Clinical Testing of Dermo-Protective Products against Environmental, Chemical and Climatic insults:

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Abstract: Our skin reflects the state of our health. Exposure of the skin to external insults like chemicals (detergents, soaps), climate (dry, cold, hot conditions) and environment (pollution), besides harming the protective ability of the skin, impacts skin properties and causes acute or chronic damage to the skin barrier. There is need to protect the skin from onslaught of various insults and to restore and conserve hydration, barrier function and protect it from pollutants. Many dermo-protective products are available and new ones are being introduced with actives to clean, soothe, restore, reinforce, protect, treat and maintain our skin in good condition. Our objective was to assess the efficacy of dermo-protectants against environmental, chemical, and climatic insults using clinical grading, imaging, along with bioinstrumentation in three *in-vivo* models.

Methods: Three clinical studies were carried out each following a randomized, blinded, untreated control design in 35 healthy female subjects. The methodology included clinical grading, imaging and the use of various bio-instruments to measure the parameters of interest.

Results: Our results from the three skin models using test methods presented under standardized conditions show the extent of dermo-protection in relation to hydration, barrier protection and removal of pollution evident with the test articles used.

Conclusions: Being in direct contact with the skin, dermo-protectants help protect and modulate skin characteristics and functioning, thus making them unique and versatile, outstepping the original boundaries of a product for providing beauty alone. Clinical trials with dermo-protectants for proving product efficacy and its extent, with proper study designs and techniques, is important in not only adding value for the consumer but also important for maintaining a competitive edge.

Keywords: Dermo-protection; Chemical; Environmental; Climatic Insults; Expert grading; Bioinstrumentation

Introduction: Skin barrier integrity assumes prime importance in the maintenance of healthy skin structure and function. Amongst the many factors that cause skin barrier to be compromised, besides the normal aging process, pollution, environment insults and chemical insults assume importance. Disruption of the barrier can lead to increased permeability and thinning of the horny layer. The result is loss of hydration and increased trans-epidermal water loss which if not checked can lead to inflammation manifesting itself in the form of various skin diseases. Many dermo-protective products can repair the damage caused by dryness (xerosis) and barrier disruption produced by pollution, cold environment and chemical insults. Dermo-protectants are currently available and more are being introduced with actives to clean, soothe, restore, reinforce, protect, treat and maintain our skin in good condition. They work by:

- Restoring damaged skin - such as dry skin and providing smooth, pleasant skin feel
-Removing dirt, sebum, microorganism, and unwanted substances like pollution
- Exfoliating skin
-Removing odor
-Reducing redness
-Reduces burning sensation
-Reinforcing vulnerable skin by balancing skin surface pH
-Protecting against various harmful factors.

Our objective was to assess the efficacy of dermo-protectants against environmental, chemical and climatic insults, using clinical grading along with bioinstrumentation and imaging in *in-vivo* models in three individual clinical trials.

Materials and Methods: N=35 females (18-65y) who met the inclusion/exclusion criteria were enrolled in each of the three clinical trials.

Test Articles:

1) **Pollution Clinical Trial:** 1) Lotion 2) a) Cleansing Lotion, b) Gentle Cream Scrub
2) **Chemical Insult Clinical Trial:** Code B: (Dermo-protectant formulation) Code C: (Untreated)
3) **Environment Induced Dry Skin Trial:** Code A: (Lotion)

Inclusion criteria

- Healthy female volunteers.
- Willing to discontinue use of any moisturizing products (lotion, moisturizer, bath additives, etc.) on the arm or leg as per study design.
- Test sites clear of hair that could interfere with the grading and /or imaging.
- Willing not to consume hot/cold and/or caffeinated beverages or foods or smoke one hour prior to any visit involving visual grading and instrumentation.
- Willing not to wet the test sites within three hours of a study visit.
- Willing to wear comfortable clothing for the entire duration of visit.
- Provide written signed Informed Consent.

Additional criteria for Environment Induced Dry Skin trial: Study was carried out in winter months on subjects who were willing to wash the lower legs only with the bar soap (Ivory) provided to them, once a day in the morning. Use of any washing appliances on the skin was not permitted, during the five days prior to the Baseline Visit and throughout the study. Subjects with at least moderate dryness and roughness (scores ≥2) at the test site after completion of the five-day wash-out period continued onto the treatment phase.

Additional criteria for Chemical Insult trial: Subjects who were willing to wash the lower legs only with water, once a day (morning only), and not to use any washing appliances during the three-day run-in period and for the study duration. Subjects with dryness and roughness scores of ≥1 at test sites after completion of the three-day run-in period continued onto the treatment phase.

Exclusion criteria

- Female subject that is pregnant or breast feeding (self-reported).
- A current skin disease of any type at the test site (e.g. eczema, psoriasis, dermatitis, etc.) or under treatment of a doctor for any skin condition.
- Any conditions that would interfere with evaluations (tattoos, scars, open cuts, sunburn, piercings, excessive hair, etc.).
- Known allergy or hypersensitivity to test products or similar materials or their ingredients.
- Insulin dependent diabetes.
- Autoimmune disease such as systemic lupus erythematosus, rheumatoid arthritis, multiple sclerosis, etc. or immunodeficiency disease such as HIV AIDs.
- Concurrent medication likely to affect the response to the test article or confuse the results of the study including routine use of anti-inflammatory medications, antihistamines, steroids, oral retinoids.
- Medical condition which, in the opinion of the Investigator, would compromise the safety of the subject or confound study results.

Visual Dryness Scoring Scale	
Score*	**Description**
0	No evidence of dry skin
1	Slightly dry skin, occasional scale, not necessarily uniformly distributed
2	Moderately dry skin, fairly uniformly distributed scale
3	Severely dry skin; pronounced scaling visible to the naked eye, definite uplifting of edges or scale sections-skin surface may have a whitish appearance
4	Extremely dry skin, more scale and pronounced separation of scale edges, some evidence of cracking

* = ½ point scores may be used to describe intermediated dryness condition

Visual & Tactile Roughness Scoring Scale	
Score*	**Description**
0	No roughness
1	Slight roughness
2	Moderate roughness
3	Severe roughness

* = ½ point scores may be used to describe intermediate condition

Hydration via Corneometer®

Skin surface hydration is measured with the Corneometer® CM825 (Courage + Khazaka; Germany) probe. The instrument probe works on the principle that water has a higher dielectric constant than most other substances which affects capacitance. The measuring capacitor of the probe shows changes of capacitance according to the moisture content of the samples. The capacitance charge penetrates the very first layer of the skin during the measurement (the depth is about 10-20 um of the Stratum corneum). Any change in the dielectric constant due to skin moisture variations will alter the capacitance of the precision capacitor in the instrument probe. These variations are detected electronically and are displayed on the instrument readout as an arbitrary unit. Triplicate readings were taken at adjacent skin areas within the test site to avoid occlusion.

Trans epidermal water loss (TEWL) by Tewameter® Probe

Evaporation of water from the skin occurs normally as part of the skin metabolism. However, when barrier function of the skin becomes even slightly damaged, water loss will increase (even though it may be invisible to the human eye). Trans-epidermal water loss will be measured with the Tewameter® TM300 Probe (Courage and Khazaka; Koln, Germany. This method is an extremely effective method to measure barrier function of the skin. The measurement of the water evaporