on human skin testing.

D.R. Wilson, H.I. Maibach, TEWL and the Newborn, Bioengineering of the Skin: Water and the Stratum Corneum, 1994, Chapter 11

Dermatological science made great strides in the 19th century utilizing man's own tools—a history, visual inspection, and palpitation. However, some areas of investigation defy such evaluation; for example, historical, visual, or palpatory changes defy discernment. Practical examples include nonerythematous irritation and subclinical forms of disease. It is in this area that measurement of transdermal water loss (TEWL) find strong advocates and provides information not otherwise obtainable. In addition, TEWL is an easily measured, noninvasive estimate of the integrity of the skin's water barrier, which has proven its usefulness in many related academic and commercial fields. The noninvasive nature of TEWL measurement makes it an especially attractive technique for neonatal studies where research ethics is
of great concern. The TEWL techniques employed in neonatal research originate from successful applications on adult human and animal models. Historically, dermatotoxicology and pharmacology investigations have used TEWL to assess the local effects of drugs, occlusive materials, and other substances applied to the skin. TEWL has played a valuable part in identifying the function of stratum corneum (SC) lipids. The cosmetic industry employs TEWL to evaluate moisturizer efficacy and to evaluate the irritation and barrier destruction potentials of soaps and solvents. The measurement is also useful in monitoring the recovery processes of wound healing and SC rejuvenation. The transdermal patch industry uses TEWL to help predict the permeability of cadaver skin for drug diffusion studies in vitro. In the clothing industry, TEWL is useful in examining fabric irritation mechanisms and occlusive effects. TEWL has also helped characterize types of dermatitis. This chapter focuses specifically on TEWL as it is applied to investigating the barrier function of neonatal skin.


The cutaneous tolerability of detergent formulations can be improved by means of suitable additives. Exogenous proteins, for example, are able to reduce the skin irritation potential of surfactants according to a double mechanism: they complex the surfactant molecules lowering the concentration of their free monomeric species; they link to the skin keratin forming a protective colloidal layer that shields the denaturing attack of surfactants. Protein derivatives used as additives for detergency are usually prepared by partial hydrolysis of animal sclero-proteins or plant reserve proteins. The main purpose of the hydrolytic cleavage is to make them water soluble and suitable for liquid products. Native, non hydrolysed wheat proteins have been recently introduced as active ingredients for detergents. Water solubility and stability are obtained by means of complexion with surfactants which also increases their actual hydrophobicity, an important parameter affecting cosmetic properties of proteins.

B. Gabard, P. Treffel, F. Charton-Picard, R. Eloy, **Irritant reactions on hairless micropig skin: A model for testing barrier creams**, Second International Symposium on Irritant Contact Dermatitis (ISICD), Zurich, April 14-16, 1994

Occupational dermatoses are most numerous among recognized occupational diseases and their frequency is increasing. Skin barrier creams (SBC) are designed to prevent or reduce the irritancy or hazardous materials in the working and/or home environment. Used repeatedly, detergents, organic solvents or cutting oils presumed to be responsible for the development of numerous chronic irritant dermatitis. Many methods have been used to identify the potential protective efficacy of SBC but up to now, there is no widely accepted model. Main difficulties reside in the wide range of possible irritants and in the obvious need to reproduce the frequent repetition of a low-grade exposure. We looked for an animal model that would present the following characteristics: - pharmacological reactions similar to the ones of human skin, allowing a meaningful comparison of the irritant reactions to be made; - possibility of easily repeating applications of various concentrations of the irritants; - possibility of quantifying the irritation with non-invasive skin measurements techniques. For these purposes, we chose the Yucatan hairless micropig (YHP), the skin of which is known to be very close to human skin, at least morphologically. In a first preliminary stage, the following experiments were conducted: 1. Physiologic characterisation of the normal YHP skin with repeated measurements on different sites of skin colour (Minolta Chromometer), skin hydration (Courage + Khazaka Corneometer) and transepidermal water loss (TEWL; Servomed evaporimeter); 2. Measurements of the skin reactions to histamine (Pricktest), aqueous methylnicotinate, NaOH, aqueous Na-lauryl sulfate (NaLS) and toluene; 3. Occlusive application of different cutting oils. The results show the following similarities and differences with known properties of human skin: 1. YHP skin showed lower L*- and b*-values, skin hydration slightly lower but TEWL similar compared to known Caucasian skin data. Site differences were detected. 2. Reactions to histamine, toluene and NaOH were well characterised and took place in a concentration range similar to the one used in corresponding experiments on human skin. This was also the case for NaLS, although the reaction showed a strong erythema, a decrease of hydration changes but little barrier impairment as measured with TEWL. YHP skin proved very insensitive to Methylnicotinate. 3. It was also shown...
that some cutting oils could provoke a measurable irritation after a single occlusive patch application. In conclusion, these experiments to be completed to better characterise the properties of the YHP skin but these preliminary results appear to support the use of this animal model in thinking about a near-practise test system for SBC.


Une étude a été réalisée sur trois émulsions eau dans huile et leurs phases grasses respectives, vaseline, huile de paraffine et huile d'amande douce, en vue de comparer leurs propriétés occlusives et par voie de conséquence leur influence sur l'hydratation cutanée. Une méthode in vitro utilisant des cellules de type 'Patel' a permis dans un premier temps de classer les différentes émulsions et leurs phases grasses en fonction de leur perméabilité à la vapeur d'eau, ce qui conduit par ordre croissant de degré d'occlusion à: huile d'amande douce, huile de paraffine et vaseline. Pour les études in vivo chez l'homme, l'influence de l'application des mêmes substances sur la petere insensible d'eau (PIE) et l'hydratation cutanée a été mesurée avec un évaporimètre et un cornéomètre. Les différentes phases grasses, utilisées purses, augmentent l'hydratation par effet occlusif, ce phénomène étant objectivé par les mesures de PIE. Par contre pour les émulsions correspondantes, il semblerait que l'augmentations de l'hydratation ne fasse pas intervenir de mécanisme occlusif.

L. Halkier-Sorensen, K. Thstrup-Pedersen, Hautschutz bei Reinigungspersonal, TW Dermatologie Heft 6, November/Dezember 1994


Kein Aha Erlebnis. Test Gesichtspflegemittel mit Fruchtsäuren, Test 10/95
Sind Pflegemittel mit Fruchtsäuren wirklich die Kosmetik der Zukunft, die Wunschträume von ewig jugendlichem Aussehen wahr werden lässt? Oder reizen die Mittel vor allem die Haut, wie andere Fachleute vermuten? In neun dieser Tiegelchen und Töpfchen schauten wir genauer hinein.

A.M. Grunewald, M. Gloor, W. Gehring, P. Kleesz, Barrier Creams, Dermatosen 43, Heft 2 - 1995
Repetitive washing with 0.01 mol/l sodium laurel sulphate solution for one week was followed by a measurable skin function disorder as evaluated by corneometry, laser Doppler flowmetry, and transepidermal water loss (TEWL) measurements. The application of commercially available barrier creams (Marly Skin®, Saniwip®, Tactosan®) as well as the application of well-defined oil-in-water emulsions containing 10% urea or 10% glycerol, respectively, significantly reduced skin function deterioration following repetitive washings. Urea and glycerol containing oil-in-water emulsions were at least as effective as the most effective commercial barrier cream Tactosan and had the additional advantage of better user acceptance.

The measurement of transepidermal water loss (TEWL) is an important noninvasive method for assessing the efficiency of the skin as a protective barrier. The stratum corneum forms a barrier against diffusion of water through the epidermis and constitutes the main obstacle to the penetration of molecules coming in contact with the surface of the skin.

E. Berardesca, H.I. Maibach, Racial Differences in Skin Function: An Update, Cosmetics & Toiletries magazine Vol. 110, October 1995
The most prominent characteristic of racial and ethnic groups is skin color. However, despite the visible color differences, documented anatomical and ultrastructural differences are only minimal. Furthermore, controversy remains as to whether these features also have a functional relevance in skin physiology. Some aspects of skin physiology may indeed have practical implications on the racial incidence and prevalence of some diseases, including skin cancer, acne and pigmentation disorders. In recent years, scientists have devoted much work to further characterizing racial differences and have published reviews of their objective techniques.

In order to establish an alternative or supplement to the Draize test, an in vitro skin irritancy test was developed with human keratinocyte-derived proinflammatory interleukin-1α and eicosanoids as in vitro parameters. These are currently validated for their relevance and reliability: In a clinical study the eicosanoid and the IL-1α content of a human suction blister fluid (SBF) and skin inflammation (clinical symptoms, transepidermal water loss TEWL) of irritated and vehicle-treated skin are evaluated. Here, the data after application of sodium laurel sulfate (SLS) are presented.

The archidonic acid-derived metabolite leukotriene B4 (LTB4) seems to play an important role in the pathogenesis of several skin diseases like psoriasis, leukocytoclastic vasculitis and atopic dermatitis.
Researchers have discussed use of polyunsaturated fatty acid supplements to treat atopic dermatitis (AD) for more than half a century. Oil from evening primrose seeds has attracted special attention because it contains Δ6-linolenic acid (GLA). Morse et al found that oral administration of this oil significantly reduces the general severity of AD, in a dose-dependant manner. The fatty-acid profile of blood lipids in AD patients shows an increase in the proportion of linoleic acid, with a decrease in arachidonic acid and other metabolites of linoleic acid. These findings suggest defective functioning of the enzyme Δ6-desaturase in AD. In a previous communication, we reported that systemic administration of evening primrose oil leads to smoother skin. This evidence has provoked much interest as to wether topical application gives similar results.

Xerosis is a very common condition affecting at least 75% of persons over the age of 64 (1) and also a significant number of younger people. Although not associated with significant physical instability, it is uncomfortable and esthetically unacceptable to many patients. Treatment is based on the use of moisturizers, of which a large variety are available commercially.

La detersione cutanea è un atto igienico ma rappresenta altresì un importante momento cosmetologico e dermatologico. Infatti solamente se il prodotto utilizzato è cosmetologicamente ben accettato essa risulta un atto gradevole. Inoltre spesso l’uso di tensioattivi o saponi tradizionali si traduce in un’alterazione del film idrolipidico superficiale. Se a questo fa seguito l’esposizione e il danneggiamento della strato corneo, può innescarsi quel meccanismo che conduce alla comparsa della dermatite irritativa da contatto, facilitando anche l’insorgenza della dermatite allergica da contatto (1,2).

Measurements of transepidermal water loss (TEWL) is widely used to characterise the water barrier function of skin, both in physiological and pathological treatments on diseased skin. In vivo TEWL can be measured according to three different techniques.

Skin care eg choosing a suitable soap is an important factor in preventing skin disease. Various medical soaps claim to minimize the strain put on the skin by repetitive washing. The aim of this study was to determine whether a new relipidising agent in a medical soap which supposedly counteracts lipid loss induced by repetitive washing leads to a significant change in transepidermal waterloss, pH, sebum excretion and epidermal lipids.

W. Schlüter-Wigger, P. Elsner, Klinische Prüfung der Wirksamkeit von vier kommerziellen Hautschutzpräparaten im repetitiven Irritationstest (RIT), 2. Poster Preis ICPCD Zürich, 10/1995

Dermatologischer Hautschutz für den Arbeitsplatz beinhaltet präexpositionell applizierte Hautschutzsalben, milde Hautreinigung und postexpositionelle Hautpflege.


Objective: The increasing complexity and use of bioengineering skin test instrumentation has created a critical need for unified software that controls the instruments, collects and stores data, performs analysis, and generates reports. In this study, user-friendly software programs were developed and applied to perform panel testing on a large number of test subjects utilising bioengineering skin test instrumentation. Methods/Results: Generic software programs were developed to integrate and automate operation, data storage, and data analysis of multiple bioengineering skin instruments. The software was applied to the following instruments:- Courage and Khazaka - Sebumeter SM810, Corneometer CM 820, skin pH-meter 900, Tewameter TM210; Minolta Chromimeter CR300, and NOVA DPM 9003. Conclusions: Automation of skin bioengineering instrumentation allows evaluation studies to be performed using a large number of test subjects (with multiple variables). This greatly increases the statistical validity of data and overall efficiency, whilst negating the historical constraints which required a large commitment of resources.

K. de Paepe, P. van Damme, M.P. Derde, D. Roseeuw, V. Rogiers, Ceramides/Cholesterol/ Free fatty acids containing body lotions: Effect on TEWL of aged and SLS-damaged skin, Active Ingredients International Conference Paris, November 1996

Thus the basic question still remains unanswered, namely if it is possible, considering the galenic difficulties involved in a correct formulation, to develop efficient cosmetic products by adding essential barrier lipids. It will be a challenge for the cosmetic industry to look for suitable solutions. One of these could be an increased interest in basic research of the barrier function of the skin leading to products that can either protect the barrier and keep it in good condition or restore a damaged barrier.

U. Griesbach, High Molecular Weight Chitosan A Multifunctional Biopolymer as an Active Ingredient for Skin and Hair Care, Active Ingredients International Conference Paris, November 1996

Hyaden CMF as a high molecular hydrocolloid is an excellent active agent for the entire skin care range as well as in decorative cosmetics. However, on account of the cationic character and the high molecular weight, this chitosan product is not compatible with anionic surfactants and can therefore not be used in surfactant skin cleansing products containing anionics.


It has been reported that occlusive treatment of irritated skin results in a reduction of barrier repair activities in hairless mice. In contrast, the clinically observed benefit of occlusion in the treatment of hand eczema and other chronic skin diseases with a perturbed barrier function is well-known. While the beneficial effect of occlusion has been proven for the treatment of psoriasis there are no controlled
clinical studies of the effect of occlusion on irritated human skin. We have therefore evaluated the effect of various occlusive treatments on repair of the human skin permeability barrier under controlled experimental conditions.


Objective: The increasing complexity and use of bioengineering skin test instrumentation has created a critical need for unified software that controls the instruments, collects and stores data, performs analysis, and generates reports. In this study, user-friendly software programs were developed and applied to perform panel testing on a large number of test subjects utilising bioengineering skin test instrumentation. Methods/Results: Generic software programs were developed to integrate and automate operation, data storage, and data analysis of multiple bioengineering skin instruments. The software was applied to the following instruments: Courage and Khazaka - Sebumeter SM810, Corneometer CM 820, skin pH-meter 900, Tewameter TM210; Minolta Chromameter CR300, and NOVA DPM 9003. Conclusions: Automation of skin bioengineering instrumentation allows evaluation studies to be performed using a large number of test subjects (with multiple variables). This greatly increases the statistical validity of data and overall efficiency, whilst negating the historical constraints which required a large commitment of resources.


During dermatological safety and efficacy studies, huge amounts of data - both instrumental data as well as evaluator scores may accumulate. We have developed an integrational data with on-line data acquisition capability. The program runs in a Macintosh network. A graphical interface facilitates data entry. A multilevel password system secures unauthorised use. In order to comply with GCP/GLP requirements all data entries and any possible changes relating to experimental studies - both scores and instrumental values - are secured in a log file together with date, time, and initials of the person entering the data. The program can at present acquire data from: Chromameter (Minolta), Tewameter, Corneometer, pH-Meter, Sebumeter, Mexameter, (all Courage and Khazaka). However, the open architecture would easily allow to incorporate more instruments with a serial interface. Data can be exported in DOS, windows or Macintosh format for easy import into any spreadsheet or statistics programs. The program has been completely validated and successfully used in a contract research organisation for over 12 months. Automatic data acquisition has proven to be very useful tool to facilitate and speed up data analysis and to enhance the quality and reliability of test results.


Total removal of the stratum corneum or perturbation of the barrier lipids by the use of solvents or tape stripping will lead to a significant increase in water loss through the upper layers of the skin, followed by a cascade of metabolic events in the epidermis, including an immediate secretion of new formed lamellar bodies (Lee et al., 1994) There are several categories of skin conditions or disorders, in which the skin is generally considered to be dry and rough, with an impaired lipid barrier and an increased TEWL (Thestrup- Pederson, 1995). The effect on the barrier function seems to be dependant on the type of lipids affected. It has even been suggested that a linear relationship could exist between the total amount of lipids removed from the stratum corneum and the degree of barrier disruption (TEWL). The TEWL thus seems to be a signal for barrier repair and regulates the recovery by initializing the burst of lipid synthesis. Barrier repair usually occurs over a period of 6 hours to 3 days (Jass and Elias, 1991). Whereas epidermal lipid synthesis is clearly linked to barrier functions, the nature and origin of signals that initiate and propagate the biosynthetic response are still a subject of current studies (Nickhoff & Naidu, 1993; Wood et al., 1994). Transcutaneous water loss itself is not the regulatory signal alone since the removal of barrier lipids also allows a simultaneous, passive loss of extracellular
calcium and potassium ions. Under basal conditions these ions inhibit the onset of new lipid synthesis (Lee et al., 1994). In addition to ion depletion which may be one of the stimuli for lipid synthesis, chronic or acute barrier disruption leads to the generation of epidermal and dermal cytokines, growth factors and other interleukins that in turn triggers epidermal hyperplasia and dermal inflammation (Elias, 1994).

U. Griesbach, High Molecular Weight Chitosan - A Multifunctional Biopolymer as an Active Ingredient for Skin and Hair Care, Active Ingredients International Conference Paris, November 1996

Hydagen CMF as a high molecular hydrocolloid is an excellent active agent for the entire skin care range as well as in decorative cosmetics. However, on account of the cationic character and the high molecular weight, this chitosan product is not compatible with anionic surfactants and can therefore not be used in surfactant skin cleansing products containing anionics.

S. Seidenari, B. Belletti, G. Pellacani, Time Course of Skin Changes Induced by Short-term Occlusion with Water: Evaluation by TEWL, Capacitance, and B-scanning Echography, Skin Research and Technology, Vol. 2 No.1 February 1996.

Application of water under occlusion increases hydration of the stratum corneum, thereby swelling the corneocytes and promoting the uptake of water into intercellular lipid domains. Hydration values, as measured by capacitance, remain higher for 20 min after soaking skin with tap water. Equalisation of water diffusion between the stratum corneum and the ambient air occurs within 20 min. Water, re-emitted from a 24h occlusion site, is recorded as increased TEWL values. B-scanning techniques, based on segmentation, enable the visual observation of the dynamics of changes due to inflammatory processes in the skin and the quantitative assessment of epidermal and dermal components of skin reactions. The effects of simple occlusion with a test chamber are assessable using the echographic evaluation of dermal edema. The aim of our study was to investigate the sonographic aspects of hydration, as documented by measurements of TEWL and capacitance, induced by a short-term occlusion with water.


Compared with the alkali resistance test (ART), a widely used method employing sodium hydroxide, a 24h patch testing with 0.5% aqueous sodium lauryl sulphate (SLS) has been tested for predicting human skin susceptibility to an irritant. Forty patients (age range from 20 to 60) with an active irritant contact dermatitis (ICD), 40 patients in whom ICD had cleared, as well as 40 healthy volunteers serving as controls were tested. Skin responses to SLS were assessed both visually and by the measurement of transepidermal water loss (TEWL) as an indicator of stratum corneum integrity. A significant increase in erythema scores and TEWL has been induced by SLS, and the increase in TEWL was even more prominent in patients with active ICD. On the other hand, a decrease in alkali resistance was only found in patients with active ICD, but not in patients with healed ICD. This study suggests that the SLS test, unlike ART, may provide a non-invasive tool predicting a possible constitutional skin susceptibility or indicating a subclinically impaired skin barrier function.


Transepidermal water loss (TEWL) measurement is an extremely useful technique for the assessment of the skin barrier function. Although many publications in the bioengineering field report TEWL data, few have defined TEWL steady state (stabilisation time) conditions. Theoretically, in measuring TEWL, steady state is the point in time when the rate of water vapour entering the measuring probe is equal to the rate exiting the measuring probe. This time may vary for different subjects and different skin types. Using mathematical formulations, a procedure was developed to establish each subject TEWL steady state condition. This procedure accomodate inter-personal variations as well as instrumental measurement errors. Conclusion: An objective method was developed which allows determination and analysis of steady-state TEWL data. This method can be applied to any time-dependant measurements which approach a steady state value.

S. Thoma, Beziehung zwischen dem gemessenen transepidermalen Wasserverlust und der Messsondentemperatur des Tewameters, Inauguraldissertation zur Erlangung der Doktorwürde der Medizinischen Universität zu Lübeck, 1996


H. Lautenschläger, Kühlschmierstoffe - Forderung des modernen Hautschutzes. Mineralöltechnik 6/96

Skin protection is a large topic in the field of metal working industry basically by use of metal working fluids. Both user, manufacturer, and distributor of lubricants take a strong interest in prophylactic skin protection measures. For that reason, high demands are made on lubricants, its handling and skin protection measure. These demands are followed by newly developed lubricants and skin protection measures concerning its chemical compounds and measuring technique. Today's tendencies and the increasing all-embracing way of personal attitude are clearly demonstrated by the need to furnish evidence of compatibility and effect. Physical and chemical parameters of lubricants and skin protection measures as well as its skin compatibility are specifically taken into account.


Aim of the study: to apply the echographic method associated to image analysis procedures to the evaluation of skin damage induced by different organic solvents and to compare the results with those obtained by other non-invasive methods.


The acceptability and effectiveness of creams is mitigating or improving contact dermatitis of automotive mechanics was studied using multiple bionengineering skin instrumentation techniques, visual skin evaluation and subject self-evaluation.

W. Gehring, Einfluß von Ceramiden auf die Barrierefunktion der Haut in Abhängigkeit von ihrem Vehikel, SOFW 4/97

Ceramide stellen einen wesentlichen Bestandteil der epidermalen Barrierelipide dar. In dem hohen Gehalt der Barrierelipide an Ceramiden wird ein wesentlicher Parameter für die epidermale Barrierefunktion und ein grundlegender Faktor für das Wasserbindungsvermögen der Hornschicht gesehen. Gegenstand der Untersuchungen war es, den Einfluß einer einmaligen Ceramidanwendung in einer W/O- und einer O/W-Emulsion sowie in liposomaler Formulierung auf die Barrierefunktion der Epidermis und die Hydratation des Stratum corneum zu untersuchen. Die Untersuchungen wurden vergleichend bei einem gesunden Kollektiv, bei experimentell induzierter trockener Haut - soweit es möglich war -
auch bei Atopikern durchgeführt. Untersucht wurden zwei Phytoceramide und drei analoge synthetische Ceramide.


Alcohol has been historically recognised as a safe and topical antiseptic with the undesirable characteristic of skin drying. The formulation of alcohol gels may mitigate or eliminate the drying effect of alcohol. This study was initiated to evaluate the effects of alcohol gels on human skin. This study provides a comprehensive assessment of the effects of alcohol gels on human skin.


Occupational irritant dermatitis has historically been evaluated by utilizing visual observation. These clinical observations of skin condition and results from patch testing have limited sensitivity and some degree of variability among trained evaluators. Recent advances in skin bioengineering instrumentation and techniques have reduced the variability among investigators and have increased the sensitivity of evaluation to the detection of subclinical levels of irritation. A software program has been developed by our lab to integrate and automate the operation, data storage, and data analysis of multiple skin bioengineering instrumentation.


Retinyl Palmitate, the skin normalizer, is useful to promote greater skin elasticity, to diminish lipid peroxidation and skin roughness following UV exposure, and promote a youthful general skin appearance. In manufacturing creams, Retinyl Palmitate (RP), which is a derivative of retinol, is used since retinol is easily oxidized by heat and light. However, only a small mount of retinyl palmitate is used since using a large amount of it may be harmful to its stability. In this study, thermal stability and UV stability of W/O-, W/S-, O/W- and MLV-type creams containing 5% of retinyl palmitate and 10% of tocopheryl acetate (TA) are measured by Chroma Meters, and the content of RP is quantitatively analyzed by HPLC at 25°C and 45°C. Also, how RP has been changed by heat, light, etc. is measured by HPLC, and toxicity of the changed substance is studied. Particle size of each type of the cream is measured, cellular renewal is measured by using DHA (dihydroxyacetone) and Chroma Meters in order to study their efficacy and effect, moisture content is measured by using Corneometer and Tewameter, and how much wrinkles are improved is studied by using Image Analyzer. Development of MLV-type cream containing 5% of RP and 10% of TA, and satisfying conditions for better creams has been successful.

**H. Zhai, H.I. Maibach, N. Poblete, A Stripped Skin Model to Predict the Irritation Potential of Topicals In Vivo in Man,** American Academy of Dermatology, 55th Annual Meeting March 1997

An in vivo human model was utilized to predict the irritation potential of barrier creams after partial removal of stratum corneum with cellophane tape stripping.


The atopic diathesis in combination with the typical skin condition can be used as a model for the “sensitive” skin.


Nicht-invasive hautphysiologische Meßmethoden (bioengineering methods) bieten neue Möglichkeiten zur Erfassung der unterschiedlichen Reaktion der Haut auf die Irritation. Schädigungen der
Haut, die zunächst nicht sichtbar sind, können durch einige dieser Messverfahren bereits frühzeitig registriert werden.


In einer dermatologischen Verlaufsun tersuchung von Auszubildenden sollen Faktoren evaluiert werden, die die Vorhersage des Auftretens von berufsbedingten Hautproblemen ermöglichen und prämorbide oder Risikozustände charakterisieren helfen.

Gute Pflege für die Fältchen, Tagescremes für die "reife" Haut, Stiftung Warentest, Juli 1997

Für die „reife“ oder „anspruchsvolle“ Haut – charmant umschreiben die Kosmetikfirmen ihre Angebote für die ältere Haut.

P. Clarys, I. Manou, A.O. Barel, Influence of temperature on irritation in the hand/forearm immersion test, Contact Dermatitis Vol.36 No. 5 1997

As indicated by in vitro experiments the penetration of irritants through the skin is significantly influenced by the temperature of the solution. In vivo experiments, demonstrated equally a significant influence of temperature in surfactant-induced skin irritation. In order to evaluate the irritant potential of detergent solutions under normal user conditions, we used the hand/forearm immersion test. We compared 2 detergents with different anionic character in a repetitive immersion protocol (30 min immersion on 4 consecutive days). The solutions were tested at 2 temperatures (37°C and 40°C). The irritation was quantified by assessment of the stratum corneum barrier function (transepidermal water loss), skin redness (a*colour parameter) and skin dryness (capacitance method). Both detergents affected the integrity of the skin in a significant way. The anionic content as well as the temperature of the solutions were found to be determinative for the irritant potential, with a stronger response for higher anionic content and temperature, respectively.

H.M. Ribeiro, L. Nougiera, L. Rodrigues, L. Pereira, J. Morais, Skin Surface Kinetic Analysis to Assess the Efficacy of Haircare Polymers Applied to Skin Care Formulations, Poster, IN COSMETICS/ISCD Conference, Düsseldorf 4-7 May 1997

Stratum corneum (SC) water retention properties are a crucial factor in keeping the skin supple and flexible.

M. Lodén, Barrier recovery and influence of irritant stimuli in skin treated with a moisturizing cream, Contact Dermatitis Vol. 36 No. 5 1997

Moisturizers are used daily by many people to alleviate symptoms of clinically and subjectively dry skin. Recent studies suggest that certain ingredients in creams may accelerate the recovery of a disrupted barrier and decrease the skin susceptibility to irritant stimuli. In the present single-blind study, a moisturizing cream was tested for its influence both on barrier recovery in surfactant-damaged skin and on the susceptibility of normal skin to exposure to the irritant sodium lauryl sulphate (SLS). Parameters measured were transepidermal water loss (TEWL) and skin corneometer values, indicating degree of hydration. Treatment of surfactant-damaged skin with the test cream for 14 days promoted barrier recovery, as observed as a decrease in TEWL. Skin corneometer values also normalized more rapidly during the treatment. In normal skin, use of the test cream significantly reduced TEWL after 14 day of treatment, and irritant reactions to SLS were significantly decreased. Skin corneometer values increased after only one application and remained elevated after 14 days. In conclusion, the accelerated rate of recovery of surfactant-damaged skin and the lower degree of SLS-induced irritation in normal skin treated with the test cream may be of clinical relevance in attempts to reduce contact dermatitis due to irritant stimuli.

Atopic dermatitis skin shows a tendency to be easily irritated and appears dry. This clinical peculiarity corresponds to impaired barrier function and to increased TEWL values. A few studies suggest that a reduced amount of total ceramides (especially of ceramide 1) deriving from epidermal keratinocytes are responsible for functional abnormalities of the skin of atopic dermatitis (AD) patients. The aim of the present study was to analyze the relationship between epidermal lipids and barrier impairment in atopic dermatitis skin.

I. Effendy, H. I. Maibach, **In vivo functional changes in human stratum corneum induced by substances with known irritation properties**, Australian Journal of Dermatology: Abstracts 19th World Congress of Dermatology, Sydney, June 1997

Functional changes in stratum corneum of normal human skin induced by repeated application of all-trans retinoic acid (RA), glycolic acid (GA) and calcipotriol was investigated in 6 healthy volunteers in comparison with sodium lauryl sulphate (SLS), a standard irritant. RA (0.1%) in ethanol, GA (12%) in water, calcipotriol (0.005%) ointment and SLS (1%) in water were applied with occlusion for 60 minutes once a day, over a period of 2 weeks (5 consecutive days weekly) on dansyl chloride-labelled skin and on untreated skin. Changes in stratum corneum were examined utilizing noninvasive bioengineering techniques.


Irritant and allergic contact dermatitis is a serious problem in many occupations. Among those with the most severe problems are automotive and body shop technicians and health care professionals. However, there is a dearth of studies which objectively characterize the extent of contact dermatitis in these occupations.

T. Hariya, K. Inoue, Y. Umino, H. Ichikawa, **Alteration of physiological parameters and the amount of skin sIgA in sensitive skin**, Australian Journal of Dermatology: Abstracts 19th World Congress of Dermatology, Sydney, June 1997

In recent surveys, more than 30% of healthy female as well as patients suffered from certain skin diseases such as atopic dermatitis or rosacea-like dermatitis believe that they have sensitive skin, and the population of this group has been expanding. It has been reported that a symptom of atopic dermatitis is influenced by exacerbating factors such as physical conditions. In this study, we examined the effects of these exacerbating factors on skin physiological parameters and secretory IgA amount in healthy female volunteers with sensitive skin.

R. A. Tupker, **The value of transepidermal water loss measurement in skin irritancy testing**, Experimental Dermatology Vol 6 No 5, ISICD and ISBS Meeting Rome 2-4 October 1997

Transdermal water loss (TEWL) measurement is a highly sensitive method to determine barrier function impairment of the stratum corneum. By means of TEWL measurement it is possible to discriminate between detergents according to their irritancy, using different types of exposure methods. The same holds true for other irritants that exert their irritant action by impairing the barrier function of the skin.

Sodium Lauryl sulfate is the most frequently used model for studying in vivo irritation. It is also one of the most frequent surfactants in soap preparations and cosmetic emulsions. To investigate the irritant potential of sodium salts of n-alkyl sulfates with different carbon chain length (n=8, 12, 14) we applied these substances on the volar forearm of 10 human healthy volunteers aged 24 to 35.


During the last two decades, bioengineering techniques have emerged as highly effective tools for the evaluation of skin condition. Studies have been performed to assess the potential of skin bioengineering instrumentation and techniques for the evaluation and treatment of occupational skin condition. Using large panels of automotive technicians, bioengineering techniques, such as TEWL and skin hydration, were used to characterize the extent of contact dermatitis and the effectiveness of intervention with protective moisturizing creams.

G. Richter, S. Großmann, *Comparison of special skin protective creams and ointment basis (German Pharmacopoea DAB 10) in different irritation models*, Experimental Dermatology Vol 6 No 5, ISICD and ISBS Meeting Rome 2-4 October 1997

Skin irritation was performed with sodium lauryl sulphate (1% and 2%, big Finn Chamber, 30 min, day 1 to 5 and 8 to 11, volar side of the right forearm) or with the skin disinfectant Sterillium® (open, 30 min, 3 times daily, day 1 to 5 and 8 to 11, volar side of the left forearm), respectively on all 21 human volunteers. Assessment data: Tewameter-, Chromameter-, Corneometer-data and visual score.


The aim of this multi center study is the development of a protection factor for barrier creams. The first step is to find a test model which produces reliable results and is reproducible in all centers and easy to handle. We tested a cumulative irritation model over 14 days with a break at the weekend.
Regional differences in percutaneous penetration and skin properties are well documented. However, only a few studies have investigated the relationship between substance penetration and specific skin characteristics in function of the body region. It was our aim to evaluate the physiological effect of topically applied substances in function of skin parameters determined at different body regions.

L. Rodrigues, P. Pinto, N. Galego, L.M. Pereira, Usefulness of Mathematical Modelling Application To Comparative Testing, Skin Research and Technology 3/1997

Comparative testing is a crucial issue when efficacy analysis is one of the objectives of studies involving topical formulations, also in cosmetic dermatology.


Iontophoresis is an important technique based on the effect of electrical current application in skin surface used to modulate skin permeation.

S. Seidenari, Follow Up of Inflammatory Diseases Using 20 MHz Sonography, Skin Research and Technology 3/1997

Besides the necessity of a realistic assessment of spontaneous course of diseases, the evaluation of the cost/benefit ratio of potentially new treatments is increasingly required.

P. Clarys, R. Lambrecht, A.O Barel, Does lipid sampling with the Sebutape technique disturb the skin physiology?, Skin Research and Technology, 1997, 3 p. 169 – 171

Lipid sampling with the Sebutape technique takes at least one hour to obtain a representative follicular pattern.
Beweiskraft der Tests. Beauty Forum 1/98
Für jedes Hautproblem bietet die Kosmetikindustrie die wirksame Patentlösung - zumindest laut werbekaftiger Aussagen.

An improved human model system for the quantification of the effects of topical agents by various bioengineering techniques was developed.

M.P. Vienne, S. Cours Darne, C. Lauze, P. Dupuy, Repairing Effect and Tolerance of Amerma Oat Milk Treatment Cream and Aveeno Moisturizing Cream on Damaged Skin, AAD, Orlando, March 1998
The aim of this study was to assess comparatively the effect of two creams containing respectively 1 % and 3 % of colloidal oatmeal on damaged skin and evaluate their tolerance.

The continual need in the cosmetic industries for developing products with low irritation or sensitizing potential has forced constant improvements in evaluation techniques utilized by the testing laboratories. The scientific literature is extensive in papers discussing the direct correlation between the increase of the TEWL in parallel with the skin irritation in products. It is not appropriate to generalize this fact because in some cases the increased TEWL is not matched at the same intensity by skin irritation. We have evaluated emulsion and tensoactive systems utilized in hair products, and our conclusion is that in some systems the TEWL increase did not necessarily correlate to the irritation due to the molecular weight of the tensoactive utilized. The evaluation of a formulation must include both TEWL and irritation tests simultaneously.

G. Gallacher, H.I. Maibach, Is Atopic Dermatitis a Predisposing Factor for Experimental Acute Irritant Contact Dermatitis?, Contact Dermatitis Vol. 38 No. 1, January 1998
Proclivity to acute irritant contact dermatitis has been reviewed by comparing the response in patients with atopic dermatitis to controls. Although several controlled studies demonstrate such a proclivity, others do not, suggesting that the mechanisms involved are complex.


Die zunehmende Problematik trockener und empfindlicher Haut in der Bevölkerung macht die Entwicklung geeigneter Reinigungsmittel notwendig. Ihre Hautverträglichkeit und minimierte Austrocknungswirkung kann in dermatologisch kontrollierten Anwendungsbeobachtungen unter Einbeziehung der
Messung hautphysiologischer Parameter objektiv geprüft werden. Das Beispiel eines Duschöls und einer Waschmalulsion für trockene und empfindliche Haut zeigt, daß durch einen hohen Ölanteil ebenso wie durch die Auswahl milder Syndetsubstanzen bei Anpassung des pH-Wertes im Hautphysiologischen, leicht sauren Bereich die Hautreinigung unter Praxisbedingungen ohne Austrocknung und Irritationen möglich ist.

**EnviroDerm’s Skin Breakthrough.** Engine Repair and Remanufacture, 01/98

Until now, prevention of occupational skin disease was very much a hit and miss affair. There was no practical way of detecting unseen damage to the skin from working practice or contact with chemicals.


The Efficacy of a topical agent in barrier recovery was evaluated after acetone-induced acute water loss barrier disruption in vivo in humans. The upper back of several volunteers was rubbed with acetone-soaked cotton balls until elevated rates of transepidermal water loss (TEWL) occurred.


Melasma and Hyperpigmentated cutaneous disorders are a challenge for dermatologists since they are very difficult to treat.


Efficacy of three cosmetic products was studied by using laser profilometry for skin roughness, by corneometry for the hydration of stratum corneum and by assessment of transepidermal water loss (TEWL).


The presented study was carried out to evaluate the the protective value of bathoils with different solvent characteristics and different content of non-ionic tenside against 3 different irritation models (NLS 2 %occluded, water, mechanical irritation).

**J.I. Ademola, A. Cua, S. Amin, P. Liu, J. Avalos, L. Miller, M. Miller, N. Scrofani, A. Anigbogu, H.I. Maibach, Dermatopharmacokinetics Of Topical Formulations In Human Stratum Corneum,** The Journal of Investigative Dermatology, Vol. 110, No. 4, April 1998

Stratum corneum tape stripping has been used to study percutaneous of topical applied substances.

**G. Yosipovitch, A. Mayan, M. David, P. Merlov, L. Sirota, Transepidermal Water Loss, Stratum corneum Moisture and Skin Surface pH of the New Born Infant in Different Body Areas,** 12th ISBS, Boston, 06/98


Using conventional transmission electron microscopy of RuO₄-fixed tissue combined with cryo/scanning electron microscopy (Cryo-SEM) of frozen biopsies, prolonged water exposure is shown to seriously disrupt stratum corneum (SC) lipid ultrastructure and the intercellular space.
This investigation extends our studies of the use of protective skin cream by automotive technicians to workers in metal working/engineering industries.

E. Berardesca, S Lazzerini, F. Pirot, M. Singh, H.I. Maibach, Racial Differences in pH and TEWL Gradient into Superficial Stratum Corneum, 12th ISBS, Boston, 06/98
Purpose of this study was to assess the changes of pH and TEWL gradients in relation to depth into stratum corneum (SC) and possible differences between white and black skin.


J. Fluhr, M. Gloor, F. Distante, S. Lazzerini, E. Berardesca, Glycerol Modulates Recovery of Barrier Function In Vivo, 12th ISBS, Boston, 06/98
The mechanism promoting barrier repair in vivo after applying of the stratum corneum are not completely clear; the modulation of water flux is probably the key factor involved.

P. Clarys, A.O Barel, Percutaneous Penetration Models In Vivo - Evaluation By Means Of Non-Invasive Biophysical Measurement Techniques, 12th ISBS, Boston, 06/98
The methods for in vivo percutaneous penetration on human volunteers are limited.


J.W. Fluhr, S. Lazzedni, F. Distante, M. Gloor, E. Beradesca, Effects of Prolonged Occlusion on Stratum Corneum Barrier Function and Water Holding Capacity, Stratum Corneum II Symposium, Cardiff, 09/98
Occlusion is used in clinical practice to enhance transcutaneous penetration and drug delivery to the skin. Occlusion can also be generated by the professional use of protective garments, gloves and cosmetics.

A.V. Schreiner, Zeden, G. Gercken, U. Hoppe, P. Gerson, Comparison of Barrier Properties of Different Layers of Stratum Corneum of Xerotic Skin of Elderly and Normal Skin, Stratum Corneum II Symposium, Cardiff, 09/98
Dry skin tends to be itchy, scaly and sometimes even chappy.

The authors introduce a novel psycho-physical approach to determining subjective skinfeel involving weights on panelists’ volar forearms. Through this method and by determining defferentiation threshold values, the authors demonstrate that skin moisturized with a liposomal formulation performs better than skin dehydrated with sodium dodecyl sulfate and aqueous ethanol.
H. Tronnier, **Empfindliche Haut**, Kosmetische Medizin 4, 10/98

Eine einheitliche Ursache für eine empfindliche Haut gibt es nicht. Zahlreiche Funktionsabweichungen, die anamnestisch zu erfassen und mit geeigneten Methoden zu bestimmen sind, können individuell das Muster einer empfindlichen Haut abgeben oder die Grundlage einer empfindlichen Haut darstellen. Wesentlichen Einfluß können psychogene Faktoren haben.

N.Y. Schürer, **Beeinflussung der epidermalen Barriere durch Externa**, Kosmetische Medizin Nr. 5, 1998


The epidermal water content is one of the most fundamental indicators for cutaneous functional evaluation. The major role of water in the skin physiological and pathophysiological processes is actually well known and recognised and for it, the reinforcement or re-establishment of these properties, through a wide variety of topical formulations, including cosmetics, is a frequent objective of therapeutical intervention.

P.M. Müller, R. Jermann, **The Skin.** IFSCC Vol. 1 No. 1, October/December 1998

The authors introduce a novel psycho-physical approach to determining subjective skinfeel involving weights on panelists’ volar forearms. Through this method and by determining differentiation threshold values, the authors demonstrate that skin moisturized with a liposomal formulation performs better than skin dehydrated with sodium dodecyl sulfate and aqueous ethanol.

C. Packham, **Chemicals and your health: Beware!**, Engine Repair and Remanufacture, January 1999.

Most people working in the engineering industry will at some time be exposed to chemicals, the range of which, is enormous and includes substances, such as the solvents used in paint spraying or to degrease engine components; this includes metal working fluids, epoxy resin compounds, and even the skin cleanser used by the mechanic or fitter to clean hands after work.


Recently, it has been shown that both the qualitative lipid composition of the intercellular lamellar sheets of the stratum corneum (SC) are important for the maintenance of the barrier function of the skin. In order to investigate whether supplementation of major barrier lipids to skin care products could exert a beneficial effect on a damaged barrier function as measured by transepidermal water loss (TEWL), a body lotion, with known composition, was enriched with ceramides, cholesterol and fatty acids using a weight ratio of 50 / 25 / 25, the appropriate ratio found in the SC.

Im Rahmen einer prospektiven ausbildungsbegleitenden Kohortenstudie wurde die Inzidenz von beruflich bedingten Handekzemen bei 91 Auszubildenden im Bäcker- und Konditorhandwerk im Ostthüringer Raum des Ausbildungsjahres 9/96 untersucht.

W. Gehring, R. Bopp, F. Rippke, M. Gloor, Effect of topically applied evening primrose oil on epidermal barrier function in atopic dermatitis as a function of vehicle, Arzneimittel-Forschung/Drug Research 49(II), 7, 635-642 (1999)

The aim of this study was to establish the effect on barrier function in atopic dermatitis of topical evening primrose oil in an amphiphilic and a stable water-in-oil emulsion. The studies were vehicle-controlled in two populations of 20 atopic subjects. Barrier function was assessed in terms of transepidermal water loss and stratum corneum hydration after a 4-week treatment period and a 1-week treatment-free period.

M. Bock, H.J. Schwanitz, Modulation der epidermalen Permeabilitätsbarriere durch die topische Anwendung von CO₂ – imprägniertem Wasserklínische und hautphysiologische Untersuchungen, Allergologie 3, 03/1999

Eine Stabilisierung der epidermalen Permeabilitätsbarriere bzw. der physiologische Wiederaufbau nach Barrierstörungen werden zu den wichtigsten Zielen der Externabehandlung gezählt.


Dermatologische Hautreinigung am Arbeitsplatz sollte schadstoffbezogen so mild wie möglich und so reinigend wie nötig sein.


Durch häufige Reinigungsmaßnahmen kann es zu einer starken Entfettung des Stratum corneum und zu Störungen der epidermalen Permeabilitätsbarriere kommen.


Die Erkennung Ekzemgefährdeter Personen ist in Berufen mit hoher Hautbelastung wünschenswert, um gerade in dieser Personengruppe eine intensive primäre Prävention durchzuführen.


This paper evaluates the stability, efficacy and effect of retinyl palmitate at 5% in four different cream formulations: w/o water-in-silicone, o/w and multilamellar vesicles.

K. Lanzerath, Eine Notwendigkeit für die dermatolische Praxis? Die apparative Bestimmung von Hautparametern, H+G Band 74, Heft 6, 1999

Transepidermaler Wasserverlust (TEWL), Corneometrie, Sebumetrie, Melanin- und Erythembestimmung – Schlagworte, die in der dermatologischen Forschung und Praxis immer mehr an Bedeutung gewinnen.

C. Packham, Bio-engineering and the skin, AOHNP(UK) 1999

In this article a modern approach to the age-old problem of irritant contact dermatitis is examined.
L. Rodrigues, P. Pinto, N. Galego, P.A. Da Silva, L.M. Pereira, Transepidermal water loss kinetic modeling approach for the parameterization of skin water dynamics. Skin Research and Technology, Vol.5 No. 2, May 1999

The evaluation of transepidermal water loss (TEWL) is one of the methods most frequently used in studies involving skin water dynamics. However, TEWL does not provide a direct measurement of epidermal barrier function, being rather a surrogate effect of it. In particular, when external stimuli change cutaneous water balance, these stimuli must be taken into account in order to achieve a rigorous interpretation of the results.


The volar forearm is the favored location for bioengineering studies. However, transepidermal water loss (TEWL), which is an important indicator of the function of the epidermal barrier, shows regional variations, and for the evaluation of cosmetic formulations, facial skin would be more suitable. In this study, we have compared 10 facial locations with 1 test site on the volar forearm for absolute TEWL values, reproducibility, and correlation.


In einer seitenkontrollierten Studie wurde drei Kosmetikpräparate auf liposomaler Basis hinsichtlich ihrer Auswirkung auf a) Hautrauhigkeit (Skin Visiometer SV 500), b) den Feuchtigkeitsgehalt des Stratum corneum (Corneometer CM825) und c) die Hautbarrierefunktion bzw. den transepidermalen Wasserverlust/TEWL (Tewameter TM 210) untersucht.

W. Pittermann, Tierversuchsfrei forschen mit dem Rindereuter-Modell, Parfümerie und Kosmetik, Nr. 3/99

Haut und Schleimhaut sind nicht nur wegen der anatomischen und funktionellen Unterschiede Zielorgane besonderer Art. In der regulären Sicherheitsprüfung für den Arbeits- und Verbraucherschutz werden sie als mögliche Angriffspunkte für lokal oder systemisch schädigende Rohstoffe oder Chemikalien behandelt. Im Mittelpunkt der kosmetischen Forschung steht jedoch die Pflege von Haut und Schleimhaut sowie die Wirksamkeit von Inhaltsstoffen und Formulierungen.

H. Tronnier, Empfindliche Haut, Seminar Hausarzt Praxis März/April 1999

Die Empfindlichkeit der Haut hat keineswegs nur somatische Aspekte und Ursachen, sondern auch psychogene. Sie wird damit partiell vergleichbar mit anderen menschlichen Empfindungen, deren Existenz niemand bestreitet, deren Definition aber alles andere als einfach ist. Kann man einer Haut ihre Empfindlichkeit ansehen?


In general, body care articles and cosmetics have only a low allergy potential. The probability that toxic-irritative reactions will arise after proper use is even lower. But especially with patients with sensitive skin, unclear skin reactions, which can frequently be confused with allergies, can arise. The cosmetics manufacturers, however, would like to produce safer products and naturally want to avoid that type of problem from the start.
J. Fluhr, M. Gloor, L. Lehemann, S. Lazzerini, F. Distante, E. Berardesca, **Glycerol Accelerates Recovery of Barrier Function In Vivo**, ISBS and EEMCO Meeting, Liege, 09/1999

The 2 studies were performed in order to evaluate 1) with 12 healthy volunteers the effect of occlusion and glycerol in the modulation of barrier repair after tape stripping and 2) on 20 healthy volunteers the effects of glycerol in the barrier repair after a repeated SLS-washing especially in the post treatment period.

V. Rogiers, **EEMCO Guidance for the Assessment of the Transepidermal Water Loss (TEWL)**, EEMCO Group 1999

The stratum corneum (SC) constitutes a natural barrier which not only provides protection against percutaneous absorption of a wide variety of xenobiotics but also prevents the loss of endogenous molecules including water from the deeper layers of the epidermis.

Y. Kawasaki, D. Quan, K. Sakamotor, R. Cooke, H.I. Maibach, **Influence of Surfactant Mixtures on Intercellular Lipid Fluidity and Skin Barrier Function**, Skin Research and Technology, Vol. 5 No. 2, May 1999

Surfactant mixtures are used in cosmetic and pharmaceutical formulas in order to establish product efficacy while maintaining mildness and skin lipids. The electron paramagnetic resonance (EPR) technique of the spin labeling method with a nitroxide spin probe is a valuable method in the study of biological membranes. The objective of this study was to define the influence of surfactant mixtures on intercellular lipid.

M. Puschmann, A. Melzer, H.P. Nissen, **Hautglätende, hautelastische und hautschützende Wirkung einer Urea-Ceramid-Kombination**, Kosmetische Medizin Nr. 4, 1999-11-22


D. Peiler, **Hautschutz im Dentallabor**, Dissertationsarbeit 1999

C. Dani, E. Martelli, M.F. Reali, G. Berini, G. Panin, F.F. Rubaltelli, **Effects of Application of Vitamin E Ointment to Premature Neonates' Skin**, Pediatric Research April 1999

Following the hypothesis that oxidative stress plays a role in the development of skin lesions in preterm infants, we planned a prospective study to investigate the effects of application on epidermis of a vitamin E ointment.

G. Kutz, D. Peltner, **Aktuelle Formulierungskonzepte moderner Hautkosmetika am Beispiel der trockenen Haut**, Kosmetische Medizin, Nr. 5, 1999

Es ist bekannt, dass die Wirksamkeit eines Dermatikums nicht nur von der Art und Konzentration des eingesetzten Wirkstoffs abhängt, sondern in großem Ausmaß auch von dem Vehikel beeinflusst wird.
M. Fischer, I.M. Schneider, R. Neubert, W. Wohlrab, Über den Einfluss methylverzweigter Fettsäuren auf die Barrierefunktion des Stratum corneum, Dermatosen in Beruf und Umwelt, 47/221-264, Nov/Dez 1999

Es wurde die Wirkung von methylverzweigtem Fettsäuren (2 % bzw. 5 % 10-Methylpalmitinsäure und 10-Methylhexadec-9-ensäuren als Penetrationsehancer untersucht.


Background: In addition to the well-defined hereditary primary ichthyoses, many sporadic or less well-defined keratinization disorders with or without systemic manifestations have been reported. Herein we describe ichthyosiform dermatosis associated with type 2 diabetes mellitus. Observations: The patients were members of a large Arab family with heavy consanguinity. Eighteen members were affected with a variously severe scaly disorder. They showed migratory polycyclic keratotic scaly plaques evolving into diffuse generalized scaling or complete remission. Acanthosis nigricans–like lesions were also noted, and there was an association with type 2 diabetes mellitus. A scarcity of intercorneocyte lamellae and reduction in lamellar body contents were observed. Conclusions: We could not find a report of a similar dermatosis. Furthermore, an association between ichthyosis and diabetes has not been documented. Therefore, we believe that this may constitute a new entity. In addition to the well-defined groups of hereditary primary ichthyoses, many sporadic or familial ichthyosiform disorders have been described. In the latter group of less well-defined ichthyoses, there may be extracutaneous manifestations. Whereas excessively dry skin of the shins with mild ichthyosiform skin changes has been associated with diabetes, true ichthyosis has not been reported, and, to the best of our knowledge, hereditary ichthyosiform dermatosis has not been associated with diabetes. Herein described is a heavily consanguineous Arab family, originating in Africa, that displays a unique form of migratory ichthyosiform dermatosis as well as type 2 diabetes mellitus, probably representing a new entity.


The aim of this study was to investigate the mechanical properties of the skin in psoriatic plaques before and after treatment with dithranol in clinically uninvolved psoriatic skin in comparison with skin of healthy controls.

P. Wirtz, Objektive Beurteilung physiologischer Parameter der Haut von an atopischem Ekzem erkrankten Kindern: eine Untersuchung von pHWert, transepidermalem Wasserverlust und Corneometrie an der Haut gesunder und erkrankter Kinder mit klinisch nicht betroffener und mittels lokalem SCORAD differenzierten ekzematöser Haut, Dissertation zur Erlangung der Doktorwürde der Technischen Universität München, 2000


The effects of a small intensity direct electric current (galvanic current) on the volar forearm skin was examined in vivo by several non-invasive bioengineering methods.


Transcutaneous monitoring of biological signals has been a major research objective specially for circular (haemodinamics) of hydro-electrolytic parameters.

We have recently shown that contact allergy patch (CAP) testing is a suitable method for studying the skin barrier function under allergic contact dermatitis (ACD) condition in double blind human models.


Squamometry is a combination of sampling corneocytes by adhesive coated discs followed by colour measurements after staining of the cells.

H.E. Packham, C.L. Packham, Skin Bioengineering as a Contribution to Product Performance and Safety, Cosmetics & Toiletries 03/2000

With today’s increasing consumers sophistication and the demand both for products that work and are safe for the user, there is a need for greater objectivity and accuracy in both formulations and claims made by the manufacturer.


The aim of this study was to compare the biophysical properties of different facial zones.


This paper describes the measurement of the TEWL under in vitro conditions using the isolated perfused Bovine Udder Skin (BUS) model.


Here we look at a selection of vegetable oils from different sources which have recently come under R&D spotlight.


The study evaluated the efficacy of adimethicone skin protectant against sodium lauryl sulfate (SLS) induced irritant contact dermatitis (ICD) by clinical visual grading and bioengineering techniques in 12 healthy humans.


The physical properties of the stratum corneum (SC) change with its water content which is regulated by the presence of water solutes (natural moisturizing factors) and lipids in the SC, and are considered to be responsible for the induction of desquamation, skin surface roughness and fine wrinkles.
A. M. Koehler, H.I. Maibach, Skin hyporeactivity in relation to patch testing, Contact Dermatitis, 2000, Vol. 42, p. 1-4
  False negative patch tests are clinically relevant.

J. Brasch, M. Hüttemann, E. Proksch, Iontophoresis of nickel elicits a delayed cutaneous response in sensitized individuals that is similar to an allergic patch test reaction, Contact Dermatitis, 2000, Vol. 42, p. 36-41
  Wearing of patch test chamber fro 1-2 days is uncomfortable for the patients.

O. Tanno, Y. Ota, R. Hikima, M. Matsumotor, M. Ota, S. Inoue, An Increase in Endogenous Epidermal Lipids Improves Skin Barrier Function, XXlst IFSCC Congress 2000, Berlin
  Stratum corneum lipids, especially ceramides, cholesterol, and fatty acids, play a critical role in the formation and maintenance of the epidermal permeability barrier.

A. Teglia, A. Mondelli, Short Term Effects of Hydrophilic Ingredients on the Hydration Parameters of the Stratum Corneum, XXlst IFSCC Congress 2000, Berlin
  Though the real benefit of raising the skin’s water content is not fully explained, it is evident to everyone that without an adequate amount of water, skin displays undesirable perceivable changes (brittleness, flakiness, roughness) and its protective function tends to be impaired.

  Surveys conducted in many nations suggest that up to 50% of cosmetic users beleive they have sensitive skin and products specifically designed for this skin type have become an important cosmetic category. In developing such products, objective assessment of the degree and the type of sensitivity is desirable.

J. Min Choi, J. Young Lee, B. Kee Cho, Chronic irritant contact dermatitis: recovery time in man, Contact Dermatitis 42, 2000
  Chronic irritant contact dermatitis (ICD) is a common skin disease, especially in the workplace, but determining the recovery time of chronic ICD is not easy. To measure the recovery time of chronic ICD, we examined the skin reactivity to a model surfactant, sodium lauryl sulfate (SLS), on previous chronic ICD and normal sites by visual grade and non-invasive instruments.

A. Teglia, A. Mondelli, Short Term Effects of Hydrophilic Ingredients on the Hydration Parameters of the Stratum Corneum, XXlst IFSCC Congress 2000, Berlin
  Though the real benefit of raising the skin’s water content is not fully explained, it is evident to everyone that without an adequate amount of water, skin displays undesirable perceivable changes (brittleness, flakiness, roughness) and its protective function tends to be impaired.

M. Gotsche, R. Dieing, A. Jentzsch, P. Hoessel, W. Schroff, Investigations of Polymers for Skin Care, XXlst IFSCC Congress 2000, Berlin
  There is a need for improved skin care products due to a demographic shift in the population. A major challenge for the cosmetic chemist in this area is the improvement of skin smoothness and moisturization.

  Biophysical and functional skin differences according to the body site have been widely reported by non-invasive studies of skin bioengineering in the past years.
It is hard to recall when silicones were not considered key ingredients for personal care products.

The aim of this study was to compare the irritancy potential of 2 industrial hand cleansers with a brand leader of “mild” children’s hand cleanser and with an emollient. The products were tested using repeated open application tests (ROATs) on the forearms of 40 subjects. Scoring of signs and symptoms (itching or burning), transepidermal water loss (TEWL) and stratum corneum hydration (Corneometer) evaluated responses.

With the advances in skin bioengineering technology, great progress has been made in the techniques used for testing the efficacy of cosmetics to the skin ranging from the physical properties to the biochemical characteristics of the skin.

The assessment of irritated skin reactions by non-invasive bioengineering methods is widely used.

Human skin topography can be studied invivo using non-invasive bioengineering techniques.

Because of the presence of thick long hairs on the scalp, little information is available concerning the functional characteristics of the stratum corneum (SC) of scalp skin. We therefore conducted a functional study of the SC of lesional scalp skin of patients with alopecia areata and of patients with androgenetic alopecia. We compared the scalp with the cheek and the flexor surface of the forearm (volar forearm). The water barrier function of the scalp SC of both patient groups, in terms of transepidermal water loss (TEWL), was almost comparable to that of the volar forearm, and was far better than that of facial skin.

Hand decontamination is crucial to control nosocomial infections. The utility of hand decontamination is related not only to its antimicrobial effectiveness, but also to its acceptability by hospital staff.

Objective: The aim of the study was to investigate skin barrier function in neonates in different anatomic sites during the first 2 days of life. Design: The study population consisted of 44 healthy full-term newborn infants. Transepidermal water loss (TEWL), stratum corneum hydration (SCH), and skin surface pH were measured in different anatomic sites (forehead, flexor part of forearm, upper back, abdomen, inguinal region, palms, and soles) during the first 10 hours of life and 24 hours later. Measurements were recorded with a Tevameter, a Corneometer, and a skin pH meter with a flat glass electrode. Results were compared with those in 20 healthy adults. Results: TEWL was lower in infants than in adults in the forehead, palms, soles, and higher in the forearms. It was significantly higher on day 1 than on day 2 in the soles, palms, and forearms, and in the forearm, palms, and inguinal region compared with the other anatomic sites. SCH was significantly lower in the infants on the forehead, back, and abdomen, and higher on the forearms and palms; it was significantly higher on the first day of life on the forearms and palms, and lower in the inguinal region. Skin surface pH was significantly higher in the infants in all body sites (>6.6 in most measurements). On day 2, it was significantly lower than on day 1, but still higher than in adults. SCH correlated positively with TEWL in the neonates but not in the adults. None of the variables were related to gestational age, sex, mode of delivery, or body weight. Conclusions: Changes take place in SCH, water loss, and pH in the first 2 days after birth, suggesting that the stratum corneum barrier is still in the process of adapting to extrauterine life. The significant anatomic variability in TEWL and SCH should be taken into account in evaluating the permeation of skin care products and topical medications in newborns.


There is no doubt that the application of cosmetic lipids has many positive effects on the structure and function of the skin. These effects are pleiotropic, caused either by direct interaction with the epidermis, particularly the stratum corneum, or indirectly, by influencing the physiologic, homeostatic condition of the skin.

A.O. Barel, R. Lambrecht, P. Clarys, B.M. Morrison Jr., M. Paye, Comparative study of the effect on the skin of two soap bars in normal use and in the soap chamber test, Experimental Dermatology Vol 6 No 5, ISICD and ISBS Meeting Rome 2-4 October 1997 and Skin Research and Technology, Vol. 7, No. 2, May 2001

A double-blind study of the normal use during 10 weeks of two soap bars (soap and a syndet) was carried out on 25 female subjects. Eventual skin changes were evaluated by bioengineering measurements during the ten weeks treatment. Characterization of the skin was carried out using measurements of the skin colour, hydration, skin surface pH and TEWL.

W. Gehring, M. Gloor, Der Effekt von Dexamethasol bei experimentell geschädigter Haut, (The effect of dexamethasone in experimentally damaged skin). H+G, Band 76, April 2001-05-21

Im Rahmen einer randomisierten vehikelkontrollierten, doppelblindigen Studie wurde Dexamethasol in zwei unterschiedlichen lipophilen Vehikeln im repetitiven Waschtest untersucht.


Surveys conducted in many nations suggest that up to 50% of cosmetic users believe they have sensitive skin and products specifically designed for this skin type have become an important cosmetic category. In developing such products, objective assessment of the degree and the type of sensitivity is desirable. Unfortunately, currently available methods, including measurements of trans-epidermal water loss (TEWL) and lactic acid stinging test do not correlate well with self-assessed sensitivity and cannot be used to identify persons who are more prone to develop adverse skin reactions than other users.

Skin is a barrier to physical and chemical environment.

Different body sites are reported to show significant variations in skin biophysical and functional properties such as the response to locally applied stimuli or substances, including cosmetic products.

In general a w/o or o/w emulsion is stabilized by sodium chloride which is hydrated by and increases electric conductivity of aqueous solutions.

Measuring biophysical properties of the skin is not only useful to study cutaneous physiology and pathology but may also be of value for the prediction of eczema risk, for the detection of subclinical eczema and for therapy control in occupational dermatology.

A major problem encountered during the development of topical preparations not designed for transdermal but for local activity is to ensure sufficient therapeutic activity or, in the case of generic formulations, bioequivalence with the branded product. There are several possible approaches to evaluate the penetration of drugs into the skin and to investigate the effect of different vehicles on topical drug delivery.

Three cosmetic emulsions with vitamin E acetate (5%) were formulated using polymeric emulsifier, with different type but same amount of emollient oil (25%).

Reconstructed human epidermis is one of the most promising tools for in vitro evaluation of cosmetics.

In clinical practice, cutaneous exposure to a variety of irritants such as surfactants and solvents is frequent.


Cosmetic formulations are actually included into the normal skin care daily habits and often aim to contribute to the normal skin physiology.


Trans Epidermal Water Loss (TEWL) is one of the most important variables used to characterize skin water balance.


α-hydroxyacids (AHA) such as glycolic acid and lactic acid have recently been used in cosmetic and dermatological formulations.

I. Castiel-Higounenc, R. Jourdain, C. Queille-Roussel, C. Ferraris, P. Bastien, R. Schmidt, O. de Lacharrière, **Is barrier function disrupted in atopic xerosis?**, Poster for SFIC, Lausanne, July 2001

Atopic dermatitis (AD) is thought to be accompanied by alterations of the epidermis including reduction in water content and an augmentation in the transepidermal water loss (TEWL). In addition, studies have suggested that qualitative and quantitative differences exist in certain epidermal lipids of the intercorneocyte spaces of atopic patients, as compared to healthy subjects. Recent studies, however, have challenged these findings and indicate that the results obtained are highly dependent upon the skin zone evaluated as well as the clinical characteristics of the subjects being studied. The purpose of the work presented here was to more thoroughly characterize the water content and the barrier function of the cutaneous barrier of atopic xerosis patients as well as to analyze the type and quantity of intercorneocyte lipids found in the epidermis of these same patients.

Y. Yoshizawa, H. Tanojo, S.J. Kim, H.I. Maibach, **Sea Water or its Components Alter Experimental Irritant Dermatitis in Man**, Skin Research and Technology, Vol. 7, No. 1, February 2001

Ocean bathing has been considered “healthy” for skin, but its efficacy remains testimonial in nature.

S.J. Bashir, A. Chew, A. Anigbogu, F. Dreher, H.I. Maibach, **Physical and Physiological Effects of Stratum Corneum Tape Stripping**, Skin Research and Technology, Vol. 7, No. 1, February 2001

Tape stripping of human stratum corneum has been performed to measure stratum corneum mass, barrier function, drug reservoir and percutaneous penetration.


Die alkoholische Händedesinfektion ist Methode der Wahl zur Vorbeugung der Übertragung nosokomialer Infektionen in Spitälen.
It is not known whether distinct anatomical locations will respond with different recovery rates following acute barrier challenges. To investigate whether barrier parameters differ at five body sites during recovery from acute disruption. Acute barrier disruption was achieved by tape stripping and by acetone extraction of stratum corneum lipids. Transepidermal water loss (to assess barrier function) capacitance (for stratum corneum hydration) and skin surface pH were measured at each of five different body sites in 14 human volunteers. Individual measurements were obtained every 24 h for 96 h. Lipid-rich skin areas (e.g. the forehead) were the most vulnerable to barrier disruption by either method.

The central role of skin moisturizers in stratum corneum (SC) for the healthy skin was established in the last decade.

Many physicochemical and biological functions of skin-care products in the last decade were generally concerned with the stratum corneum (SC). The structure of the SC was proposed as a “brick & mortar model” by Elias in 1981. Bricks represented the corneocytes and intercellular lipids (composed of cholesterol, fatty acids and ceramides) formed the mortar.

Acute irritant contact dermatitis (ICD) is frequently treated with cool water or saline compresses. While presumed effective, little quantitative evaluation documents the treatment’s benefit. This study
sought to determine the efficacy of both distilled water and physiologic saline compresses on experimentally-induced ICD.


The lipids of 101 snake sheddings from 32 different species kept at Pentapharm’s serpentarium were extracted and analyzed by HPLC/LSD (light scattering detection and TLC. The snake shedding extracts were compared with those of human stratum corneum.


Besides a good compatibility, which should be a matter of course for cosmetic products, the skin’s physiological effectiveness, in particular moisture and skin-smoothing effects, are of main interest for this kind of product. Techniques such as FOITS (Fast Optical In vivo Topometry of human Skin), and corneometry are used to investigate their effectiveness. In order to succeed in reproducible and statistically significant results, experimental side conditions, such as a defined panel, controlled climatic conditions or a test design that includes a positive and a negative standard, are the basic starting tools.


Iontophoresis is a technique used to enhance the transdermal delivery of a drug by means of an electric current. The iontophoretic transport is influenced by several factors, such as concentration, size, ionic strength and the Ip of the drug and pH of the solvent, and also by the applied intensity and shape of the current and the application time.


A considerable number of people complain about enhanced skin sensitivity. The aim of this study was to investigate the characteristics of subjective statements and objective measurable parameters in subjects with self-estimated enhanced skin susceptibility. Four-hundred-and-twenty volunteers completed a questionnaire form with a self-estimation of skin susceptibility, possible triggering factors and other skin problems. In addition, basal values of transepidermal water loss, cutaneous blood flow and skin hydration were measured.


Biologic rhythms of cells and organisms are well documented and have been extensively studied at the physiologic and molecular levels. For the skin, many circadian changes have been investigated but few systematic studies comparing skin at different body sites have been reported. In this study we investigated facial and forearm skin circadian rhythms in eight healthy Caucasian women. Noninvasive methods were used to assess skin capacitance, sebum excretion, skin temperature, transepidermal water loss, and skin surface pH on fixed sites of the face and the volar forearm during a 48 h span under standardized environmental conditions. Using the cosinor or ANOVA methods, circadian rhythms could be detected for sebum excretion (face), transepidermal water loss (face and forearm), skin temperature (forearm), pH (face), and capacitance (forearm). No circadian rhythmicity was found for the other biophysical parameters. In addition to the 24 h rhythm component, rhythms with periods of 8 h were found for sebum excretion, of 8 and 12 h for transepidermal water loss (face and forearm), and of 12 h for skin
temperature (forearm). Our study confirms that rhythms of skin surface parameters are readily measurable and that these rhythms differ between different sites. Furthermore, we demonstrate for the first time that, for transepidermal water loss (face and forearm), sebum excretion, and skin temperature (forearm), in addition to circadian rhythms, ultradian and/or component rhythms can be detected.


Sensory evaluation is an important factor for cosmetic products. Several devices for the measurement of sensory properties have been developed in the recent years.


Squamometry is a combination of sampling corneocytes by adhesive coated discs following by colour measurements after staining the cells. In this study, the correlation between stratum corneum (SC) hydration and scaling was investigated using capacitance measurements and squamometry, respectively.


Alkali soap-free synthetic detergents, i.e. washing preparations with a neutral or skin-neutral pH-value, have proved themselves as mild cleansing agents for general use.


Dry skin is a widespread phenomenon of our time and is characterized by a deficiency of fat and moisture.


Daily influences, such as stress and the effects of weather, attack our skin and cause damage that is initially slow and scarcely detectable.


Body cleansing is particularly important in modern civilization, with its emphasis on hygiene, and it makes an important contribution to individual well-being.


Chronic irritant contact dermatitis (ICD) is one of the most pressing problems in occupational medicine and is common in the food processing industry. To date, protective creams that fulfil the special requirements in the foodstuffs industry have not been available.

C. Hun Huh, K. Il Seo, S. Duck Kim, J. Han, H. Chul Eun, *Biophysical changes after mechanical injury of the stratum corneum in normal skin,* Contact Dermatitis, January 2002, Vol. 46 No. 1

Scrubbing off the stratum corneum with a rough towel after soaking in warm water is a bathing custom unique to Korea. However, Korean dermatologists have advised against this practice due to the potential harm that it may cause, though there is little data to support this advice.

Background/Aims: Sensory evaluation is an important factor for cosmetic products. Several devices for the measurement of sensory properties have been developed in recent years. The objective here is to measure skin surface friction using these devices and examine the correlation with other physiological parameters in order to evaluate the potential of physical measurement of tactile sensation.

Methods: A KES-SE Frictional Analyzer, a commercial device for measurement of surface frictional characteristics, was used in this study. An arm holder was added to this device for measurement on the human forearm. The frictional coefficient (MIU) and its mean deviation (MMD) were used as the parameter to indicate surface friction. The moisture content in the stratum corneum was measured with a Corneometer CM825, the transepidermal water loss with a Tewameter TM210, the viscoelastic properties of the skin with a Cutometer SEM575 and the skin surface pattern by observing the negative replica using silicon rubber. Results: The MIU was not influenced by load; however, it was increased due to water application on the skin. The relationship between MIU and the moisture content in the stratum corneum, between MMD and skin surface pattern and between MMD and viscosity of both normal human forearm skin and SDS (sodium dodecyl sulfate)-induced dry skin were confirmed by statistical analysis in a test on human subjects. There was also a correlation between either MIU or MMD and sensory evaluation in the morning after the application of moisturizing products. Human skin surface friction was measured by using a KES-SE Frictional Analyzer. Conclusion: Judging from the correlation between either MIU or MMD and sensory evaluation, we considered this instrumental analysis to be useful for evaluating the tactile impression of human skin.


Skin protection creams are considered judicially as cosmetics. Besides a good efficacy, a main requirement to be fulfilled by these preparations is maximal safety as they are often applied on lesioned skin.

H. Tronnier, Effects of Textiles on Human Skin, SOFW Journal, 128. Jahrgang 4-2002

Very often, the people concerned as their employers make detergent residues in clothes responsible for skin reaction to textiles. Sometimes allergies are suspected.

S. Richert, A. Schrader, K.-H. Schrader, Comparing Methods to Measure Porcine Skin Integrity In Vitro, Cosmetics & Toiletries, January 2002, Vol. 117, Nr. 1

To confirm the integrity of porcine skin prior to penetration tests, published studies show that measuring transepidermal water loss, transdermal electrical resistance or caffeine penetration levels are often chosen techniques. New results demonstrate that TEWL is the superior method.

J. Woodruff, Body of evidence, Soap, Perfumery & Cosmetics 2002 April

Proving effect may not be new but it is of course an absolute requirement these days. And there are many different ways of going about it, explains John Woodruff

J. Djordjevic, G. Vuleta, J. Milic, H. Zhai, H. Maibach, O/W Emulsions Enriched with Vitamin E, Cosmetics & Toiletries 2002 April, Vol. 117, Nr. 4

Vitamin E has an important protective function for the entire organism. It is believed that the broad biological activities of vitamin E are due to its ability to inhibit lipid peroxidation and stabilize biological membranes.

Mathematical modelling of cutaneous variables is an attractive strategy to meet the complex nature of in-vivo skin, especially in the presence of an external stimulus such as a topical product.

M. Fuchs, S. Schliemann-Willers, C. Heinemann, P. Elsner, Tacrolimus enhances irritation in a 5-day human irritancy in vivo model, Contact Dermatitis, May 2002, Vol. 46, No. 5

Tacrolimus (FK 506) is a macrolide discovered in 1984 as a metabolic product of Streptomyces tsukabaensis. It has been used successfully in treating atopic dermatitis, allergic contact dermatitis, lichen planus mucosae and pyoderma gangrenosum. In the present study, we evaluated the antiinflammatory activity of FK506 in 2 human skin inflammation models.

M. Stücker, M. Hoffmann, P. Altmeyer, Instrumental evaluation of retinoid-induced skin irritation, Skin Research and Technology 2002, No. 8

Adapting retinoid therapy to the patient’s skin type can reduce the initial irritative side-effects. During the first days, patients with skin type 1 or 2 should add a medium potency corticosteroid. Stronger skin irritation caused by tazarotene therapy increases therapy effects.

Hurdles getting to the Market…is the product right?…is it safe?…is it legal? A report from the Britisch Society of Cosmetic Chemists, IFSCC Magazine – Vol. 5, No. 3/2002

The 2002 spring symposium at the Royal Society of Medicine proved to be a great success

C. Packham, H. Packham, Health and Safety at work: special report, Occupational Skin Management Update, Croner, Issue 60, August 2002

C. Urquhart, C. Rayner, Mavena® Mg 46 Dead Sea Salt Balneotherapy Accelerates Restoration of Barrier Function in Japanese Skin, 20th World Congress of Dermatology, Paris 2002

Therapeutic bathing in Dead Sea salt solution in the ambulatory setting is commonly referred to as “Balneotherapy”. Chronic skin diseases such as atopic dermatitis and psoriasis are often associated with a poor hydration status and a compromised barrier function of the skin. Dead Sea salts have a different mineral composition to salts arising from other sources.


The acidic pH of the horny layer, measurable on the skin surface, has long been regarded as a result of exocrine secretion of the skin glands. The ‘acid mantle’ was thought to regulate the bacterial skin flora and to be sensitive primarily to skin cleansing procedures. In recent years, an increasing number of investigations have been published on the changes in, and constituents and functions of, the pH of the deeper layers of the stratum corneum, as well as on the influence of physiological and pathological factors.

S. Seidenari, Non-Invasive Techniques for Diagnosis and Monitoring of Skin Diseases: an Updating of Recent Techniques useful in Dermatology, 20th World Congress of Dermatology, Paris 2002

Besides the necessity of a realistic assessment of spontaneous course of diseases, the evaluation of the cost/benefit ratio of potentially new treatments is increasingly required. Objective documentation of dermatological disorders can be achieved by means of bioengineering techniques, which provide numerical values as a basis for statistical analysis and enable instant in vivo information in the absence of interferences with the spontaneous course of the disease.

Purpose: The aim of this study was to establish age-related reference ranges in healthy Caucasian women for some widely used skin biophysical parameters.


Quantification of disease severity is a prerequisite for the development of evidence-based therapy. Today, patient history and clinical scoring are the main tools for dermatologists when attempting to assess the morbidity of patients with atopic dermatitis AD. These methods however have their limitations, as they all are operator dependent and frequently show poor inter- and intra-observer reproducibility.


The study was performed to compare skin pH, transepidermal water loss (TEWL), skin surface lipids and hydration in postmenopausal women receiving hormone replacement therapy (HRT) and those who not. Two parallel age-matched groups (each 24) of 48 postmenopausal women evaluated by tewameter, sebumeter, pHmeter and corneometer.


The authors investigated the intra-individual and the inter-individual variations of transepidermal water loss, capacitance and microcirculation in 10 different facial areas in subjects with “sensitive skin” and in subjects with “non-sensitive skin”.


Lamellar bodies (LBs) are the source of lipid composition of the stratum corneum (SC). SC intercellular lipid bilayers formed from secreted LBs are the most important structure of the permeability barrier. The cornified cell envelope (CE), formed during the terminal differentiation of keratinocytes, is a specialized structure covalently bound with SC intercellular lipids. This forms a structurally and functionally complete permeability barrier. Also, during epidermal differentiation, specific keratins are synthesized.


This theory envisages a linear correlation between the logarithm of the steady-state flux and the exchange cohesive energy between the permeating molecule and the lipid compounds of the stratum corneum (SC). The latter cohesive parameter is obtained from solubility parameter calculations and an attempt is made to verify the theoretical approach with experimental permeability data.
Phosphatidylcholine (PC) is the most abundant component of biological membranes. It possesses an intrinsic hydration force, and its metabolites are essential osmoprotectants. PC that is composed of saturated fatty acids (hydrogenated PC), also named gel-state PC or HPC, possesses physical properties that are comparable with those of the components of the skin permeability barrier.

In the present work, an oil-in-water (o/w) moisturizing cream was applied to experimentally elicited, scaly skin in order to investigate whether the product could promote a more rapid recovery of the disturbed barrier function (as measured by transepidermal water loss (TEWL measurements) than physiological barrier repair. Experimental models of both irritant (ICD) and allergic (ACD) contact dermatitis were applied. ICD was provoked by sodium lauryl sulfate (SLS), well known for its damaging action on the skin barrier function. The ACD study concerned a nickel-mediated contact allergy patch (CAP) test, carried out in nickel-sensitized volunteers.

The stratum corneum (SC) plays an important role in the clinical appearance of the skin as a result of its water-holding capacity and lipidic content. In addition, it acts as a barrier to protect the body from percutaneous absorption of a wide variety of xenobiotics, from desiccation, and from insults by a number of environmental conditions.

There was a significant decrease of water content of stratum corneum at both test sites from the time points 0 h to 3 h and 6 h (P<0.01) and transepidermal water loss from the time point 0 h to 6 h (P<0.05). Regarding the roughness parameters, a significant increase of Rz in the directions of 45º/225º and 90º/270º to the body axis and Sm in the directions of 0º/180º (P<0.05) on the forearm and VC1 (P<0.05) on the cheek.


The plasminogen (Plg) activation system plays a role in the process leading to dry skin with impaired barrier function, and serine protease inhibitors are known to improve dry skin. In this study, we have discovered that a urokinase-type Plg activator (UK), a trigger of the Plg activation system, which was previously believed to work within the epidermis, also exists in stratum corneum (SC). Focusing on the UK reaction in SC, we sought to develop a method of dry skin prevention.

B.S. Hammond, E. Fendler, The Impact of a Skin Care Program in a Fiberglass Facility utilizing Bioengineering Techniques, International Conference on Occupational and Environmental Exposures of Skin to Chemicals, September 8-11, Hilton Crystal City, Washington DC

A study was conducted at a fiberglass manufacturing facility to better understand the effects of a skin care regimen. A comprehensive skin care program was implemented that included site surveys and anlyses. A training program and the use of Gojo products.


Recent consumer marketing surveys have shown that the number of female consumers, assessed as having sensitive skin, has been increasing. In order to find an effective approach to improve sensitive skin, has been increasing. In order to find an effective approach to improve sensitive skin, it is important to know the detailed mechanism of sensitive skin.


Competition has driven manufacturers to incorporate into their skin-care products an ever increasing number of new active ingredients. While many of these materials are beneficial to the skin, some can cause adverse reactions. In this age of cosmeceuticals, it is easy to forget that simple cosmetic bases, without actives, can contribute substantially to cutaneous health. Although this benefit has long been suspected, few published studies are available. We focused on the effects of cosmetic bases on atopic dermatitis (AD), a skin disease characterized by itchiness and dryness which affects many cosmetic users.


The recent rapid growth of sunscreens marketing indicates that even though a suntan is still desired, people are nevertheless quite conscious of accompanying dangers like actinic changes (wrin-
kling, premature ageing of the skin, irregular thinning of the epidermis, hyperpigmented macules), de-
velopment of premalignancies (solar keratoses) and skin cancer (melanomas, basal and squamous cell
carcinomas) occurring as a result of excessive ultraviolet (UV) radiation.

A. Kramer, T. Bernig, G. Kampf, Clinical double-blind trial on the dermal tolerance and user ac-
ceptability of six alcohol-based hand disinfectants for hygienic hand disinfection, Journal of Hos-
pital Infection, 2002, 51: 114-120

Six commercially available alcohol-based hand rubs (AHD 2000, Desderma, Mus-
casept A, Manropad (Poly-Alkohol, Spitäcid, and Sterillium)) were investigated in a clinical double-blind 
trial involving 10 participants who had no previous experience of using hand rubs (Group 1) and seven 
who had Substantial professional experience of using hand rubs (Group 2, viro laboratory staff).

I. Le Fur, A. Reinberg, S. Lopez, F. Morizot, M. Mechkouri, E. Tschachler, Facial Skin Circadian 
Rhythms of Healthy Women Investigated Using Non-Invasive Methods, 22th IFSCC Congress, Ed-
inburgh, 23-26 September 2002 and 20th World Congress of Dermatology, Paris 2002

When studying the biophysical parameters it is of major importance to know about their possible 
time-dependant changes.

M. Ghyczy, V. Vacata, Phosphatidylcholine and Skin Hydration, “Skin Moistarization”, Cosmetic Sci-

Phosphatidylcholine (PC) is the most abundant phospholipid in animal cells. It possesses an 
intrinsic hydration force, and its metabolites are essential osmoprotectants. Phosphatidylcholine com-
pnosed of saturated fatty acids (hydrogenated PC; HPC) possesses physical properties which are com-
parable with those of the components of the skin permeability barrier.

J.L. Sugarman, J.W. Fluhr, A.J. Fowler, T. Bruckner, T.L. Diepgen, M.L. Williams, The Objective Sever-
ity Assessment of Atopic Score – An Objective Measure Using Permeability Barrier Function and 
Stratum Corneum Hydration with Computer Assisted Estimates for Extent and Disease, Arch. 
Dermatol., Vol. 139, Nov. 2003

Clinical scores used to assess the severity of atopic dermatitis (AD) rely entirely on subjective 
criteria to the severity of lesions and the extent of involvement.

für die Händedesinfektion relevanter antimikrobieller Wirkstoffe, in Günter Kampf (Ed.): Hände-
Hygiene im Gesundheitswesen, Springer Verlag, 2003, Kapitel 5

In zahlreichen Ländern (z.B. Belgien, Dänemark, Deutschland, Finnland, Schweden, Schweiz 
und allen osteuropäischen Ländern) sind Hände-Desinfektionsmittel Arzneimitteln gleichgestellt und zuzulassungspflichtig.

J. Fluhr, Jeffrey L. Sugarman, Thomas L. Diepgen, M. L. Williams, The Objective Severity Assess-
ment of Atopic Dermatitis (OSAAD) Score, 61st Meeting of the American Academy of Dermatology, 
March 21-26, 2003

Measurements of epidermal permeability barrier function and SC hydration correlated closely 
with clinical estimates of disease severity. PH was found not to be a sensitive measure of AD severity. 
The OSAAD score correlated well with current “gold standard” of AD severity, the SCORAD (p<0,001; 
Spearman correlation coefficient of r=0,63439)

Repeated application revealed that betamethasone-17-valerate caused a statistically significant reduction in erythema and TEWL compared to cipamfylline and placebo. We also observed a significant suppression of proliferating cells and cytokeratin 16 expression at sites treated with betamethasone compared to the other sites.


The objectives of the study were to explore the effects of using the water-soluble mucilage of Monostroma nitidium to replace the humectant and half of the thickening agent on the rheological properties, color, storage stability, water-holding capacity, and film formation time of moisture masks thus prepared. Results showed that moisture masks containing water-soluble mucilage were pseudoplastic fluids.


A number of studies have shown that, depending on the concentration, treatment with urea could improve skin barrier function, despite of its penetration enhancing properties. This controversial skin effect has not been explored systematically in terms of the effect of vehicle on the performance of urea.

L. Monteiro Rodriguez, J. Martins Magro, M. Mouzinho, P. Pinto, M. Almeida, Bioengineered characterisation of the thermal burn injury healing process, Skin Research and Technology, Vol. 9, No. 2, May 2003

Full thickness burn injuries may be followed-up through non-invasive bioengineered methodologies. This elegant approach to this complex multifactorial process allows us to obtain quantitative data involving several variables representing structure and function, providing more objective support to practical management and therapeutical intervention.

J. Fluhr, J.S. Kao, P.M. Elias, K.R. Feingold, Short-term glucocorticoid treatment compromises both permeability barrier homeostasis and stratum corneum integrity: inhibition of epidermal lipid synthesis accounts for functional abnormalities, Skin Research and Technology, Vol. 9, No. 2, May 2003

Prolonged exposure of human stratum corneum to excess endogenous or exogenous glucocorticoids (GC) can result in well-recognized cutaneous abnormalities. Here, we determined whether short-term GC treatment would alter two key functions of the skin, permeability barrier homeostasis and stratum corneum (SC) integrity and cohesion, and the basis for these changes.

P.C. Pinto, R. Minhos, L.M. Pereira, L. Monteiro, Validation of a compartmental model to quantitatively describe transepidermal water loss, Skin Research and Technology, Vol. 9, No. 2, May 2003

New computational methods are being applied to analyze data from TEWL experiments mostly using non-linear algorithms. A new strategy involving the application of a compartmental model to TEWL data obtained from a Plastic Occlusion Stress Test (POST) has been used with encouraging results. This strategy is now being validated in order to establish its major determinants affecting the model’s parameters.
P.C. Pinto, L.M. Pereira, L. Monteiro Rodriguez, Skin water dynamics: disposition-decomposition analysis (DDA) od transepidermal water loss (TEWL) and epidermal capacitance, Skin Research and Technology, Vol. 9, No. 2, May 2003

Knowledge about human skin water dynamics seems to represent a growing importance to understand the organ’s normal physiology. Mathematical modelling of (cutaneous water) related variables obtained through skin bioengineering, provided new perspectives to approach this problem.

M. Bock, H.J. Schwanitz, Site variations in susceptibility to SLS at the volar forearm evaluated by TEWL measurement, Skin Research and Technology, Vol. 9, No. 2, May 2003

According to the “guidelines on sodium lauryl sulphate (SLS) exposure test” of the ESCD standardisation group the flexor side of forearm skin with cubital fossa and wrist excluded is the preferred study site’. This study analyses the exact anatomic region within the suggested test area in respect to the outcome of SLS exposure test.


We recently reported that open application of seawater for 20 min ameliorated experimental irritant contact dermatitis induced by sodium lauryl sulphate (SLS) cumulative irritation. The efficacy was overall contributed by 500 mM of sodium chloride (NaCl) and 10mM of potassium chloride (KCl), which are consistent with the each concentration in seawater.


Nowadays, vitamin E acetate is used as an antioxidant and moisturizer in sunscreens. Although free vitamin E presents UV protection effects, little data has been forthcoming documenting the beneficial effects of vitamin E acetate on cutaneous photodamage, when combined with sunscreens. The aim of this study was to evaluate the protective effect of a sunscreen formulation with or without vitamin E acetate on erythema in hairless mice, transepidermal water loss (TEWL) and sunburn cell formation.


The rainforest regions of South America are the most bio-actively diverse natural phenomena on the planets housing 70 % of the world’s flora and fauna, 10-15 million insects and 20000 different species of planet life.

H. Lambers, H. Pronk, S. Piessens, E. Voss, Natural human skin surface pH is on average below 5, Gordon Conference, Aug. 2003

The acidic surface pH and the pH gradient over the stratum corneum (SC) are important for optimal condition of the skin, supporting the following functions: regulation of skin microflora, thereby preventing pathogenesis, optimal structure and function of the lipid barrier, optimal stratum corneum homeostasis.


Prolonged or repeated exposure of skin to surfactants used in personal care products or cleaners often results in damage to the stratum corneum (SC) barrier function. Prevention of stratum corneum damage requires careful formulation of such products and suitable screening methods to detect changes in stratum corneum function.

Atopic dermatitis (AD) is characterized by an intensely pruritic skin disease with typical distribution and morphology. The age of onset is nearly always within the first 5 yr of life, and lifetime prevalence in children is roughly 10 to 15% in industrialized countries.


In order to find an effective approach to improve sensitive skin, it is important to know the detailed mechanism of sensitive skin. In this study, detailed characteristics of sensitive skin were investigated using non-invasive methods. Sensitive skin was classified into three different types based on their particular characteristics.


The plasminogen (Plg) activation system plays a role in the process leading to dry skin. In this study, we have discovered that a urokinase-type Plg activator (UK), a trigger of the Plg activation system, which was previously believed to work within the epidermis, also exists in stratum corneum (SC).


A biometrologia cutânea, ramo da ciência que avalia quantitativamente as propriedades biomecânicas da pele, tem encontrado na cosmética um importante aliado, pois o apelo mercadológico dos produtos destinados aos cuidados com a pele e com os cabelos tem-se baseado cada vez mais em evidências científicas e técnicas sensíveis, precisas e validadas, ao invés de serem fundamentadas em especulações.


The Amazon Rain Forest presents incomparable biodiversity, representing approximately 25% of all the plants on earth. Its inhabitants, Indians or natives of the region often referred to as “caboclos”, utilize this diversity to improve their health and beauty. The “traditional use” of these plants is often referenced in the product stories told by cosmetic companies.


The permeability barrier function is traditionally measured with instruments assessing the transepidermal water loss (TEWL) relying on (i) closed loop systems (ii) open loop systems. In the present study three closed loop system-based instruments were compared under different experimental in vivo conditions with 4 open-loop based instruments: MEECO, H4300, VapoMeter, TM 210, TM 300, DermaLab and EP.


Sensory evaluation is important in the testing of cosmetic products. Several devices for the measurement of sensory properties have been developed in recent years. The objective here is to measure skin surface friction using these devices and to examine the correlation with other physiological parameters in order to evaluate the feasibility of using physical measurement to predict tactile sensation.

A great number of compounds is available for the treatment of inflammatory skin diseases, the most effective external anti-inflammatory compounds being glucocorticoids. Their side effects have motivated a continuing search for other therapeutic compounds, and fungal metabolites like Poria cocos have figured in the literature.


One of the trends in modern dermatology and its perspectives for the near future are skin bioengineering and imaging. The 1st joint meeting of two scientific societies focusing on measurements and visualisation of skin function, structure and physiology – the International Society for Skin Imaging (ISSI) – took place in Hamburg, May 21-24, 2003. Before that, the meetings and conferences organised by these societies had been held separately.


Field of invention: The present invention is concerned with methods for treatment of human skin damaged by laser treatment or chemical peelings and compositions useful in carrying out such methods. Background of the invention: Laser treatments are nowadays widely used in cosmetics, dermatology and surgery. A wide selection of laser devices are available for these purposes, such as: Neodymium Yttrium-Aluminium-Garnet Laser [Neodymium:YAG] (1064 nm) This laser provides a high penetration depth and produces a photothermolysis. By superposition of a potassium titanyl phosphate crystal the frequency can be doubled, thus halving the wave length to 532 nm. The emerging green light is well absorbed by structures containing melanine or oxyhemoglobin. Thus, this laser is used for the treatment of epidermic pigmented lesions.


Background/Aims: Antioxidants have been proposed, over the last decade, as functional ingredients for anti aging preparations and to prevent and modulate oxidative skin damages. Up to date, beside the photo-induced oxidative skin damages model, none in vivo protocols have shown sufficient reproducibility for the validation of the antioxidant claim for a cosmetic finished product. To this aim, we have recently anticipated a new in vivo protocol based on a microinflammatory model, driven by reactive oxygen species. In the present study our model was validated by comparison with four different instrumental methods. Methods: The effects of a pre-treatment of two different formulations based on antioxidant functional ingredients, were investigated on forearm skin of 15 healthy volunteers, and compared to a cosmetic base and control area. The instruments considered in the study were Chromameter (CR-300 Minolta), Tewameter TM 210 (Courage-khazaka, Cologne, Germany), Laser Doppler Perfusion Imager (PIM1.0 Lisca Development AB, Sweden), in comparison to DermAnalyzer(R), an easy to use
software program developed by us, using the CIE L*a*b* color space parameters. Results: The comparative measurements showed that the antioxidant formulations tested were all able to reduce, in different but statistically significant extent, the intensity of skin redness, and of cutaneous blood flow, when compared to control area (P < 0.0001). Conclusions: The methyl nicotinate (MN) based microinflammatory model, in conjunction with objective measure- ments, resulted an effective tool for in vivo assessment of oxidative skin injuries. In view of the high level of repeatability, short time of answer and simplicity, the procedure by us developed, is proposed as a possible protocol for the evaluation of in vivo efficacy of antioxidant functional ingredients in cosmetic formulations.


Background and problem: It is well known that the damaging effect of surfactants on the stratum corneum varies according to the surfactant used. The present investigations aim to compare four standard commercial cleansing solutions (Esempiant® Cleansing Lotion, Stephalen® Shower Gel, Manipur® Antimicrobial Cleansing Solution and Tork® Mevom™ Liquid Soap) with respect to their cleansing and skin barrier-damaging effects.


The aim of this study was to investigate whether the extract of chamomile (Chamomilla recutita, (L) Rausch, Asteraceae) increases skin hydration level and its barrier properties when used in an O/W cream. In addition, it was of interest to find out whether the encapsulation of chamomile extract in liposomes affects its skin functionality.


Olive Oil is the one of the lipids showing the highest compatibility with our skin. Olive Oil in fact is a precious vegetable oil as it has got a high similarity to human skin lipids. The sebum secreted by the sebaceous glands works through an important activity: to protect the skin against the environment and to reduce the Trans-Epidermal-Water Loss.

H. Drexler, Hautbelastung, Hautbeanspruchung und Hautschutzverhalten bei Krankenpfelgeschüler(inne)n, Institut u. Poliklinik für Arbeits-, -Sozial- und Umweltmedizin der Univers. Erlangen-Nürnberg

Fragenstellung: Wie hoch ist die Inzidenz beruflich verursachter Dermatosen unter Berücksichtigung von Risikofaktoren, Exposition und Hautschutzverhalten bei Berufsanfängern in der Krankenpflege? Welche Parameter sind geeignet, die berufliche Belastung zu objektivieren?


Background: Limited information documents the prevention and treatment benefits of a hand care regimen using moisturizer in a controlled manner for employees in typical manufacturing situations. Objective: The objective was to assess the effectiveness of a comprehensive skin care program including skin conditioning lotion in multiple manufacturing environments where employees are at high risk for skin disease.
H. Shibayama, H. Indo, K. Ueda, K. Yoshio, Y. Kook Choi, Y. Ishigami, M.S. Yang, D.S. Lim, G.Y. Lee, S.S. Lee, New Derivatives of Supiculisporic Acid as Biosurfactants and Application for Cosmetics, IFSCC Orlando USA, 2004

It is well known that some microorganisms produce surface-active substances on cultural conditions.


Summary: The non-invasive assessment of post-burn wound recovery allows new insights into wound-healing pathophysiology. This pilot study enrolled thermal burn patients (n = 9) with autografted wounds. Grafted lesion (GL) and donor lesion (DL) areas were followed for 6 months by non-invasive measurement of local microcirculation, transcutaneous PO2, and transepidermal water loss (TEWL); the contralateral intact areas were used as controls. The results show that local flow changes in GL were significantly different (p < 0.05) from normal until week 6, while in DL differences still persisted at week 8. No differences between GL and DL were found for transcutaneous PO2 measurements. However, full functional recovery was achieved earlier in DL, while in GL statistically significant differences (p < 0.05) between the lesion and the control area were still present at week 26. TEWL evolution demonstrated that significant differences (p < 0.05) between lesions, compared with the respective controls, persisted in week 26, probably resulting from different recovery mechanisms. Globally, the present study helps to define the wound-healing functional profile of the lesions, highlighting the interest of the non-invasive assessment of wound pathophysiology in burn care and rehabilitation.


The aim of these studies was first to investigate the possible reasons inducing S.P.F. variations during clinical testing, as regards specific cutaneous parameters (skin colour, hydration, barrier function, pH, surface lipids ...), and secondly to assess the effect of racial origin (Asian/Caucasian) in a large range of sunscreen products (S.P.F. 4 to 30).


Background/Purpose: To describe the water and ion transport through the skin under different conditions, we developed a three-component mixture model. This model has proven to describe the transient change in transepidermal water loss (TEWL) after a change in relative humidity and the result of damage to the skin.

Pathogenesis of atopic dermatitis (AD) has been studied in animal models such as the NC/Nga mouse strain or Balb/C mice that are repeatedly treated with 2,4,6-trinitro-1-chlorobenzene (TNB). These mice exhibit features of chronic contact dermatitis, including an intensified early type skin reaction, increased number of mast cells and elevated serum IgE levels with a shift of cutaneous cytokine expression from a type 1 to type 2 profile.


Water is one of the most important and limiting factors for plants, animals and humans. The human being consists of 60-65% water and loses daily up to several liters through the skin. The regulation of water content is therefore very significant. Plants especially have developed fascinating physiological and structural strategies to minimize water loss and survive periods of dryness.


The sodium lauryl sulphate (SLS) irritation test is a well-established model for irritant contact dermatitis after the effects of surfactants. The course of changes in corneometric measurements (stratum corneum hydration), in transepidermal water loss (TEWL), in laser Doppler measurements (epidermal perfusion) and in colorimetric measurements (skin redness), after a single SLS irritation, should be studied over time.

"Symposium Medical – Für sie referiert", *Hautzustandsmessung als Präventionshilfe am Arbeitsplatz*, Symposium Medical 2004, S. 22

Während Augen, Ohren, Lunge und andere Organe, die am Arbeitsplatz Schadstoffen oder Belastungen ausgesetzt werden, in der Arbeitsmedizin schon seit vielen Jahren überwacht und gemessen werden, wird die Haut, die mit ca. 1,8 m² das größte menschliche Organ darstellt, vielfach außer Acht gelassen oder maximal visuell überprüft.


Regular skin cleansing with washing substances has medical, cosmetic, hygienic and sociocultural functions. In western cultures, the hygienic and cosmetic aspects prevail. The aim of a washing process is to remove or reduce dust particles, microorganisms and odorous substances. The resident skin flora in a washing process can be reduced significantly. The antiseptic effect of washing is gained independently from the function of tensides, through the removal of dust and dandruff material from the skin and hence through a reduction of growth medium for bacteria.

C. Packham, *You need hands: protecting your hands from the working environment*. Health & Safety International, October 2004

In our daily life our hands will be exposed to many different hazards. Some of these will occur, or mainly, at work, some in the home or in our hobbies or free time activities. In principle we can divide these hazards into two main groups: physical and chemical.

Nursing has been identified as a wet-work occupation, with a high prevalence of occupational irritant contact dermatitis. Reduction of exposure to skin irritants contributes to the prevention of occupational skin disease in nurses. The role of the use of soap and water, hand alcohol and gloves in prevention programmes is discussed.


Eventual relationships between the vascular function and transepidermal water loss (TEW), in vivo, have not been entirely explored. By promoting local perfusion alterations through a well-known challenge test, the “tourniquet-cuff occlusion” manoeuvre, the present study searches for other dynamical factors influencing the cutaneous barrier, further exploring the applicability of these flow-related variables in dermatological research.


The need for reliable and reproducible measures for assessment of atopic dermatitis severity has resulted in the development of numerous scores most of which have not been adequately tested in terms of validity, reliability, responsiveness to change and acceptability. The SCORAD index of the European Task Force on Atopic Dermatitis has been considered the standard outcome measure in clinical trials in the last decade.

H. Lambers, S. Piessens, A. Bloem, H. Pronk, P. Finkel, E. Voss, Natural skin surface pH is on average below 5, which is beneficial for its resident flora, Skin Research and Technology 10, Abstracts, 2004.

The acidic surface pH as well as the pH gradient over the gradient over the stratum corneum (SC) are important for a good skin condition, supporting optimal structure and function of the lipid barrier and SC homeostasis.


The „strip“ patch test (SPT) is a variant of patch testing which is used for substances with a poor percutaneous penetration. Penetration of the substance is enhanced by repeated applications of adhesive tape prior to their application to the skin. However, no guidelines exist for standardized performance of the SPT.


Mammalian skin is a highly dynamic organ that is constantly adapting to changes in its environment. It provides structural, sensory, immunologic, and physiologic functions and contributes an essential barrier function against potential environmental insults.

K.L. Gebhard, Evaluation und Standardisierung von Hauttestungen zur Diagnostik der irritativen Kontaktdermatitis, Digitale Bibliothek der Universität Marburg, 2004

Ziel der vorliegenden Arbeit ist es, durch Variation verschiedener Applikationszeiten, Konzentrationen und Vorbehandlungen (VB) der Teststellen zu evaluieren, ob der bisher übliche 24-stündige epikutane Irritationstest auf 4 Stunden verkürzt werden kann. Hierzu wude an 36 hautgesunden Probanden ein epikutanes Natriumlaurylsulfat-Test (NLS-Test) auf die oberen Rückenpartien appliziert. Fol-

V. Nikolai, K. Quecke, Beobachtungen zur Feuchtigkeitsregulation am Pferdehuf mittels TEWL-Messung, Der praktische Tierarzt 85, Heft 11, S. 816-819, 2004


It is known that, depending on the concentration, treatment with urea could improve skin barrier function, despite its penetration-enhancing properties. This controversial skin effect of urea has been explored systematically in this study in terms of the effect of vehicle on the performance of urea. In the first part, a series of four semi-solid emulsions with 5% (w/w) urea, varying in the type of emulsion, nature of emulsifier and polarity of oil ingredients, have been evaluated with regard to their skin hydrating and transepidermal water loss (TEWL)-modifying properties.

G. Vielhaber, J. Ley, O. Koch, N-Palmityl-4-Hydroxy-L-Proline Palmityl Ester: A Ceramide Analogue that provides efficient skin barrier repair, IFSCC Orlando 2004, Podium Proceedings

The epidermal permeability barrier protects the skin against uncontrolled water loss and environmental damage. It is located in the horny layer and consists of a compact lipid matrix of ceramides, fatty acids and cholesterol embedded between the corneocytes.

B.M. Morrison, M. Paye, V. Charbonnier, H.I. Maibach, The Effect Of Surfactants On Skin As Measured By Squamometry : A Sensitive Way To Observe Sub-Clinical Irritant Dermatitis, IFSCC Orlando 2004, Podium Proceedings

In order to define the early parameters of surfactant induced skin dryness, an exaggerated hand washing model has been chosen to assess the effects of three surfactants, SLS, SLES, and AOS on stratum corneum function as measured visually, instrumentally, and through Squamometry. These three surfactant solutions were compared to their water controls.


Background: Xerosis is a common skin condition (1) characterized by dry, rough, scaly, and itchy skin, (2) associated with a defect in skin barrier function, and (3) treated with moisturizers. People in the tropics have effectively used coconut oil as a traditional moisturizer for centuries. Recently, the oil also has been shown to have skin antiseptic effects. A moisturizer with antiseptic effects has value, but there are no clinical studies to document the efficacy and safety of coconut oil as a skin moisturizer. Objective: This study aimed to determine the effectivity and safety of virgin coconut oil compared with mineral oil as a therapeutic moisturizer for mild to moderate xerosis. Methods: A randomized double-blind controlled clinical trial was conducted on mild to moderate xerosis in 34 patients with negative patch-test reactions to the test products. These patients were randomized to apply either coconut oil or mineral oil on the legs twice a day for 2 weeks. Quantitative outcome parameters for effectivity were measured at baseline and on each visit with a Corneometer CM825 to measure skin hydration and a Sebumeter SM.
to measure skin lipids. For safety, transepidermal water loss (TEWL) was measured with a Tewameter TM210, and skin surface hydrogen ion concentration (pH) was measured with a Skin pH Meter PH900. Patients and the investigator separately evaluated, at baseline and at each weekly visit, skin symptoms of dryness, scaling, roughness, and pruritus by using a visual analogue scale and grading of xerosis. **Results:** Coconut oil and mineral oil have comparable effects. Both oils showed effectiveness through significant improvement in skin hydration and increase in skin surface lipid levels. Safety was demonstrated through no significant difference in TEWL and skin pH. Subjective grading of xerosis by the investigators and visual analogue scales used by the patients showed a general trend toward better (though not statistically evident) improvement with coconut oil than with mineral oil. Safety for both was further demonstrated by negative patch-test results prior to the study and by the absence of adverse reactions during the study. **Conclusion:** Coconut oil is as effective and safe as mineral oil when used as a moisturizer.


A non-detergent urea emulsion cleanser and a detergent cleanser with added moisturizers were compared for their effects on stratum corneum moisture, surface lipids and transepidermal water loss (TEWL) of atopic skin. Following a single wash with either cleanser, low corneometry and sebumetry values increased and elevated TEWL values decreased. Over the course of more than 6 h, all induced changes gradually returned to their starting points. In all instances, the changes induced by the urea emulsion lasted significantly longer than those caused by the detergent cleanser. The sebumetry increase after a wash with the lipid-free detergent cleanser indicated that this method recognized not only true lipids but also the lipid-derived and skin lipid-depleting detergents. The transient TEWL normalization with either cleanser could not be attributed to a passing barrier restoration nor to an occlusion. It is speculated that the TEWL changes were related to stratum corneum water binding capacity.


Background: Nitric oxide (NO) synthesis is upregulated in dermatitis, which may lead to deterioration in skin barrier function (1). It may also be involved in the modulation of keratinocyte proliferation and formation of the cornified envelope (2). On the other hand, beneficial effects of NO in damaged skin have been reported, which suggest that the source of NO and its relative concentrations in defined locations may be important (3). A better understanding of the role of NO in skin irritation could lead to the development of new medications for patients with irritable skin or at risk of developing irritant contact dermatitis. Objective: To examine the possible effects of modulators of NO production on erythema and transepidermal water loss (TEWL) induced by sodium lauryl sulphate (SLS). Methods: Ten volunteers with normal skin were patch tested with water and SLS 0.2%, 0.5% and 1% on the back. The outcomes of TEWL was assessed, using the TEWL meter (Courage & Khazaka, Cologne, Germany) and erythema was measured by skin reflectance and a visual scoring method. at 1, 6, 25 and 49 hours. The effects of the NO inhibitors, L-NAME, extracts of Olea europa and Ginkgo biloba (as 1% gel solutions) and of the NO donor, glyceryl trinitrate (as 2% ointment) were compared with their control gel and ointment. Results: L-NAME and the plant extracts reduced TEWL. The TEWL induced by 0.5% SLS was significantly diminished by L-NAME at 1 and 6 hours and by ginkgo extract at 6 and 49 hours. Erythema was too mild for reflectance measurements to show significant inhibition, but erythema scores tended to be lower at 6 hours the application of NO inhibitors. Conclusion: NO inhibitors may protect skin barrier function from the adverse effects of chemical irritants.
Functional assessment of a washing emulsion for sensitive skin: mild impairment of stratum corneum hydration, pH, barrier function, lipid content, integrity and cohesion in a controlled washing test, Skin Research and Technology, 2005-11, May, p. 53-60

Sensitive skin has been described as a skin type with higher reactivity than normal skin and exaggerated reactions to external irritants. Washing with soaps is harmful for barrier-related parameters.

Validation of the VapoMeter, a closed unventilated chamber system to assess transepidermal water loss vs. the open chamber Tewameter®, Skin Research and Technology 2005-11, May, p. 61-69

The Stratum Corneum (SC) – the uppermost layer of the epidermis – contains the barrier function of the skin. Besides the proteinaceous hydrophilic corneocytes, this barrier consists of lipid-rich hydrophobic intercellular bilayers.

Skin irritation due to repetitive application of adhesive tape: the influence of adhesive strength and seasonal variability, Skin Research and Technology 2005-11, May, p. 102-106

Medical pressure-sensitive adhesive tapes are applied to human skin in one of two ways, depending on their indication for use. Either they are replaced and applied on the same site every day, as is the case with traditional sticking plasters and surgical tapes, or they are pressed on to and remain on the skin for a few days when used at the site of the transdermal delivery of drugs.

Visible and subclinical skin changes in male and female dispatch department workers of newspaper printing plants, Skin Research and Technology 2005-11, May, pp. 132-139.

Irritant hand dermatitis is one of the major occupational diseases. Approximately 90% of all cases of hand eczema are caused by occupational exposure. It is a well-established fact that wet work and skin exposure to detergents or solvents often trigger irritant contact dermatitis. Even water can be a skin irritant itself.

Folic Acid (Folacin) – New Application of a Cosmetic Ingredient, Kosmetische Medizin 3/2005, p. 16-22

Many years of trials and research tests proved that a lot of well-known vitamins could be successfully used in cosmetology. The available data indicate that one of them – folic acid plays an important role in life process of mitotically active tissues and its deficiency increases background level of DNA damage.


The measurement of transepidermal water loss (TEWL) has been established as one of the main parameters in the assessment of skin barrier function. One of the most widely employed devices to measure TEWL is the Tewameter®. Courage and Khazaka launched the TM300 in 2003 and successfully eliminated some of the limitations of the previous model.
P.M.B.G. Maia Campos, M. D. Gianeti, G. M. S. Gonçalves, L. R. Gaspar, **Assessment of in vitro antioxidant and in vivo anti-ageing effects of cosmetic products containing vitamin C and its derivatives on human skin**, Presentation at the IFSCC in Florence 2005

The objective of this study was to determine the *in vitro* antioxidant activity of vitamin C (AA) and its derivatives, magnesium ascorbyl phosphate (MAP), ascorbyl tetra-isopalmitate (ATIP) as well as their *in vivo* anti-ageing effects by using Cutaneous Bioengineering Techniques on human skin. The study of antioxidant activity *in vitro* was made with an aqueous and a lipid system, the luminol-chemiluminescence, and malondialdehyde assay, respectively.


Our research conducted over several years has demonstrated that odorant inhalation produces an effect on cutaneous functions by inducing changes in the neuroendocrinological system. For example, inhalation of the natural sedative component of the rose flower, DMMB (1,3-dimethoxy-5-methylbenzene), inhibited an increase in plasma cortisol levels and barrier recovery delay or an increase in forehead sebum, which was induced by stress. These findings were obtained using authentic experimental patterned stress and short-period odorant inhalation.

D. Kowatzki, C. Machold, K. Krull, P. Elsner, J.W. Fluhr, **Regeneration kinetic of sweating, Stratum Corneum hydration, Surface pH, Sebum production and mechanical properties is not altered by regular sauna bathing**, Presentation on the ISBS Meeting 2005 in Philadelphia and Skin Research and Technology 2005, 11 (abstracts)

Wellness and especially sauna bathing are of growing interest in modern health care. The positive effect of sauna for general health is well documented. However, to our knowledge no controlled studies have been published on the effect of sauna on skin physiology.

J.W. Fluhr, M. Breternitz, M. Flach, P. Elsner, **Acute experimentally induced barrier disruption by tape stripping is influenced by pressure, time and anatomical location: Integrity and Cohesion assessed by sequential tape stripping**, Presentation on the ISBS Meeting 2005 in Philadelphia and Skin Research and Technology 2005, 11 (abstracts)

Tape stripping is a well-known procedure in stratum corneum physiology research. Adhesive films are pressed to the surface of SC and then removed. The superficial layers of SC adhere on the film and are accessible for further investigations. Although this method is widely used, only few information about standardization are known.


In order to investigate the influence of low relative humidity, we measured saccharin clearance time (SCT), frequency of blinking, heart rate (HR), blood pressure, hydration state of skin, transepidermal water loss (TEWL), recovery sebum level and skin temperature as physiological responses. We asked subjects to judge thermal dryness and comfort sensations as subjective responses using a rating scale. Sixteen non-smoking healthy male students were selected. The pre-room conditions were maintained at an air temperature (Ta) of 25°C and a relative humidity (RH) of 50%. The test room conditions were adjusted to provide a Ta of 25°C and RH levels of 10%, 30% and 50%.

Goal of the study: To assess the skin irritant effects of food additives and the potential relevance for the development of irritant contact dermatitis. Methodology: The irritants (ascorbic acid, acetic acid and sodium hydroxide at different pH values) were applied to the skin of the mid-back of 19 volunteers twice daily for four days using and occlusive epicutaneous patch test system and in combinations with sodium lauryl sulfate (SLS).


The hardening phenomenon results from the adaptation of the skin to repeated influence of exogenous irritative noxes. This study focuses on the lipid composition on the stratum corneum before and after induction of a hardening phenomenon.


Topical products with high concentrations of urea have been recently incorporated to dermatological vademecum. Urea, an active ingredient with a long history in dermatology has been extensively used in several skin diseases due to their moisturizing, desquamating, antiproliferative and antipruritic effect.


The objective of the present study was to test the discriminative capacity of the mathematical modeling of the transepidermal water loss (TEWL) curves that result from a plastic occlusion stress test (POST) to variations in the skin barrier – insults inflicted to the skin or differences in two distinct anatomical regions. This study was exclusively performed in the arm. On the first part of the work, three different insults to the skin barrier were assessed: tape stripping, lipid extraction with ether: acetone, and skin-surface biopsy.


Diffusion/penetration properties of locally applied drugs are affected by both the status of the stratum corneum (SC) and by the composition and colloidal structure of the vehicle.

H. Zhai, E. Dika, M. Goldovsky, H.I. Maibach, Tape Stripping Method in Man: Comparison on Evaporimetric Methods, Presentation at the EADV London, Oct. 2005

Transepidermal water loss (TEWL) documents integrity of stratum corneum (SC) water barrier function and is a sensitive indicator of skin water barrier alteration. Adhesive tape stripping is commonly used for investigating SC physiology, bioavailability and bioequivalence of topical drugs.


Die periorale Dermatitis (PD) als Krankheitsentität ist 1964 von Mihan und Ayres erstmals in den USA beschrieben worden.
Intensive-care patients are at risk for organic failures. But there are hardly any results known for the skin barrier function of patients in intensive care. There are only studies of transepidermal water loss (TEWL) in premature infants (1,2). It was found that premature infants have an insufficient cutaneous barrier, which can be improved by bland local therapy (2).

Measurement of transepidermal water loss (TEWL) is widely used to characterize the water barrier function of skin (both in physiological and pathological conditions), to perform predictive irritancy tests, and to evaluate the efficacy of therapeutic treatments on diseased skin. TEWL assessment can be performed using different techniques [1,2] (closed-chamber method, ventilated-chamber method, and open-chamber method).

Skin may adapt to topical irritants through accommodation. This study focuses on long-term exposure to irritants and attempts to demonstrate accommodation. Sodium lauryl sulfate (SLS) induced irritant contact dermatitis at 3 concentrations (0.025% to 0.075%).

For the patients’ own safety, certain dental treatments require them to use protective glasses. Until recently wearing of glasses during dental treatment was not a generally accepted and widely used method in Hungary. In our study we wanted to find out whether this unusual circumstance has any effect on the children’s dental fear, and what effect – if any – the lens color of the protective glasses makes.


Cadherin adhesion molecules are key determinants of morphogenesis and tissue architecture. Nevertheless, the molecular mechanisms responsible for the morphogenetic contributions of cadherins remain poorly understood in vivo. Besides supporting cell–cell adhesion, cadherins can affect a wide range of cellular functions that include activation of cell signalling pathways, regulation of the cytoskeleton and control of cell polarity. To determine the role of E-cadherin in stratified epithelium of the epidermis, we have conditionally inactivated its gene in mice. Here we show that loss of E-cadherin in the epidermis in vivo results in perinatal death of mice due to the inability to retain a functional epidermal water barrier.

**B. Gabard, Testing the Efficacy of Moisturizers, 2005 by CRC Press LLC**

Among the beneficial properties claimed for dermatological and cosmetic products m “moisturizing” is possibly the most widely used. This term has been coined after the now classic observations of Blank, who discovered the plasticizing effect of water in the stratum corneum (SC). A common skin surface disturbance, xerosis, or so-called dryness of the skin, is experienced by most persons at some time, by a few persons all the time, and by all individuals increasingly as they grow older. Thus, as consumers advance in age, concern about dry skin increases. In addition, moist, clean, soft, and wrinkle-free skin is perceived as youthful, and for this reason, moisturizers are widely used, and skin care with these products is regarded as a dominant growth area in cosmetics and toiletries.

**M. Lodén, Transepidermal Water Loss and Dry Skin, 2005 by CRC Press LLC**

The outer layer of the skin, the stratum corneum (SC), is produced by the basal layer in the epidermis. The SC consist of about 20 stacked layers of dry, flattened dead bodies of epidermal cells; the corneocytes. The protein-enriched corneocytes and the lipid-enriched intercellular domains make SC highly resistant to physical and chemical trauma.

**C. Uhl, Neue Wege in der Hautdiagnostik, Kosmetische Praxis, Juni 2005**


Diese Information ist unentbehrlich, um eine fundierte Hautberatung durchzuführen. Auf dieser Diagnose soll der gesamte Pflegeplan aufgebaut werden, der essentiell für den Erfolg der Behandlung und damit für die Zufriedenheit der Kunden ist. Lesen Sie, welche Methoden es gibt und wie man vorgeht.


Biogenic amines are potential irritants e.g. in fish-, meat-, milk- and egg-processing professions like cooks, butchers and bakers. The aim of this study was to test the irritative and barrier-disrupting properties of the biogenic amines ammonium hydroxide (AM), dimethylyamine (DMA) and trimethylamine (TMA). A repeated sequential irritation of 30 min twice per day was performed over a total of 4 days (tandem repeated irritation test) on the back of 20 healthy volunteers of both sexes with AM, DMA, TMA and sodium laurel sulphate (SLS). The epidermal barrier function was assessed with a Tewameter TM 210, stratum corneum surface pH was measured with a Skin-pH-Meter 900, inflammation was assessed with a Chromameter CR-300 on the a* axis for redness and a visual score was recorded. All tested
biogenic amines (AM, DMA and TMA) induced a barrier disruption and a pH increase paralleled with a 1-day-delayed onset of inflammatory signs. These effects were further enhanced and accelerated by a sequential application of SLS together with the biogenic amines, and inflammation occurred earlier than with the single compounds. Acetic acid (AA) in contrast did only show mild barrier disruption and no significant inflammatory signs. Our system allowed a ranking of the different compounds in their irritative potential in the tandem irritation with SLS: SLS > NaOH > TMA > AA > AM > DMA. The results are suggestive that in the food-processing industry the simultaneous contact with biogenic amines and harmful detergents like SLS should be minimized.


Background: Combined exposure to dry climatic conditions and local heat sources together with detergents represents a common workplace situation. These conditions may support the induction of chronic barrier disruption leading subsequently to irritant contact dermatitis (ICD). Objectives: To test the irritant and barrier disrupting properties of air flow at different temperatures and velocities. Methods: Using noninvasive biophysical measurements such as transepidermal water loss (TEWL) (TM 210; Courage & Khazaka, Cologne, Germany) we assessed the effects of short-term exposure to air flow at different temperatures (24 degrees C and 43 degrees C) in combination with sodium lauryl sulphate (SLS) 0.5% on the skin of 20 healthy volunteers in a tandem repeated irritation test. Chromametry was used to control the accuracy of the SLS irritation model. Results: In our study air flow alone did not lead to a significant increase in TEWL values. Sequential treatment with air flow and SLS led to an impairment of barrier function and irritation stronger than that produced by SLS alone. The two different air flow temperatures led to different skin temperatures but had no influence on permeability barrier function. Conclusions: Warm air flow has an additional effect on the SLS-induced barrier disruption in a tandem irritation test with sequential exposure to SLS/air flow. This combination is suspected to promote ICD in workplace and household situations, especially in short-term applications as tested in our model.

H. Matsuki, K. Kiyokane, T. Matsuki, S. Sato, G. Imokawa, Recharacterization of the Nonlesional Dry Skin in Atopic Dermatitis through Disrupted Barrier Function, Exogenous Dermatology, March 2006

The etiology of the nonlesional dry and barrier-disrupted skin of patients with atopic dermatitis (AD) is still unclear. Objective: To determine whether disrupted barrier function in the nonlesional skin is associated with inflammatory or postinflammatory events, which are relevant to the severity of AD or local dry skin properties, respectively.

H. Matsuki, K. Kiyokane, T. Matsuki, S. Sato, G. Imokawa, Reevaluation of the Importance of Barrier Dysfunction in the Nonlesional Dry Skin of Atopic Dermatitis Patients through the Use of Two Barrier Creams, Exogenous Dermatology, March 2006

Atopic dermatitis (AD) can be considered a barrier disease in which antigens and irritants that can easily penetrate clinically normal, nonlesional skin due to its defective barrier function trigger and worsen the dermatitis.


Abstract: Calibration of devices measuring transepidermal water loss (TEWL) is in intensive discussion. Comparative studies revealed that comparable measuring systems, e.g. open and closed chamber systems, do not always deliver the same results, even when expressing the measured values in SI units, namely in g/m2/h. Therefore, adequate and reliable calibration procedures need to be established. We were able to test the reliability of a multi-step calibration algorithm for an open chamber
system such as Tewameter TM 300. In order to achieve reliable measurements, the maintenance of stable microclimate conditions without air turbulences is mandatory. The TEWL values should be compared with those determined gravimetrically on heated skin simulators. The reproducibility of the results is warranted by consecutive measurements on different adjacent spots of a defined area. Preheating of the probe sensors is an effective approach for shortening the measuring time and gaining a rapid steady-state. The accurate calibration of the probe can be checked under laboratory conditions any time. The critical point of the calibration and ultimately the accuracy of in vivo measurements maintain the steady functional capacity of the probes during the entire duration of continuous studies. The studied calibration procedure ensures these requirements.

E. Houben, K. de Paepe, V. Rogiers, Skin condition associated with intensive use of alcoholic gels for hand disinfection: a combination of biophysical and sensorial data, Contact Dermatitis 2006: 54, p. 261-267

Hand hygiene of healthcare workers (HCWs) is of major concern to avoid nosocomial infections (1-4). Therefore, hospitalwide infection control programmes prescribe disinfection of the hands after each patient contact (5, 6).


A series of factors like excessive treatment with detergents or organic solvents, UV irradiation as well as low humidity are known to damage skin. Frequent barrier malfunction is due to a reduced amount of lipids.

Experiment „SkinCare“ auf der Raumstation: Hautphysiologische Messungen in Schwerelosigkeit, Newsletter #1/2006, Raumstation: Fachinformationsdienst zur Nutzung der Internationalen Raumstation, April 2006, p. 10


It is not easy to measure the preventive efficacy of skin care products, but Claire Mas-Chamberlin, Philippe Mondon, Francois Lamy, Karl Lintner, Claire Jossan and Frederique Girard report on an accelerated skin ageing-type process used to investigate active efficacy.

Reevaluation of the importance of Barrier Dysfunction in the Nonlesional Dry Skin of Atopic Dermatitis Patients through the use of two barrier creams, Karger 09.03.2006

Background: Atomic dermatitis (AD) can be considered a barrier disease in which antigens and irritations that can easily penetrate clinically normal, nonlesional skin due to its defective barrier function trigger and worsen the dermatitis. Thus, replenishing the barrier function in clinically normal, nonlesional skin of patients with AD seems to be a key for preventing the refractory nature of the dermatitis.

Beurteilung von frühkindlichen Verbrennungen – Objektivität optimiert Therapie; aesthetic Tribune, Ausgabe 8, Dezember 2006

Die Beurteilung von Narben erfolgt im Allgemeinen visuell und palpatorisch durch den Arzt. Darin liegt allerdings auch ein grosses Fehlerpotential begraben, da jeder Untersucher die Narbe subjektiv
Literature Tewameter® 2019/10


F. Tokumura, Y. Yoshihura, T. Homma, H. Nukatsuka, Regional differences in adhesive tape stripping of human skin, Skin Research and Technology 2006, 12, p. 178-182

Medical pressure-sensitive adhesive tapes are applied to various regions of the human body for many purposes. Although some adhesive tapes are designed for a specific purpose and applied to a single region, such as first-aid bandages for the fingers and a variety of adhesive pads for foot-care, a large number of adhesive tapes are applied to various regions.


Ceramides (CERs) are the major component of the stratum corneum (SC), accounting for 30-40% of SC lipids by weight. SC CERs, together with cholesterol and fatty acids, form extracellular lamellae that are responsible for the epidermal permeability barrier. Previous studies reported decreases of SC CERs in atop dermatitis patients, who have low cutaneous barrier function. Such alterations of CER contents may be responsible for the impaired water-barrier function of the skin in atop dermatitis.


The terminal differentiation of keratinocytes results in the formation of stratum corneum, that serves as a protective barrier against hazardous environments. During the transition phase from granular to cornified cells, keratinocytes lose their nuclei to form the cornified layer, a crucial step in completing differentiation and to invoke subsequent physiological functions. Disordered differentiation frequently leads to the persistent presence of nuclei in the cornified layers, a condition known as parakeratosis that seriously disrupts the barrier function of the skin. This study is aimed at elucidating the mechanisms of keratinocyte denudation and its disorder, parakeratosis.


A great number of compounds is available for the treatment of inflammatory skin diseases like atop dermatitis (1), dermatitis solaris or psoriasis (2), the most effective external anti-inflammatory compounds being glucocorticoids. Their side effects (3) have motivated a continuing search for other therapeutic compounds, and fungal metabolites like Poria cocos (PoCo) have figured in the literature. The present study was designed to evaluate the anti-inflammatory efficacy of PoCo extracts against experimentally induced irritant contact dermatitis (ICD) in a non-invasive human in vivo model with different parameters.
Calibration of devices measuring transepidermal water loss (TEWL) is in intensive discussion. Comparative studies revealed that comparable measuring systems, e.g. open and closed chamber systems, do not always deliver the same results.

Permeability barrier function is measured with instruments that assess transepidermal water loss (TEWL), either with closed- or open-loop-systems. Yet, the validity of TEWL as a measure of barrier status has been questioned recently.
Measurement of TEWL was performed on the inferior nasal turbinate. TEWL was measured with an evaporation meter applying Fick's law (Tewameter TM 300; Courage and Khazaka, Cologne, Germany). Results: TEWL value tends to increase in order of age, indicating that the barrier function of epithelium may decline with age. Conclusion: The measurement of transepithelial water loss should be contributed to assess the efficiency of nasal mucosal barrier disorders in the elderly.


The relationship between dry skin and uraemic pruritus remains controversial. In addition, there is a lack of published data describing the structure and function of the stratum corneum (SC) in end stage renal disease (ESRD). The purpose of the present study was to assess the function and structure of the skin barrier in patients with ESRD and to correlate any abnormalities with uraemic pruritus.

H. Fujita, T. Hirao, M. Takahashi, A Simple and non-invasive visualization for assessment of carbonylated protein in the stratum corneum, Skin Research and Technology 2007, p. 84-90

Stratum corneum (SC) is the interface of body and environment and is continuously exposed to oxidative stress, resulting in oxidative modification of proteins. Consequent carbonylated proteins (CPs) have so far been labelled with 2,4-dinitrophenyl (DNP) hydrazine and subsequently detected with anti-DNP antibody.


Objective: to assess the ability of a commercially available moisturizing cream to ameliorate the dry skin condition of subjects 65 to 86 years of age. Methods: in this 7-week, single-blinded, controlled clinical study, 28 subjects with moderate to severe xerosis were treated twice daily for 6 weeks with a moisturizing cream containing 10% urea and 5% sodium lactate.

R. Muggli, Systemic Evening Primrose Oil for Irritated Skin Care, Cosmetics & Toiletries magazine, Vol. 122, No. 2/February 2007

Dry skin is a common complaint from men and women alike and its incidence and severity increase with age. This condition is the result of an impaired barrier function, increased transepidermal water loss (TEWL) and a significantly lower level of ceramides in the horny layer that causes the skin to lose an excessive amount of water.

U. Eich, Thermische Verletzungen im Kindes- und Jugendalter, Dissertation Universität zu Lübeck 06.06.2007


If the occlusion time of a closed chamber evaporimeter on the skin is too long, saturation might occur. We previously compared an open chamber and a closed chamber device on healthy volunteers. Comparable data on stripped skin with higher evaporation rates are not available.

K. Shimada, K. Awai, H. Irie, **Ceramide Polymer improves skin texture**, Personal Care, May 2007, p. 47-50

Anti-ageing cosmetics are increasingly demanded today. Many consumers, especially women, care about keeping their skin young by controlling wrinkles and freckles and keeping their skin soft, firm, smooth and beautifully white. Ingredients for controlling the ageing of the skin are demanded and are actively studied.


Zur Untersuchung, welche Auswirkungen inkohärentes polarisiertes Licht (VIP = visible incoherent polarized light) auf die menschliche Haut zeigt, sind in unterschiedlichen Messreihen an insgesamt 48 Probanden Veränderungen von Evaporation und Temperatur über der Haut des Unterschenkels in einem Messzylinder (Tewameter) untersucht worden. Verwendet wurde eine im Rahmen der VIP-Lichttherapie eingesetzte Lichtquelle der Firma Bioptron.

M. Kerscher, T. Reuther, G. Schramm, **Chlormadinonacetat enthaltende Mikropille verbessert unreine Haut**, Frauenarzt 48 (2007), Nr. 4, S. 373-378


The measuremnt of transepidermal water loss (TEWL) has been established as one of the main parameters in the assessment of skin barrier function. One of the most widely employed devices to measure TEWL is the Tewameter. Courage and Khazaka launched the TM300 in 2003 and successfully eliminated some of the limitations of the previous model.

J. Fluhr, **What’s Wrong with the Barrier**, Dermatologie in Beruf und Umwelt, Jahrgang 55, Nr. 2/2007, p. 67

Irritant contact dermatitis is frequently observed not only in occupational dermatology but also in the context of atopic dermatitis and under house-hold conditions. Functional analysis of epidermal barrier-related parameters are performed using non-invasive instruments, based on biophysical measurements.


Die Zellen der menschlichen Haut sind täglich vielen schädlichen Umweltinflüssen ausgesetzt. Intakte Zellen können sich in den meisten Fällen dagegen wehren. Sollte dennoch eine Schädigung erfolgen, regenerieren sie sich mit Hilfe eines eigenen Zellreparatur-Mechanismus. Wenn dieser natürliche Zellreparatur-Mechanismus gestört oder überfordert können kosmetische oder pharmazeutische Wirkstoffen eine Lösung sein. In jüngster Vergangenheit wurde eine neue Klasse solcher Zell-reparie-
render und schützender Substanzen identifiziert. Gefunden wurden sie u. a. dort, wo deren Eigenschaf-
ten von lebensnotwendiger Bedeutung sind – in Organismen die unter extremen Bedingungen wie z. B.
in den Salzseen der Wadi Natrun Wüste (Abb. 1) in Ägypten existieren.

E. Berardesca, Bioengineering as a Tool in Occupational Dermatology, Dermatologie in Beruf und Umwelt, Jahrgang 55, Nr. 2/2007, p. 67

Bioengineering techniques have been proven to be helpful in monitoring changes in skin physi-
ology and quantifying skin disease. Detection of subliminal or non visual changes is a challenge in order
to predict potentially pathological conditions such as irritation or pre-clinical dermatitis.

W. Gehring, New Concept of Skin Protection after Occlusion and Wet Work, Dermatologie in Beruf und Umwelt, Jahrgang 55, Nr. 2/2007, p. 89

Occlusion and wet work induce barrier damage, increasing the risk for the development of con-
tact dermatitis. The use of adstringent agents before exposure to the noxious conditions does not always
provide sufficient protection.


Liposomal formulations have been used for skin moisturization, due to the occlusive effect of a
phospholipid film deposited on the skin surface. Furthermore, interactions between liposomal lipids and
Stratum corneum lipids may affect positively the structure of the Stratum corneum. Phospholipids them-
selves are hygroscopic and bind water.

G. Maaß, Anwendungsstudie der sebamed TROCKENE HAUT Produkte bei Kindern mit atopi-

Es erfolgte in einer vierwöchigen Anwendungsuntersuchung eine klinische Überprüfung der
sebamed TROCKENE HAUT Pflegeprodukte – Waschlotion, Pflegelotion, Tagescreme und Nacht-
creme – bei Kindern mit atopischem Ekzem anhand von quantitativen Meßgrößen, von klinischen Be-
fundurteilen sowie von qualitativen Beurteilungen der Pflegewirkungen.

T. Yoshihara, K. Shimada, Y. Momoi, K. Konno, T. Wasaki, A new method of measuring the Tran-

Abstract: Human skin barrier function is evaluated by measuring transepidermal water loss
(TEWL). However, this conventional method has not been applied to assess canin skin barrier function
because the equipment is not suitable for dogs due to the effects of eir turbulence resulting movement
of the subject and vapor from the subject’s hair coat. The TEWL analyzer CC-01 was developed as a
closed-chamber method device; this means that instead of using the open-chamber method, it has a
vantiilated chamber that uses dry air. TEWL value s measured by CC-01 show less variability than those
measured by the convetional method. An ambient temperature of 20-26°C is optimal for measurement
with the CC-01, and humidity affects te length of measurement but not te values. The CC-01 may be
more reliable for measuremnet of TEWL than the conventional methods and may give new insights in
the evaluation of skin barrier function in dogs.

University of Basel, Inst. of Pharmaceutical Technology, In Vivo Comparison of Various Liposomal
Formulations for Cosmetic Application, 7th Int. Cosmetic Symposium (IcoS), 20-22 June 2007, Istan-
bul Türkiye

Liposomal formulations haen been used for skin moisturization, due to the occlusive effect of a
phospholipid film deposited on the skin surface. Furthermore, interactions between liposomal lipids and
Stratum corneum lipids may affect positively the structure of the Stratum corneum. Phospholipids them-
selves are hygroscopic and bin water.
G. Khazaka, Useful and practical advice by measuring TEWL and skin moisture with Corneometer® CM 825 and Tewameter® TM 300, The Journal of Skin Barrier Research

The Skin bioengineering measurement of skin hydration and transepidermal water loss is a useful tool to evaluate the physicochemical status of skin. As integrated skin barrier function is also derived from the interaction between subject and surrounding environment, the bioengineering measurement technique has been evolved to predict the dynamic aspect of skin biology.


M. Andreas, R. Bilenchi, G. Mariotti, M. Centini, L. Andreassi, C. Anselmi Phytic Acid: a Novel Topically Active Antioxidant Suitable for Cosmetic Preparations, 21st World Congress of Dermatology, Buenos Aires, Argentina, 2008

Many substances with antioxidant activity are present in the human skin, and their concentrations are generally higher in the epidermis than in the dermis. Under the effect of an oxidative stress, such as that caused by ultraviolet (UV) rays, these substances are strongly depleted, especially in the external epidermal layer


Objective of the study: The first objective was to compare the sebaceous function in Asian and Caucasians, female, in real life conditions, using both intrumental measurement and visual evalutation by expert. A second objective was to investigate climate induced changes in the sebaceous function on a separate group of Japanese women, using the same methodology.

N. Garcia Bartels, A. Mieczko, H. Proquitté, R. Wauer, T. Schink, U. Blume-Peytavi, Influence of Bathing in Newborns: A Prospective, Randomized Clinical Study on Skin Barrier During the First Four Weeks of Life, 21st World Congress of Dermatology, Buenos Aires, Argentina, 2008

Background: The adapting process of skin barrier to extra-uterine life and the influence of bathing on term neonates’s skin is not completely understood. Thus, we investigated the effect of bathing on skin barrier during the first four weeks of life. Methods: Monocenter, prospective, randomised study with 57 healthy full-term newborns (32 boys and 25 girls).


Background: Cancer patients undergoing chemotherapy frequently experience skin problems e.g. xerosis. The aim of this study was to verify whether a concomitant treatment with an acidic washing and emollient products (pH 5.5) can significantly improve the quality of the skin in such patients
Protection effect of cosmetics on human skin under simulated rigorous environment


The efficacy of cosmetics on human skin measured under normal mild laboratory environment might be discounted by exterior environment factors such as wind, UV exposure, etc. Few studies have focused on the “genuine” efficacy of cosmetics on human skin during exposure to external rigorous environment.

Clinical scoring and biophysical evaluation of nasolabial skin barrier damage caused by rhinorrhea

E. Houben, R. Adam, J.-P. Hachem, D. Roseeuw, V. Rogiers, K. de Paepe, *Contact Dermatitis* 2008, 59; 296-300

Suffering from an acute viral cold – caused by rhinoviruses or coronaviruses – probably is the most common illness known. A common cold usually is mild and self-limiting. Apart from an overall discomfort, cold symptoms are sneezing, serous nasal secretion, and obstruction of nasal breathing caused by the swelling and inflammation of the sinus membranes. These symptoms occur 2-3 days after the infection and usually last for 7-10 days. In acute viral rhinitis, only the symptoms can be treated and common over-the-counter medication for a cold may already be effective.

Change of biophysical properties of the skin caused by ultraviolet radiation-induced photodamage in Koreans


Ultraviolet (UV) irradiation affects the function and complexion of the skin by inducing changes in physical properties through formation of erythema, proliferation of epithelial cells, DNA damage, activation or inactivation of various enzymes and proteins, and free radical formation. In this study, the authors intended to observe the overall course of changes in barrier function and reflectance of the skin induced by photodamage, and healing reaction in the course of time, and alteration of skin complexion.

Grapefruit Extract Cream: Effects on Melanin and Skin


Emulsions are thermodynamically unstable systems defined as microscopic dispersions of liquid droplets contained within another liquid, with a diameter ranging from 0.5 to 100 um. Emulsions usually consist of mixtures of an aqueous phase with various oils or waxes.

Recharacterisation of the nonlesional dry skin atopic dermatitis through disrupted barrier function


The skin represents the most superficial layer of the body, so it is constantly exposed to different environmental stimuli. Many authors have written about the influence of the environment on human skin. Egawa et al. (1) studied the effect of exposure of human skin to a dry environment: they found a decrease in the stratum corneum water content and related to this lack of water, a deterioration of the skin texture and the formation of fine wrinkles.

**Objectives:** Oxybutynin has been proven to be effective in patients with generalized hyperhidrosis. Some dermatoses aggravate as a result of sweating. Therefore, oxybutynin might also be useful in such normohidrotic patients. The aim was to evaluate the efficacy and safety of different doses of oxybutynin on exercise-induced sweating in healthy individuals. **Methods:** Two randomized, double-blind, placebo-controlled, cross-over studies were performed, in which two different doses (2.5 and 5 mg) of oxybutynin were tested. The degree of sweating was determined by transepidermal water loss (TEWL) measurement on the forearm and hand during exercise. Furthermore, the effectiveness was evaluated by means of the individual’s global assessment score, and side effects were noted. **Results:** No significant differences between oxybutynin and placebo were found on the forearm and the hand at both dosages of oxybutynin with respect to TEWL values and the individual’s global assessment score. Side effects consisted of diarrhoea, dizziness, dry mouth and dry eyes. **Conclusions:** In this model, oxybutynin did not result in inhibition of exercise-induced sweating in healthy volunteers.


The aim of this study was to develop a model to evaluate the efficacy of drugs with expected sweat-reducing properties in healthy subjects in order to select candidate drugs for the systemic treatment of primary generalized hyperhidrosis. A randomized, double-blind, placebo-controlled cross-over study was performed in 8 healthy subjects. Sweating was induced by exercise. The degree of sweating at different exercise levels was determined by measurement of transepidermal water loss.

J.W. Fluhr, M. Breternitz, P. Elsner, *Glycerol-based emollient enhances stratum corneum (SC) barrier homeostasis, SC hydration and in vivo corneocyte morphology after acute barrier disruption in a controlled, double-blinded study*, Skin Physiology Laboratory, Department of Dermatology, Friedrich-Schiller-University, Jena, Germany

**Background and Purpose:** Glycerol is known to exert barrier repairing and moisturizing properties. The underlying mechanism for the barrier repair after an acute insult is still under discussion. Furthermore, most of the studies on glycerol-based emollients are not placebo controlled. The aim of the study was to test effect of a glycerol-based emollient (V00034CR) vs. placebo on barrier homeostasis and SC hydration after acute disruption of the skin barrier. Furthermore, we investigated the effect of glycerol on corneocyte morphology assessed by *in vivo* confocal microscopy.

Wool is a natural fibre that is mainly made up of protein. It contains external lipids (lanolin) and a small amount of internal lipids (1.5%). Internal wool lipids (IWL) are rich in cholesterol, free fatty acids, cholesteryl sulphate and ceramides, and resemble those from membranes of other keratinic tissues such as human hair or stratum corneum from skin. Intercellular lipids of skin stratum corneum, mainly ceramides, play an important role in the barrier function of the skin by preventing penetration of external agents and controlling the transepidermal water loss to maintain the physiological skin water content. Recent studies have shown that formulations containing lipids that resemble the natural components of the skin, especially ceramide supplementation, can improve disturbed skin conditions.


Atopic dermatitis (AD) has been issued as a serious disease and the prevalence of atopic dermatitis has been rising progressively in developed countries since the 1940’s. However, the reason is not enough to explain the increasing prevalence of atopic dermatitis, and some researchers suggest that there must be crucial factors in the expression of the disease like environmental and allergics. According to recent studies, the damage of skin barrier has been reported as one of the main reasons which cause atopic dermatitis.

K.-F. Huang, E. Tsai, D. Chang-Chin Kwan, Y.-F. Chen, K.-C. Chen, M.-F. Wang, Studies of Ceramide Lotion on Moisture of Skin, IFSCC Barcelona 2008

Stratum corneum intercellular lipids such as ceramides play an important role in the regulation of skin water barrier homeostasis and water-holding capacity. The aim of the present study was to evaluate the potential water retention capacity of an oil-in-water emulsion containing ceramide.

G. Lemos Anconi, P.M.B.G. Maia Campos, Stability and Clinical Efficacy of Cosmetic Formulations Containing Different Peptides, IFSCC Barcelona 2008

Wrinkles, as a sign of skin aging, have an important social impact, especially because of longer lifetimes and more frequent social relationships; consequently, they are an important factor influencing our way of communication. Wrinkles represent the more evident outcome of cutaneous ageing. Their onset is linked to a variety of events, resulting from both chrono- and photoageing. Both intrinsic (hormones, racial and genetic factors, oxidative stress, systemic disease) and extrinsic (temperature, air pollution, smoke, alcohol) factors worsen skin condition. However, wrinkles deriving from skin texture, or micro-relief, modification afflict women more than all other wrinkles as signs of ageing in the common mind.

A. Thibodeau, Biomimetic Liquid Crystals as Skin Barrier Restructuring Agents, IFSCC Barcelona 2008

The main roles of the skin are: protection from UV radiation (melanogenesis), immune defense and a barrier function preventing the penetration of foreign particles. Perhaps of greater importance, skin is dynamically involved in the management of internal water levels [1]. As an example of its inter-connection with internal organs, it is interestingly to note that the skin is the site for the photoproduction of vitamin D that will be distributed through all the body, and also the site of cutaneous distribution of vitamin E (through sebum secretion) obtained from nutrition.

The Research & Development of cosmetic products that are able to act in skin ageing alterations has been a challenge in Cosmetic area. This way, a great number of botanical extracts have been proposed as active ingredients for anti-ageing cosmetic development. *Myrtus communis* is a plant rich in polysaccharides, essential oils, flavonoids, among other substances. Some studies showed that its different hydroalcoholic extracts have a potent antioxidant activity mainly due to the presence of polyphenols. *Myrtus communis* leaves hydrolyzed extract has been proposed as cosmetic ingredient with anti-ageing properties because it is rich in galacturonic acid, ramnose, galactose, glucose, xylose and fructose.


Moisturizers are used on large body surfaces to maintain the smoothness of the skin. It is well known moisturizers can increase stratum corneum hydration by occlusion of the skin surface or by water-attracting properties. This study presents a discussion of different equipments, Tewameter® (Courage&Khazaka) and Vapometer® (Delfin) after treatment with different moisture substances to evaluate the transepidermal water loss.


Phospholipid systems show high morphological diversity as a function of its structure and composition [1]. This fact plays an important role in the applications of aggregates such as micelles, bicelles and vesicles, which are extendedly used in skin research [2]. Thus, investigations that help clarifying the relation of structural parameters with the effect of the phospholipid aggregates in the skin are needed. Liposomes and micelles have often been used for skin treatment [3-4], although their application is debated due to some aspects. Liposomes seem to be too large to penetrate into the narrow interlamellar spaces of stratum corneum (SC) lipids [5]. Concerning to the micelles, the usual presence of surfactant in their composition supposes a problem due to the well known irritating effect of these solubilising agents on the skin [6]. In this line, the use of bicelles (discoidal micelles constituted by phospholipids) for skin treatment may report advantages comparing to the use of liposomes and micelles: the size of bicelles is small enough for passing through the SC lipid lamellae and their composition consists exclusively of lipids.


There are many substances frequently used in anti-aging products due to their moisturizing, photoprotective and skin barrier effects and among them we can point out vitamin A, C and E derivatives. Vitamin A palmitate acts on epithelization and on abnormal keratinization [1]. Vitamin E acetate is a free radical scavenger and can reduce DNA damage and keratinocytes death (sunburn cell formation) [2,3] and also can enhance stratum corneum hydration and reduce skin roughness [4]. Tetra-isopalmitoyl ascorbic acid (VC-IP) releases vitamin C in physiological conditions and enhances cellular tolerance against UVB and reactive oxygen species as well as reduces the production of interleukin-1α and prostaglandin E2 [5].

A prolonged stay in weightlessness includes several medical alterations of the human body and also results in impairment of the skin. The stratum corneum, epidermal barrier as well as other skin compartments are affected in terms of their susceptibility to dryness, desquamation and pruritus. This can lead, for example, to wound healing disorders. Skin physiological tests were performed on the skin of an astronaut during and after the the ASTROLAB-Mission within the Skin Care program initiated by the ESA.


Astronauts often show skin reactions in space. Systematic tests, e.g. with noninvasive skin physiological test methods, have not yet been done. In an interdisciplinary cooperation, a test series with skin physiological measurements was carried out before, during and after a long-term mission in the International Space Station. The hydration of the stratum corneum (Corneometer), transepidermal water loss (Tewameter), and the surface structure of the skin (SkinVisiometer) were measured. In order to record cutaneous states, the suction elasticity was measured (Cutometer), and an ultrasound measurement with 20 MHz (DermaScan) was also made. In addition, one measuring field of the two inner forearms was treated with a skin care emulsion. There were indications of a delayed epidermal proliferation of the cells, which would correspond to the clinical symptoms. Hydration and TEWL values are improved by respective skin care. On the cutaneous level, the elasticity measurements and the ultrasound picture showed results which correspond to a significant loss of elasticity of the skin. Further examinations are necessary to validate these preliminary results.

J. Lademann, J. Fluhr, This Issue at a Glance: Skin Reactions of Astronauts in Space and Microstructures of Topically Applied Formulations, Skin Pharmacology and Physiology 2008; 21:245

The analysis and characterization of the properties of human skin under natural conditions and under topical treatment on Earth is a topic of comprehensive investigation. In the present issue, it is demonstrated that there is also a skin physiology outside the Earth in the universe. Tronnier et al. investigated the changes in skin physiological parameters in space. Astronauts often show skin reactions. In an interdisciplinary cooperation, a test series with skin physiological measurements was carried out before, during and after a long-term mission at the International Space station.

K. de Paepe, E. de Rop, E. Houben, R. Adam, V. Rogiers, Effects of lotioned disposable handkerchiefs on skin barrier recovery after tape stripping, Skin Research and Technology 2008; 14, S.440-447

Background/purpose: In the present work, it was studied whether repeated use of lotioned disposable handkerchiefs on tape-stripped forearm skin was able to improve skin barrier recovery. Methods: Skin assessments included scoring of visual erythema and dryness/scaliness; and measuring of skin redness (Chromameter® CR300), skin hydration (Corneometer® CM825), and transepidermal water loss (Tewameter® TM300). Four different lotioned paper handkerchiefs – randomly assigned to one of two subject groups (n=20) – were tested vs. the non-lotioned control handkerchief. The results were also compared with those obtained using a topically applied oil-in-water barrier cream (Dermalex®). Results: The three-day lasting protocol revealed that handkerchief wiping itself delayed skin recovery, but a significantly better performance was seen for the lotioned handkerchiefs containing fatty alcohols and mineral oils. This shows that the use of lotioned tissues helps to prevent skin damage inevitably caused by the wiping process. Conclusion: The controlled pre-damaged forearm method with tape stripping appears to be a suitable model to study the effects of repetitive wiping on irritated skin with disposable handkerchiefs of different quality. More specifically, the model seems applicable to mimic the nasolabial skin damage observed during a common cold associated with frequent use of disposable handkerchiefs.

The demand for naturally-derived active ingredients for cosmetics continues to increase. Our objective was to look for moisturising and antioxidative agents from Indonesian botanical resources which contain flavonoid and polyphenol. The article describes natural ingredients extracted with ethanol from Indonesian plants namely Orthosiphon aristatus (Blume) miq = OE (patent pending) and Phyllanthus niurii L = PE (patent pending). The study was carried out using DPPH scavenging activity for antioxidant agent in vitro; and Corneometer and Tewameter for moisturising effect.

Objectives: The purpose of this study is to compare, using bioengineering methods, the efficacy of applying an anti-aging cream alone or in combination with an antiaging serum. The anti-aging products included in this study contain a peptide similar to procollagen fragment, hyaluronic acid, a glycosaminoglycans complex and polysaccharides with urea.

T. Reuther, S. Schröder, M. Kerscher, Analysis of site-dependent differences of transepidermal water loss, skin capacitance and skin surface pH using both, T-test and correlation analysis, Abstract, EADV Paris 09/2008
Transepidermal water loss (TEWL), skin capacitance (SC) and skin surface-pH (pH) are today standard parameters for assessing skin barrier function. While there are many studies analysing the relationship between absolute values from different sites using t-test investigations providing information from the analysis of such data using correlation analysis are very rare. Therefore the aim of the present study was to analyze TEWL, SC and pH of the forearm (FA) and the forehead (FH) using and comparing t-test and correlation analysis.

Z.D. Draelos, E. Baltas, Skin barrier and desquamation in patients with mild plaque psoriasis is improved with the use of a gentle moisturizing cream, Abstract, EADV Paris 09/2008
Psoriasis is a disorder characterized by faster than normal skin growth and replacement. The result of this rapid skin growth and replacement is a build-up of red, thickened areas with a scaly appearance. The most commonly affected areas are the scalp, elbows, knees and back. These plaques are often dry and non-pliable areas on the skin that can be a source of pain and/or discomfort to affected individuals. Moisturization of these areas may provide some relief by increasing hydration.

Background: Studies showing an increase in transepidermal water loss (TEWL) and a decrease in water-binding properties in atopic dry skin suggest that the skin barrier function is compromised in patients with atopic dermatitis. These studies also suggest that the judicious use of effective moisturisers can improve the epidermal barrier function. Objectives: As part of an assessment program for a new and innovative moisturiser (Physiogel Intensive), the efficacy of Physiogel Intensive as a skin barrier
and moisturizer was evaluated.


Background: Skin lesions are among the most common chronic side effects of sulfur mustard intoxication. Objectives: We conducted this comparative study to evaluate skin hydration and transepidermal water loss (TEWL) in patients with sulfur mustard-induced dermatitis.

M. Chang, J. Han, C. Lee, S. Kim. **The surface profiles of lip corneocytes are different from face and arm skin**, Abstract, EADV Paris 09/2008

A novel approach about the surface characteristics of corneocytes has been studied by atomic force microscope (AFM) nowadays. The physical properties of lip skin is very particular compared to normal skin, face and arm. But there are little studies about the lip skin. In this study, we have studied the characteristics of surface profiles of lip skin, and we have compared lip to face and arm skin.


Background: Since in weightlessness many astronauts report skin problems like dryness, itching, tendency to get injured, impaired wound healing etc., a “Skin Care” program was initiated for the ASTROLAB Mission of ESA (European Space Agency). It was carried out by a consortium with different tasks.

N. Gerlach, H. Grosch-Rafalski, M. Wiebusch, U. Heinrich, H. Tronnier, **Skin physiological experiments in space**, Poster Dermatronnier Experimental Dermatology

Over the duration of a long-term microgravity space flight, human bodies undergo dramatic changes. Impairments due to circulatory and vestibular disturbances of the equilibrium are the prevalent medical side effects astronauts suffer from. These are followed by dermatological problems. The effects of microgravity on skin reported by crewmembers are slow healing of contusions and lacerations, dryness and cracking as well as rashes and itchiness.


Background: The objective of the study was to determine changes in skin parameters during the intake of a beverage rich in green tea extract. The detection of hydration properties, transepidermal water loss (TEWL), changes of skin surface (SELS), skin elasticity, skin thickness and density as well as serum analyses were determined during the study. Methods: Hydration measurements were carried out with the Corneometer CM 825 prior to and during the study. Transepidermal water loss (barrier function of the skin) was measured with the Tewameter, skin surface (SELS) with the Visioscan and skin elasticity with the Cutometer (Courage & Khazaka Electronics, Cologne, Germany).

A. Reich, J. Kopyra, K. Korfanty, E. Pióro, K. Postrzech, **Influence of soap on epidermis barrier**, Abstract, EADV Paris 09/2008

Background: Washing the body is the human’s basic need. However, soaps, one of the most often used washing products, can damage epidermic barrier and disturb the protective function of the skin. Objective: The purpose of this study was to compare the influence of three different soaps on epidermis moisture and transepidermal water loss (TEWL).

In einer offenen multizentrischen Studie wurden insgesamt 48 Kinder mit atopischer Dermatitis und anderen Hauterkrankungen mit Pelsano® med Salbe behandelt. Während der dreiwöchigen Intervalltherapie verbesserten sich die typischen Leitsymptome trockene Haut, Juckreiz, Schuppung, Erythem und Lichenifikation hochsignifikant (p < 0,001). Die während der Behandlung durchgeführten Messungen verschiedener Hautparameter zeigten eine hoch - signifikante Verbesserung der Hydratation der Haut bei gleichzeitiger Reduktion des transepithelialen Wasserverlustes (TEWL), was auf eine verbesserte Barrierefunktion hinweist.

S. Gardinier, J. Latreille, C. Guinot, E. Tschachler, The skin hydration state as determined by a score based on biophysical parameters and Raman spectrometry data, Abstract, EADV Paris 09/2008

The skin hydration state can be assessed by various instrumental methods, including conventional measurements, e.g. capacitance, transepidermal water loss (TEWL), and more sophisticated methods like Raman spectroscopy. These techniques are considered complementary, as they investigate different aspects of skin hydration. The objective of this study was to summarize and quantify in a synthetic way the skin hydration state by a score based on biophysical parameters, as well as the content of some skin components assessed by confocal Raman spectroscopy.


Theoretically, skin barrier creams reduce or even prevent the penetration into the skin by building up a physical barrier, like a thin film, between the skin and the toxic substance. Practically, controversial experiences concerning the effectiveness of barrier creams exist. For this, we propose an in vivo method to evaluate the efficacy of barrier creams trough clinical and instrumental analysis.

D. Khazaka, Useful and practical advice for measuring TEWL and skin moisture with Cornemeter® and Tewameter®, Presentation, CHI 2008, Bitec Bangkok

The presentation gives an overview about the measurement of the barrier function and hydration of the skin with worldwide standard devices. The history of those techniques as well as the benefits and pitfalls are described. Multi centric studies which have been performed in this field to show accuracy of the instruments and between different instruments and new approaches, as the recent use of this technology in space or measurements of hydration in different depth of the skin and field devices for consumer tests for laboratories are presented. New methods to look at porphyrines on the skin surface, to measure skin color and skin gloss and methods to access the deep lines (e.g. “crow’s feet”) with a camera and oblique light are explained in the session.


H. Tronnier, M. Wiebusch, U. Heinrich, Project Skin Care of the European Long-Term Mission (Astrolab) on the ISS, DermaTronnier Research, Poster

Impairments due to circulatory and vestibular disturbances of the equilibrium are the prevalent medical side effects astronauts suffer from. These are followed by the dermatological problems. In order to examine these skin problems and find ways to prevent them, skin-physiological measurements as a project “Skin Care” were carried out within the framework of the European long-term mission (ASTROLAB) 2005-2007.

A total of 64 patients received AlloDerm graft selectively on joint areas during the study period from March, 2005 to July, 2007. From January to March, 2008, a total of 31 patients returned to our burn center to examine the functional results by measuring range of motion of joints. Additionally, the quality of grafted skin condition criteria of skin elasticity, scar thickness, trans-epidermal water loss, melanin and erythema level was measured in a total of 11 patients among them. By analyzing the limitation level of 55 joints excluding hand areas, we found that 24 joints (43.6%) showed no limitations, 12 joints (21.8%) showed limitations below 10%, 16 joints (29.1%) showed limitations between 10 and 19% and 3 joints (5.5%) showed limitations over 20%. The scar thickness of non-AlloDerm applied areas was 2.5 ± 0.9 mm and AlloDerm applied areas was 1.8 ± 0.7 mm (p = 0.396). Trans-epidermal water loss for non-AlloDerm applied areas was 20.9 ± 7.7 g/h/m² and AlloDerm applied areas was 10.8 ± 3.4 g/h/m² (p < 0.001). Erythema value for non-AlloDerm applied areas was 436.1 ± 65.8, whereas AlloDerm applied area was 394.4 ± 61.2 (p < 0.001). Acellular dermal matrix is a good option for treating major burns to prevent scar formation after burn and loss of joint function.


Cutaneous complications are common in diabetes, with approximately 30% of patients experiencing some skin involvement during the course of their illness; these may also be the first presenting sign of diabetes or even herald the diagnosis by many years. The skin involvement in diabetes encompasses various clinical entities such as acanthosis nigricans, necrobiosis lipoidica, diabetic dermopathy and neuropathy, sclerodema and granuloma annulare.


Purpose: The aim of this study was to explore the potential contribution to skin damage caused by standard washing and drying techniques used in nursing. Design: An experimental cohort design was used, with healthy volunteers (n = 15) receiving 6 different washing and drying techniques to the volar aspect of the forearm. Subjects underwent 3 washing and drying techniques on each arm; each technique was repeated twice, separated by a 2-hour rest period. Methods: Skin integrity was assessed by measuring transepidermal water loss (TEWL), skin hydration, skin pH, and erythema. Comparisons were made between washing with soap or water alone, and drying using a towel (rubbing and patting) or evaporation. The significance of any difference was assessed by nonparametric analysis. The study was approved by the local research ethics committee, and all volunteers gave informed consent. Results: TEWL was seen to increase following each type of wash, and increased further following repeated washing. Drying of the skin by patting with a towel increased TEWL to give readings identical to those obtained from wet skin. There was an increase in skin pH with all washing and drying techniques, particularly when soap was used. Erythema also increased with repeated washing, particularly when soap was used. No significant changes were observed in skin hydration as measured by a corneometer, although there was a tendency for the values to decrease with washing. Conclusions: These data suggest that washing with soap and water and towel drying has a significant disrupting effect on the skin’s barrier function. There is tentative evidence to suggest that a cumulative effect may exist with damage increasing as washing frequency increases. Drying the skin by patting with a towel offers no advantage to conventional gentle rubbing as it leaves the skin significantly wetter and at greater risk of frictional damage.

We investigated the effect of dietary phospholipid (PL) concentrate from bovine milk on the epidermis. Thirteen-week-old hairless male and female mice (Hos:HR-l) were separated into two experimental groups, each fed two experimental diets: the control group and the PL group. The mice were given the experimental diets for 6 weeks. Stratum corneum hydration and transepidermal water loss (TEWL) were measured using Corneometer CM825 and Tewameter TM300 (Courage and Khazaka Electronics, Cologne, Germany) at 3 weeks and 6 weeks. After the feeding period, ceramides in stratum corneum were analyzed. We found that stratum corneum hydration and ceramides in the PL group were significantly higher than those in the control group and that TEWL in the PL group tended to decrease. These results indicate that dietary PL concentrate improves epidermal function by increasing the amount of ceramides, resulting in higher hydration.


Compositions for the treatment of wounds and/or scars are described herein. The compositions contain between 1 and up to 30% by weight, more preferably between 1 and 20%, most preferably between about 5 and 10% by weight particles, such as titanium dioxide or a similar material in a pharmaceutically acceptable base or carrier, such as petrolatum. The compositions are less greasy than petrolatum alone, and thus are more aesthetically pleasing. The compositions exhibit occlusive properties comparable to petrolatum. The compositions are absorbed into the skin, unlike petrolatum, and exhibit significant wound healing characteristics not observed with petrolatum alone. In one embodiment, the pharmaceutically acceptable base is petrolatum and the particles are titanium dioxide. The compositions can be used to treat complex, hard to heal wounds, such as diabetic ulcers; pressure sores, such as bed sores; lacerations; bite wounds; burns; penetrating wounds; surgical wounds, etc. The composition can also be used to promote normal healing of scar tissue. The compositions can also be used for the topical delivery of one or more active agent. The compositions can be used to reduce fine lines and wrinkles, and to rehydrate skin or to treat dry skin.


Background: Water-filtered infrared-A (wIRA) irradiation has been shown to enhance penetration of clinically used topically applied substances in humans through investigation of functional effects of penetrated substances like vasoconstriction by cortisone. Aim of the Study: Investigation of the influence of wIRA irradiation on the dermatopharmacokinetics of topically applied substances by use of optical methods, especially to localize penetrating substances, in a prospective randomised controlled study in humans. Methods: The penetration profiles of the hydrophilic dye fluorescein and the lipophilic dye curcumin in separate standard water-in-oil emulsions were determined on the inner forearm of test persons by tape stripping in combination with spectroscopic measurements. Additionally, the penetration was investigated in vivo by laser scanning microscopy. Transepidermal water loss, hydration of the epidermis, and surface temperature were determined. Three different procedures (modes A, B, C) were used in a randomised order on three separate days of investigation in each of 12 test persons. In mode A, the two dyes were applied on different skin areas without water-filtered infrared-A (wIRA) irradiation. In mode B, the skin surface was irradiated with wIRA over 30 min before application of the two dyes (Hydrosun radiator type 501, 10 mm water cuvette, orange filter OG590, water-filtered spectrum: 590-1400 nm with dominant amount of wIRA). In mode C, the two dyes were applied and immediately afterwards the skin was irradiated with wIRA over 30 min. In all modes, tape stripping started 30 min after application of the formulations. Main variable of interest was the ratio of the amount of the dye in the deeper (second) 10% of the stratum corneum to the amount of the dye in the upper 10% of the stratum corneum. Results: The penetration profiles of the hydrophilic fluorescein showed in case of pretreatment or treatment with wIRA (modes B and C) an increased penetration depth compared to the non-irradiated skin (mode A): The ratio of the amount of the dye in the deeper (second) 10% of the stratum corneum to the amount of the dye in the upper 10% of the stratum corneum showed medians and interquartile ranges.
for mode A of 0.017 (0.007/0.050), for mode B of 0.084 (0.021/0.106), for mode C of 0.104 (0.069/0.192) (difference between modes: p=0.0112, significant; comparison mode A with mode C: p<0.01, significant). In contrast to fluorescein, the lipophilic curcumin showed no differences in the penetration kinetics, in reference to whether the skin was irradiated with wIRA or not. These effects were confirmed by laser scanning microscopy. Water-filtered infrared-A irradiation increased the hydration of the stratum corneum: transepidermal water loss rose from approximately 8.8 g m(-2) h(-1) before wIRA irradiation to 14.2 g m(-2) h(-1) after wIRA irradiation and skin hydration rose from 67 to 87 relative units. Skin surface temperature increased from 32.8 degrees C before wIRA to 36.4 degrees C after wIRA irradiation. Discussion: The better penetration of the hydrophilic dye fluorescein after or during skin irradiation (modes B and C) can be explained by increased hydration of the stratum corneum by irradiation with wIRA. Conclusions: As most topically applied substances for the treatment of patients are mainly hydrophilic, wIRA can be used to improve the penetration of substances before or after application of substances - in the first case even of thermolabile substances - with a broad clinical relevance as a contact free alternative to an occlusive dressing.

B. Cravello, A. Ferri, Relationships between skin properties and environmental parameters, Skin Research and Technology 2008; 14: p. 180–186

Background/purpose: Many authors have written about skin physiological parameters and their changes according to different environmental conditions. Nevertheless, the literature puts in evidence disagreement among different studies due to the great variability in these parameters and due to the difficulty in comparing the results obtained under different working conditions. Hence, the aim of this work is to attempt to clarify the relationship between some skin properties, such as transepidermal water loss (TEWL), skin hydration and mean skin temperature (Tsk), and the environmental parameters of ambient temperature (Ta) and relative humidity (RH), with the help of a climatic chamber to make the environment reliable. This work must be considered as the preliminary step of a wider project dealing with textile engineering: the results will be used in identifying criteria for textile design with the aim of producing more comfortable clothing. Methods: Experiments were carried out in a climatic chamber with independently controlled Ta and RH. All the combinations between three levels of Ta (20 1C, 25 1C and 30 1C) and four levels of RH (25%, 45%, 65% and 85%) were used on a panel of six young female subjects. The assessments made were: skin surface hydration using an electrical capacitance method, TEWL using a Tewameter and Tsk using a set of thermistors. Results: The results showed a significant correlation between TEWL and Ta, while the RH had a weaker effect on TEWL in the temperature range under investigation. Also, Tsk showed a higher correlation with Ta compared with RH. Finally, skin surface hydration was found to be strongly affected by both environmental parameters. Conclusions: The analysis of experimental data resulted in the elaboration of some easy empirical models useful to evaluate the changes in TEWL, skin hydration and Tsk in different climatic conditions. These relationships must be considered to be valid only in a restricted range of Ta (20– 30 1C) and RH (25–85%) for young female subjects (25–35 years old).

M. Ionescu, A. Gougerot, A.M. Matta, L. Lefeuvre, M. Bohbot, Melanocytes' dendricity down-regulated by the association niacinamide-ascorbic acid, JAAD, March 2009, San Francisco

To assess the effects of the association niacinamide-ascorbic acid on melanogenesis process in human skin explants exposed to solar simulated radiation (SSR). Normal human skin explants were treated (untreated control) by an O/W emulsion based on the association niacinamide-ascorbic acis (2mg/explant, 1 time per day from baseline to day 9, 30 min before SSR irradiation).


The stratum corneum (SC) has been well recognized as a principal water barrier of the skin. It is a cellular tissue, a fabric of cornified cells creating a tough, flexible, coherent membrane, acting as a two-way barrier, minimizing water loss, electrolytes and other body constituents, and decreasing the entry of noxious substances from the external environment. Maintenance of the SC structural integrity
is critical to barrier function. Transepidermal water loss (TEWL) documents the integrity of SC water barrier function, and is a sensitive indicator of skin water barrier alternation.


Measurement of water concentration profiles across living human skin by confocal Raman spectroscopy has developed into a powerful tool for a better understanding of distribution and function of water in the epidermis. From the water profile across the epidermis the border between stratum corneum and stratum granulosum can be estimated. This is due to the steep drop in water concentration from the inner to the outer side of the stratum corneum.


In the present work, nasolabial skin condition and the influence of seasonal changes during autumn and winter were studied in 16 healthy female volunteers. Apart from visual scoring of erythema and skin scaliness, transepidermal water loss (TEWL), skin hydration, apparent skin pH, skin colour and skin desquamation were biophysically measured. The study results showed that nasolabial TEWL was significantly higher during wintertime than in autumn.


With more consumers interested in following a healthy and eco-conscious lifestyle, demand for natural and organic beauty care products has grown tremendously in the past couple of years. Indeed, it is more than a trend, consumers today expect their cosmetics to be natural. Silab has more than 20 years of experience in the field of natural active ingredients. Most recently, we have developed a range of certified organic active ingredients that respond to the main cosmetic claims: anti-aging, anti-free radicals, moisturizing and soothing.


Sulfur mustard is a powerful vesicant (blistering agent) and a member of the heterogeneous group of chemicals that are referred to as chemical warfare agents. This agent reacts with skin proteins, degrading structure of both cells and underlying extracellular matrix. Sulfur mustard DNA adducts are believed to be the most critical lesions.


The primary function of the skin is to act as a barrier against unwanted influences from the environment and to protect the body from waterloss. This barrier function is ensured mainly by the stratum corneum, the upper layer of the epidermis. The stratum corneum comprises corneocytes, which are keratinised keratinocytes, surrounded by lamellar lipid membranes. These lamellar lipids play a fundamental role in the structure and functions of the epidermis. They cement the corneocytes and with them form the permeable barrier of the epidermis.


Ill health due to skin exposure remains a considerable problem, particularly in the workplace. In our aim to reduce the incidence of occupational skin disease and ill health due to skin exposure we need to understand how exposure to substances and physical factors is affecting the skin and how best
to identify early signs or pre-clinical signs of skin disease. This project investigated possible new techniques for occupational skin health surveillance. The project focused on techniques that would identify sub-clinical damage that could lead to irritant contact dermatitis.

*W. Pratchyapruit,* Grading of improvement and relapse in melasma of Thai females after 8 weeks-treatment with a combined cream of hydroquinone, steroid and tretinoin, ISBS Besancon, 2009

Melasma is a common skin problem in any races including Asians. It commonly occurs in Thai females, age 30-40 years and females outnumber males about 13:1. In addition to multiple etiologic factors, the environmental factor of Thailand as a tropical and sunny climate country constitutes a definite factor responsible for improvement and relapse of pigmentation after any treatments. At present, the topical treatment consisting of hydroquinone (HQ), steroid and tretinoin together with sunlight protection is a standard treatment for melasma.

*P. Contreiras Pinto, J.G. Morais, L. Monteiro Rodrigues,* TcpO2 decay rates used as a metabolic indicator of the human skin in vivo, ISBS Besancon, 2009

Transcutaneous variables such as TcpO2 and skin’s microcirculation (LDF) had been used to approach skin metabolic activity, particularly in conditions that are related with the normal physiologic state. The sensibility of these variables to changes increase with the use of dynamical protocols that overstimulates skin and permits the study in extreme conditions. The 100% oxygen ventilation atmosphere used as a challenge test evokes the capacity to understand and quantify the maximum Oxygen disposition in the skin, which ultimately may be related with several skin conditions involving cutaneous perfusion.

*P. Contreiras Pinto, J.G. Morais, L. Monteiro Rodrigues,* To understand skin circulatory physiology by low perfusion experiments with a monocompartmental model. The influence of age, ISBS Besancon, 2009

Monocompartmental evaluation of Laser Doppler Flowmetry (LDF) and transcutaneous oxygen (TcpO2) data has been applied to low perfusion experiments, accepting that oxygen disposition rates may be reliable predictors of vascular impairment. After defining a new compartmental model to analyze TcpO2 and LDF data from dynamical maneuvers, the authors applied this model to a group of normal individuals (young versus old) to evaluate the applicability of the model and the influence of age over those parameters.

*P. Contreiras Pinto, C. Parreirao, L. Monteiro Rodrigues,* Characterization of sensitive skin syndrome volunteer’s barrier by dynamical analysis, ISBS Besancon, 2009 and Skin Research and Technology 2010; 16; p. 479

Several studies suggest that 50% of the population considers to suffer from some cutaneous sensibility. Some of these individuals do not show any objective skin sign and therefore his characterization is often difficult or even impossible. The auto-perception of these symptoms is the only way to diagnose the condition. The use of dynamical measurements such as the Plastic Occlusion Stress Test (POST) combined with compartmental analysis had been suggested to be a more sensitive method to discriminate small differences in the skin barrier function.


Chronic venous insufficiency (CVI) comprises all symptoms caused by permanent venous and capillary hypertension. While the clinical manifestations of the disease have been well characterized, there is little knowledge on the skin barrier function in the affected individuals. The aim of the study was to assess non-invasively the epidermal barrier function in patients with CVI stage C2 and C4 according to the CEAP classification and compare the findings to a group of healthy controls (stage C0). 30 patients with CVI without concomitant diseases and 15 healthy, aged-matched volunteers were included.
in the study following photoplethysmography and duplex sonography examination of the lower extremities.

*C. Rosado, P. Pinto, L.M. Rodrigues, Assessment of moisturizers and barrier function restoration using dynamic methods, Skin Research and Technology 2009; 15: 77-83*

Dynamic methods, such as the mathematical modeling of the transepidermal water loss curves that result from a plastic occlusion stress test (POST), enable the complete characterization of the dynamic water balance established between the deep and the superficial skin structures. Previous studies have indicated that this methodology was able to detect impaired barrier function and differentiate normal and dry skin. The objective of the present study is to apply the discriminative capacity of the model to the efficacy testing of moisturizing products.


Until recently, the study of infant skin in vivo has been limited to simple non-invasive techniques focusing on skin surface properties such as stratum corneum (SC) hydration, transepidermal water loss, and SC pH. With this work we demonstrate the development of non-invasive optical methods adapted for measurements on infant skin and the use of such methods to document skin maturation changes during the first years of life. Optical methods can be classified into methods relating to spectroscopy, microscopy, macroimaging, or a combination of the above. Skin spectroscopy can be achieved in vivo with the use of fiber optic probes that can come in contact with the skin site of interest.


A new tendency in cosmetic formulation is the association of botanical extracts and vitamins to improve skin conditions by synergic effects. The objective of this study was to determine the antioxidant activity of associated bioflavonoids, retinyl palmitate (RP), tocopheryl acetate (TA) and ascorbyl tetraisopalmitate (ATIP), as well as their photoprotective effects in preventing increased erythema, transepidermal water loss (TEWL) and sunburn cell formation in hairless mouse skin.

S.E. Dal Belo, L.R. Gaspar, P.M. Maia Campos, J.P. Marty, *Skin Penetration of Epigallocatechin-3-Cate and Quercetin from Green Tea and Gingko biloba Extracts Vehiculated in Cosmetic Formulation*, NCBI 2009

Green tea (Camellia sinensis) and Ginkgo biloba extracts in cosmetic formulations have been suggested to protect the skin against UV-induced damage and skin ageing. Thus, it is very important to assess the human skin penetration of their major flavonoids to verify if they penetrate and remain in the skin to exert their proposed effects. The aim of this study was to evaluate the human skin penetration of epigallocatechin-3-gallate (EGCG) and quercetin from green tea and G. biloba extracts vehiculated in cosmetic formulations. This study was conducted with fresh dermated human Caucasian skin from abdominal surgery mounted on static Franz diffusion cells.


Vitamins C and its derivatives, mainly due to their antioxidant properties, are being used in cosmetic products to protect and to reduce the signs of ageing. However, there are no studies comparing the effects of vitamin C and its derivatives, magnesium ascorbyl phosphate (MAP) and ascorbyl tetraisopalmitate (ATIP), when vehiculated in topical formulations, mainly using objective measurements, which are an important tool in clinical efficacy studies. Thus, the objective of this study was to determine the in vitro antioxidant activity of AA and its derivatives, MAP and ATIP, as well as their in vivo efficacy on human skin, when vehiculated in topical formulations.
L.R. Gaspar, F.B. Camargo Jr., M.D. Gianeti, P.M. Maia Campos, Evaluation of dermatological effects of cosmetic formulations containing Saccharomyces cerevisiae extract and vitamins, NCBI 2009,
Saccharomyces cerevisiae extract (SCE) is used in cosmetics since it can act in oxidative stress and improve skin conditions. This study investigated dermatological effects of cosmetic formulations containing SCE and/or vitamins A, C and E. The formulation studied was supplemented or not (F1: vehicle) with vitamins A, C and E esters (F2) or with SCE (F3) or with the combination of vitamins and SCE (F4). Formulations were patch tested on back skin of volunteers. For efficacy studies, formulations were applied on volunteers and transepidermal water loss (TEWL), skin moisture (SM), skin microrelief (SMR) and free radicals protection were analysed after 3h, 15 and 30 days of application.

L.R. Gaspar, P.M. Campos, Photostability and efficacy studies of topical formulations containing UV-filters combination and vitamins A, C and E, NCBI 2009,
It is already known that the photostability of a sunscreen is important for its performance on human skin. On the other hand, there are many formulations besides sunscreens containing combinations of UV-filters and daily use active substances with other claims like hydration and anti-aging effects. Vitamins A, C and E are frequently added in these kinds of products and it is not known if the UV-filters have some influence on the hydration and antiaging effects of these vitamins on the skin as well as on their stability mainly when photounstable UV-filters like avobenzone and octoyl methoxycinnamate are present in the formulation.

S.E. Dal'Belo, L.R. Gaspar, P.M. Maia Campos, Moisturizing effect of cosmetic formulations containing Aloe vera extract in different concentrations assessed by skin bioengineering techniques, NCBI 2009,
The polysaccharide-rich composition of Aloe vera extracts (Aloe barbadensis Miller), often used in cosmetic formulations, may impart moisturizing properties to the product. The aim of this study was to evaluate the effect of cosmetic formulations containing different concentrations of freeze-dried Aloe vera extract on skin hydration, after a single and a 1- and 2-week period of application, by using skin bioengineering techniques. Stable formulations containing 5% (w/w) of a trilaureth-4 phosphate-based blend were supplemented with 0.10%, 0.25% or 0.50% (w/w) of freeze-dried Aloe vera extract and applied to the volar forearm of 20 female subjects.

K.A. Tadini, L.R. Gaspar, P.M. Maia Campos, Epidermal effects of tretinoin and isotretinoin: influence of Isomerism, NCBI 2009,
The efficacy of tretinoin is well established in the treatment of acne and photoaged skin, however as a typical side effect of tretinoin treatment most patients develop a low-grade irritant dermatitis. Since isotretinoin topical treatment usually shows much lower incidence and intensity of adverse effects than tretinoin topical treatment, histological studies are needed to scientifically evaluate the effects of isotretinoin application on epidermis and also to assess if it can be used in anti-aging products as an alternative to tretinoin.

J. Alander, Shea butter with improved moisturizing properties, Personal Care, September 2009, p. 31-33
Shea butter has recently become a very popular ingredient in cosmetics and personal care applications due to its good emolliency and moisturising properties. The high content of unsaponifiable lipids, especially triterpene cinnamates, contributes to skin healing and restoration by anti-inflammatory action. Shea butter in all its forms is also easy to formulate with, especially if one of the butters specifically developed for cosmetic applications is used. All in all, this indicates that shea butter is both a functional and marketable ingredient with a long history of safe use in cosmetics and explains well its popularity in modern skin care.
J. Fluhr, Objektive Messmethoden bei dermatologischen Erkrankungen, 18th Congress of EADV Berlin, 2009


In the present study we investigated the effects of low relative humidity (RH) and high air velocity (VA) on physiological and subjective responses after bathing in order to present the evidence for required nursing intervention after bathing. Eight healthy male subjects participated in this experiment. There were four thermal conditions which combined RH (20% of 60%) and VA (low: less than 0.2 m/s or high: from 0.5 to 0.7 m/s) After taking a tub bath, subjects sat for 80 min in the test room under each condition. In addition, one condition under which the subjects were exposed to 20% RH and high VA condition for 80 min without bathing condition was conducted.

S. Farahmand, L. Tien, X. Hui, H.I. Maibach, Measuring transepidermal water loss a comparative in vivo study of condenser-chamber, unventilated-chamber and open-chamber systems, Skin Research and Technology 2009; 15; p. 392-398

Two main systems have been utilized for measuring transepidermal water loss (TEWL): open chamber and closed chamber. Yet, further validation aned standardization studies may be necessary to reveal the sensitivity, precision, and robustness of these instruments. Three instruments are compared for their applicability to assesss TEWL: unventilated chamber, open chamber and condenser chamber. The comparative study was performed on human forearm skin.


Motivation der Studie war herauszufinden, ob die Mani Bio-Oliven Crème anti-inflammatorische (entzündungshemmende) Eigenschaften hat und zur schnelleren Wundheilung beiträgt. Bei Behandlung von leichten Verbrennungen mit dieser Creme ist aufgefallen, dass der Schmerz schnell nachlässt und die Haut sich schneller regeneriert. Aus diesem Grund hat die Firma Bläuel in Zusammenarbeit mit alchemia-nova und Unterstützung der österreichischen Forschungsförderungsgesellschaft mbH be-

Sensations of itching and skin tightness are frequently reported after recreational swimming in pool water. Our objective was to measure the potential changes occurring at the skin surface under such conditions. Nine women participated in this study, which consisted of two periods. During a 4-day control period, basal biophysical skin parameters were assessed every morning. On the first day, measurements were also performed in the afternoon. The second study period followed the same study design as for the control period, except that, on the first day, women swam for 1 h in a public pool, between the measurements performed in the morning and the afternoon.

F. Morizot, J. Latreille, S. Gardinier, L. Staner, C. Guinot, A. Porcheron, E. Tschachler, Effects of partial sleep deprivation on face appearance and skin properties, ISBS Besancon, 2009 and Skin Research and Technology 2010; 16; p. 473-474

A reduction of sleep time on a chronic basis is a hallmark of life in modern society (“modern 24h-society”). Sleep has important homeostatic functions and sleep deprivation has effects on brain plasticity, energy conservation, tissue restoration, immune response and thermoregulatory function. Our objective was to investigate the effect of partial sleep deprivation on facial appearance and on skin functions (skin barrier, skin hydration, skin temperature, sebaceous secretions and skin sensitivity).

H. Tagami, The barrier function and water-holding capacity of the stratum corneum are not simply inter-related each other but are influenced by underlying pathological conditions as well as by body locations, ISBS 2009, Besancon

The barrier function and water-holding capacity constitutes the indispensable functional properties of the stratum corneum (SC). Both can be instrumentally evaluated in vivo as transepidermal water loss (TEWL) or as high frequency impédance, i.e., conductance and capacitance. From the observation of their behaviors in commonly observed skin changes, it is generally though that they are correlated each other. Recently, it is reported that the filaggrin gene mutations that causes dry, scaly skin changes of ichthyosis vulgaris based on the deficiency in filaggrin-derived amino acids, i.e., the natural moisturizing factor, ion the SC may also induce SC barrier impairment, leading to the development of atopic dermatitis by facilitating the penetration of various environmental antigens. However, the elevated TEWL values recorded instrumentally in patients with ichthyosis vulgaris is rather mild to allow the permeation of those large molecular environmental antigens, although the skin surface hydration state is extremely low even compared with sénile xérosis, another well known dry skin condition.

G. Khazaka, C. Uhl, B. Becker, Skin analysis techniques advance, Personal Care, January 2010

New legal regulations and growing competition in the market of cosmetic products demand more and more tests in the field of bioengineering. R&D departments are looking out for bioengineering methods which are non-invasive, objective, sensitive and reproducible. Skin analysis techniques have significantly advanced and technology now allows multiple measurements to be conducted and real-time quantitative values calculated. Such testing can be reproduced in laboratories worldwide. For higher reproducibility, it is important to standardise the test protocol and documentation. For this reason, in 1993, EEMCO (European Group on Efficacy Measurement of Cosmetics and other Topical Products) was foundet in order to create guidelines for tests such as the one for the assessment of Trans Epidermal Water Loss in cosmetic sciences.
Moisturization remains the main objective of skin care cosmetics, coupled with secondary functions such as antiwrinkle, firming or brightening benefits. The moisturizing ability of a formulation generally is imparted by the use of polyols, mainly glycerin. Glycerin can help attract water from the formulation or the atmosphere and retain it in the epidermis. Added to an emulsion at levels between 3% and 10%, glycerin ensures a good level of hydration that is maintained for several hours; the duration of this effect depends on the other components in the formulation.

Water is the single most vital parameter governing the function of the epidermal stratum corneum (SC) and other keratinised tissues, and a knowledge of the hydration state therein is of general interest. The corneum hydration state has been shown to be an indicator in the determination and evaluation of non-visible skin disease such as atopic eczema. We want to investigate the possibility of finding an objective measuring method that estimates in vivo water content and hydration state of the SC.

The objectives of this study were to assess dermal exposure of cell workers to nickel at a South African base metal refinery and to characterize their skin conditions by measuring skin hydration and trans epidermal water loss (TEWL) indices.

Instrumental methods for efficacy testing of cosmetic products have long been of interest. The first Journal of the Society of Cosmetic Chemists published in 1947 contained an article on cosmetic efficacy testing although the only instrumental method quoted was the use of a spectrophotometer to measure UV absorbance of sunscreen agents. It is interesting to note that the need to determine if these were subject to photodegradation was mentioned. Papers on efficacy testing have appeared in almost every issue of the journal since that first edition but most methods are subjective. Instrumental methods other than those to measure physical parameters or analytical ones to measure ingredient concentrations of the cosmetic composition were sadly lacking until 1956 when a paper describing the measurements of percutaneous absorption using radioisotopes to measure absorption journal during 1956 was an in-vitro method using radioisotopes to measure absorption by hair.

Ultrastructural studies have shown that the epidermis of full-term infants born after 40 weeks of gestation is morphologically indistinguishable from that of adults. It was therefore assumed that the biophysical properties are similar as well. The present study investigated skin physiology in neonates, especially the barrier function during the first 4 weeks of life and the influence of bathing and washing.

The skin covers our entire body, and through it we project our image to other people. It reflects our age and the state or our health. Healthy skin is the organism’s first defence barrier, and as such it
is subject to constant aggressions that can succeed in upsetting its structural balance.

**Seba med Flüssig Wasch – Emulsion**, Erfahrungsbericht, [www.ciao.de](http://www.ciao.de)


Confocal Laser Scanning Microscopy (CLSM) allows visualization of the keratinocytes of the different layers of the epidermis rapidly and non invasively. The aim of this study was to quantify in vivo the size of the keratinocytes of the granular and spinous layers with the new VivaScope® 1500 Multilaser to investigate the age effect on the forehead and the ventral forearm. A panel of 98 healthy Caucasian women aged 18 - 70 was recruited for the study. Photoageing was scored according to the Larnier scale. Biomechanical properties of the skin were measured with Cutometer SEM 575 (Courage & Khazaka) with a 2 mm probe and a 500 mBar suction on the cheek and the ventral forearm. Image acquisitions were taken with the VivaScope® 1500 Multilaser (Lucid - Mavig GmbH) on the forehead and the ventral forearm with 2 wavelengths: 445 nm and 830 nm. Three stacks, separated by 5 mm, with a 2 µm step were performed from the skin surface to 150 µm depth. Mosaics of images (3 x 3 mm) were acquired at the center of this region of interest at granular layer and spinous layer levels. Images were analyzed with ConfoScan V02 (Orion Concept).

**V. Mahler, Rizinuswachserpen – eine icht irritierende Alternative zu reibemittelhaltigen Handreinigern**, KOM Newsletterservice Volume 1, Issue 8, September 2010


Introduction: Laser therapy is clinically effective in hair removal; however, despite the development of various strategies, laser procedures still present a risk of adverse effects due to the overheating of the skin. Objective: To investigate the effects of 810-nm diode laser treatment on hair and on the biophysical properties of skin by using various non-invasive techniques on various parameters, including hair analysis, surface color changes, integrity of skin barrier, sebum production rate and pH level. Methods: In this randomized, right – left comparison study, 35 women with axillary hair received single-session diode laser therapy. Hair analysis and biophysical properties of the skin were assessed before treatment and at weeks 2, 4 and 6 after the therapy. Results: Hair density and thicknesses statistically significantly decreased after the first post-treatment evaluation. Regarding comparison of the biophysical properties of the skin, there was no statistically significant difference in the assessments, except for the increase determined during the second week in the erythema index in the laser-treated areas. Conclusion: The findings of this study showed that the diode laser can perform a significant reduction in the hair amount without significant epidermal damage, at least for a short period.


Primary hyperhidrosis may be a disabling condition causing emotional stress and negative impact on a patient’s quality of life. Oral anticholinergics are some of the treatments available. There are few published data on the use of the anticholinergic drug oxybutynin given orally in the treatment of hyperhidrosis. To evaluate the efficacy and the safety of oral oxybutynin in the treatment of primary hyperhidrosis. From January to June 2010, patients with primary hyperhidrosis were treated with oral oxybutynin in the Department of Dermatology, Besançon, France, and attended follow-up. Treatment was started with oxybutynin 2.5 mg three times daily during 3 days. The 3 following days, the dose of oxybutynin was increased at 5 mg per day. Patients then took 7.5 mg of oxybutynin per day during 24 days. The study lasted 1 month from the first day of oxybutynin treatment. Patients were evaluated every two weeks by clinical and biometrologic methods. The following parameters were assessed on the palm and plant: degree of sweating was determined by measuring Trans Epidermal Water Loss (TEWL) using a double-probe Tewameter (TM 300; Courage+Khazaka), skin temperature (Thermometer® ST500), skin pH (pH-meter, PH 900) and skin hydration (Corneometer® CM 825).


The combination of UV filters with antioxidant substances and natural extracts with biological activity in terms of photoprotection can provide unique benefits to the skin, by increasing its protection against UV radiation and also by improving skin conditions. Thus, the aim of this study was the assessment of protective effects of cosmetic formulations containing UV-filters, vitamins, Ginkgo biloba and red alga Porphyra umbilicalis extracts by biophysical and skin image techniques. For this purpose, an emulsion was supplemented or not (F) with Ginkgo biloba extract (FG), or red alga Porphyra umbilicalis extract (FA), or the combination of these extracts and vitamins A, E and C (FGAV). These formulations were submitted to preliminary studies for the evaluation of Sun Protection Factor (SPF), which were carried out on a group of human volunteers according to the COLIPA methodology. After that, the formulations were applied on 10 human volunteers’ forearm skin, followed by the analysis of their effects using biophysical and skin image techniques. This evaluation was done in terms of transepidermal water loss (TEWL) (Tewameter® TM 210), water content of the stratum corneum (Corneometer® CM 825), viscoelastic properties (Cutometer® SEM575), skin microrelief (Visioscan® VC 98) and the dermal thickness (Dermascan C®). The measurements were done before and after a 30 day-period of daily applications.
M.M. Pereira, L.M. Rodrigues. **Assessing the effects of different semi-occlusive wound dressing over the epidermal barrier recovery**, Skin Research and Technology 2010, 16; p. 488-489

To evaluate the impact of different wound dressings in the recovery of the skin “barrier” function. 30 healthy women, ages ranging 19-49 y.o. were selected after informed written consent. A Sodium Lauril Sulfate (SLS) solution (5%) was applied under occlusion (24h) in predefined sites of both fore-arms (volar). This induction phase was followed by the repairing phase with the application of different wound dressings: hidroxipoliuretan (PermaFoam), Hialuronic acid (Hyalofill), polyurethane film (Opsite Flexigrid) and gauze soaked in saline. Site distribution was previously randomized (Latin square).

M. Steiner, S. Aikman-Greed, F.D. Dick. **Side-by-side comparison of open chamber (TM 300) and closed chamber (Vapometer) TEWL**, Skin Research and Technology 2010; 16; p. 489-490

We compared a closed-chamber TEWL meter (transepidermal water loss, Delfin Vapometer (DV) against an open-chamber TEWL meter, which is viewed as the reference standard for TEWL measurements (Courage & Khazaka TM 300). The TM 300 was used in two modes, the standard open chamber method (CKO) and a closed mode (CKC) with a semi-permeable membrane chamber cover. 540 TEWL measurements were taken in 17 participants with sessions of three and six sets of measurements on different days, measuring the TEWL on the dorsum and palm of both hands on each occasion. Four participants took part on either day one or day two only. The order of TEWL measurements was randomised to exclude confounding by interference when taking repeated measures.


Skin is a sense organ with sensory nerve endings and receptors, which behaves like a body wrap with its protection and regulation functions. Sensory informations are originated at the sensory receptors and it makes possible body representation, mediating physical world exploration. Experimental studies have shown that many factors may affect tactile sensations. For this purpose it was measured the current perception threshold (CPT) sensory nerve fibers by using an electric current sine wave stimulator (NeurometerTM) in 20 healthy women volunteers, aged from 25 to 35 years, before and after 2 hours of a single application of a formulation containing an association of vitamins A, C, E, Ginkgo biloba and Phorphyra umbilicalis extracts. The CPT for 5Hz, 250Hz and 2000Hz frequency current are reported to enable a selective quantification of the sensory thresholds of C, Ad, and Ab fibers respectively. In parallel, the stratum corneum hydration, the sebum content and the TEWL were measured using Corneometer™ CM285, Sebumeter™ SM810 and Tewameter™ TM210, respectively. Skin water and sebum content were significantly increased after 2 hours of the formulation application. The test group showed significantly decreased in the TEWL and in the CPT of 2000Hz, while the control group did not demonstrate any change on those parameters.

E.S. Abrutyn, **Skin Care Moisturizers**, Cosmetics & Toiletries Vol. 125, No. 12/December 2010, p. 18-25

Moisturizers are an important category of personal care products, and such formulas are designed to add moisture to the skin. Developing a good moisturizer requires carefully balancing the ingredients in a formula so that, upon application, the product maintains proper water content in the skin, i.e. 10-30%, to maintain its plasticity and barrier integrity. Insufficient water content can lead to the thickening or thinning of skin; fissure development, which produces chapped, rough and cracked skin; and the loss of pleasing skin aesthetics. Therefore, choosing the right moisturizer requires knowledge of its chemical, physical and performance properties and how to best utilize it against the targeted performance claims and consumer expectations. In addition, it requires knowledge of the skin to which it will be applied.
C.G. Benevenuto, M.A.S Di Matteo, P.M.B.G Maia Campos, L.R. Gaspar, Influence of the Photostabilizer in the Photoprotective Effects of a Formulation Containing UV-Filters and Vitamin A, IFSCC 2010 Buenos Aires, Argentina

Retinyl palmitate has been used in daily use moisturizing, antiageing and protective formulations since it acts on epithelization in dry and rough skin, as well as on keratinization considered being abnormal. However, some studies report that this substance shows some photoreactivity and can form photoproducts, which can lead to the impairment of safety and efficacy of cosmetic products containing this vitamin. Consequently, cosmetic formulators have been doing many efforts to stabilize formulations containing vitamin A derivatives and other photounstable substances such as searching for new UV-filters or using photostabilizers to increase their photostability and consequently their safety and effectiveness. Thus, the objective of this research was to evaluate the influence of different photostabilizers on the photoprotective effects of a cosmetic formulation containing UV-filters and a vitamin A derivative.

S.M. Bertucci, L.S. Freitas, L.R. Gaspar, D.G. Mercurio, M.D. Gianeti, P.M. Maia Campos, Efficacy of Cosmetic Formulations Containing Green Tea and Ginkgo Biloba Extracts-Pre-Clinical and Clinical Studies, IFSCC 2010 Buenos Aires, Argentina

This research aims to evaluate the effects of cosmetic formulations containing green tea (Camellia sinensis) and/or Ginkgo biloba glycolic extracts by histopathological and histometric studies and also to evaluate the immediate and long-term effects on human skin using biophysical techniques and skin image analyses. The pre-clinical efficacy evaluation was performed by the application of the formulations on the dorsum of hairless mice once a day for 5 days. For the clinical studies, formulations under study were applied to the forearm skin of 48 volunteers, which was evaluated by biophysical techniques and skin image analyses according to the following parameters: stratum corneum water content, transepidermal water loss (TEWL), skin elasticity and viscoelastic-to-elastic ratio and skin micro-relief, before (basal values) and after 3 hours (immediate effects), 15 and 30 days (long term effects). The histological analysis showed the formulations containing green tea extract, alone or in combination with the Ginkgo biloba extract, provoked significant enhancement in viable epidermis thickness and in the number of cell layers, suggesting a moisturizing effect and an induction of cell renewal. The clinical efficacy studies showed that the extracts under study had a moisturizing effect and also acted synergistically on skin viscoelastic-to-elastic ratio, related to hydration of deeper epidermal layers.


We investigated antioxidant activity and inhibitory effect on tyrosinase and elastase of the extract/fractions of Onion (Allium cepa) Peel. Besides the cream containing the ethyl acetate fraction of Onion (Allium cepa) Peel extracts was formulated. The skin hydration and transepidermal waterloss were investigated after topically application of the cream on skin. These results indicate that Onion (Allium cepa) Peel extract/fractions could be applicable to new functional cosmetics for antiaging. The skin is sensitive to stress by various environment factor (UV, pollution or oxidants). The major factor of oxidative stress is exposure of UVA or UVB on skin, it is occurred when there is ROS (reactive oxygen species) more than antioxidants in skin[1-2]. ROS includes singlet oxygen (1O2), superoxide anion radical (O2 -), hydroxyl radical (·OH) and hydrogen peroxide (H2O2). These can be produced significantly in cells by a variety of processes including high energy irradiation, photosensitization, phagocytosis and several enzymatic reactions[3]. Excessive production of ROS may accelerate skin aging by inducing mutations, inflammation, degradation of collagen or elastin, carcinogenesis and protein denaturation[4-7]. Besides, the flavonoids widely used as therapeutic agents are known to act as strong scavengers of ROS, and react with peroxyl radicals involving termination of radical chain reactions during the autoxidation of polyunsaturated fatty acids[8].

This paper focuses on the characterization of Sphagnum Magellanicum peat, its properties and the different uses in cosmetic products. Studies were conducted to analyze the organic, inorganic and microbiological content of this material. The results determined that it is an important source of polyphenols with antioxidant capacity. It has anti-inflammatory action and is safe in contact with skin. It has germicide properties. Humic substances have a large capacity to retain multivalent ions forming metalorganic complexes acting as a natural organic sequestrant. Because the intensity of UV light absorption it can be used in the formulation of coloured sunscreen emulsions and taking into account the other properties tested in the development of others cosmetic products. Considering the results obtained we found that Sphagnum Magellanicum peat has interesting properties for being used in the cosmetic industry coupled with the benefit of this raw material which has the important property of being natural and organic.


Background/Objectives: Prior studies have demonstrated that both the skin surface pH and epidermal permeability barrier function vary with skin pigmentation types. Although melanin deficiency is the main feature of vitiligo, alterations in cutaneous biophysical properties in vitiligo have not yet been well defined. In the present study, stratum corneum (SC) hydration, the skin surface pH and epidermal permeability barrier function in vitiligo were evaluated. Methods: A total of 30 volunteers with vitiligo comprising 19 males and 11 females aged 13–51 years (mean age: 27.91 ± 2.06 years) were enrolled in this study. The skin surface pH, SC hydration, melanin/erythema index and transepidermal water loss (TEWL) were measured by respective probes connected to a Courage-Khazaka MPA5. SC integrity was determined by measuring the TEWL following each D-Squame application. The barrier recovery rate was assessed at 5 h following barrier disruption by repeated tape stripping. Results: In addition to SC hydration, both melanin and erythema index were significantly lower in vitiligo lesions than in contralateral, nonlesional sites, while no difference in skin surface pH between vitiligo-involved and uninvolved areas was observed. In addition, neither the basal TEWL nor SC integrity in the involved areas differed significantly from that in the uninvolved areas. However, barrier recovery in vitiligo-involved sites was significantly delayed in comparison with uninvolved sites (40.83 ± 5.39% vs. 58.30 ± 4.71%; t = 2.441; p < 0.02). Conclusion: Barrier recovery following tape stripping of the SC is delayed in vitiligo. Therefore, improvement in epidermal permeability barrier function may be an important unrecognized factor to be considered in treating patients with vitiligo.

L. Massoudy, Klinische Untersuchung zu postnatalen Adapptionsprozessen der Hautphysiologie und zum Einfluss von Pflegeprodukten auf die Hautbarriere in der Windelregion bei reifen Neugeborenen, Dissertation zur Erlangung der Doktorwürde der Charité Universitätsklinik Berlin, November 2011

Die Hautbarriere reifer Neugeborener: Die Haut eines reifen Neugeborenen mit einem Gestationsalter von mindestens 37 vollendeten Schwangerschaftswochen zeigt in anatomischer Hinsicht eine vollständige Entwicklung. Lediglich die epidermodermale Vernetzung, die Papillen und Reteleisten, die ein Ineinandergreifen der Dermis und Epidermis bewirkt, ist im Vergleich zum Erwachsenen vermindert.

G. Dell’Acqua, K. Schweikert, G. Calloni, Oak, Green Tea and Orange Derivatives to Disrupt JAK/STAT, NF-kB Irritation Pathways, Cosmetics & Toiletries, Vol. 126, No. 1/January 2011

Skin is exposed to the external environment that brings with it daily aggressions such as UV light, chemicals, pollution, temperature, etc. these aggressions can create skin irritation, especially in sensitive skin individuals, leading to itching and discomfort. Moreover, in the long-term, irritation leads to skin damage and premature aging as a result of elastosis and matrix degradation. It is therefore important to stop skin irritation rapidly to not only reduce skin discomfort, but also avoid further skin
damage. Skin irritation is sustained by a crosstalk mechanism between a keratinocyte in the epidermis layer and the infiltrating immune cell, e.g. T lymphocytes. This cross-talk creates an amplification loop that leads to overreaction and escalates the inflammatory process with consequent skin erythema and irritation.


Sensitive skin is a vague, subjective and difficult to characterize affliction. If affects a large part of the population and is accompanied with great interest by the cosmetic industry. Some studies have suggested that sensitive skin is the result of impaired barrier function, which leads to the exposure of immune system cells and sensitive nerves, resulting in marked cutaneous responses to otherwise harmless stimuli. This study aimed to investigate the cutaneous barrier integrity of individuals with sensitive skin by a novel approach: a plastic occlusion stress test followed by measurement of transepidermal water loss (TEWL) desorption curves.


Skin appearance and functionality are affected by a complex combination of factors including both genetic, i.e. intrinsic, and actinic, i.e. extrinsic or environmental. Indeed, genetic and actinic factors act together to modulate the expression of key genes involved in skin homeostasis. Intrinsic aging is genetically regulated and follows a chronological clock inside of cells, while environmental factors such as UV exposure, humidity and air pollutants are responsible for actinic aging. Together, genetic and actinic aging target important metabolic pathways in skin cells that trigger the signs of aging such as skin roughness and wrinkling. At a molecular level, it has been demonstrated that collagen synthesis is reduced in aged skin cells and in cells damaged by UV radiation.


A. Thibodeau, P. Jacobs, S. Amari, *Olive oil fatty acids: positive effects for the skin*, Personal Care, March 2011, p. 51-57

The skin is externally located and thus serves as a sheath separating internal organs from direct contact with the environment. The main roles of the skin are: protection from UV radiation (melanogenesis), immune defence and a barrier function preventing the penetration of foreign particles. Perhaps of greater importance, skin – especially the stratum corneum layer – is dynamically involved in the management of internal water levels. The first skin layer facing the external environment is the stratum corneum; the outermost layer of the epidermis. This histological section is predominantly represented...
by keratinocytes. The epidermis is constantly renewed through an upward movement – and differentiation – of keratinocytes originating from epidermal basal layers up to the stratum corneum.


Transepidermal water loss (TEWL) is universally recognized to be a measure of skin barrier function, either at baseline, after experimentally induced barrier abrogation or following topical treatments. In mammals, it is also known as “insensible water loss” as it is a process over which organisms have little physiological control. Measurements of TEWL (grams per square meter per hour) is useful for identifying skin damage caused by certain chemicals, physical insult (such as “tape stripping”) or pathological conditions such as eczema as rates of TEWL increase in proportion to the level of damage even before the damage is clinically visible. It may thus be considered as the tool that evaluates the water barrier function of the epidermins.

A. Thibodeau, P. Jacobs, S. Amari, Biomimetic ingredient offers formulation benefits, Personal Care, March 2011

The skin is externally located and thus serves as a sheath separating internal organs from a direct contact with the environment. The main roles of the skin are: protection from UV radiation (melanogenesis), immune defence and a barrier function preventing the penetration of foreign particles. Perhaps of greater importance, skin – especially the stratum corneum layer – is dynamically involved in the management of internal water levels. The first skin layer facing the external environment is the stratum corneum; the outermost layer of the epiderm is. This histological section is predominantly represented by keratinocytes. The epidermis is constantly renewed through an upward flow of keratinocytes originating from epidermal basal layers up to the stratum corneum.


What was this mystery plant with over 100 different names in multiple languages around the world? Moringa Oleifera – “the miracle tree” whose leaves alone contain seven times the vitamin C of oranges, four times the vitamin A of carrots, four times the calcium of milk, more iron than spinach, three times the potassium of bananas, and twice the protein of yogurt. In addition, this vitamin – rich plant contains a variety of amino acids, as well as antioxidants and trace elements. The positive attributes of the moringa tree do not end with its nutritional benefits In fact, the seed oil from Moringa oleifera has the highest oxidative stability of any vegetable oil available.

G. Mayeux. E. Xhaufflare-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 though 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.

J. Blaak, R. Wohlfart, N.Y. Schürer, Treatment of Aged Skin with a pH 4 Skin Care Product Normalizes Increased Skin Surface pH and Improves Barrier Function: Results of a Pilot Study, Journal of Cosmetics, Dermatological Sciences and Applications, 2011,1, 50-58

Abstract: The physiological skin surface pH is just below 5. With age the skin surface pH increases up to 6. An increased pH correlates with reduced barrier integrity/cohesion. The present pilot
study assesses possible normalization of an increased skin surface pH of the elderly and improvement of barrier function via application of
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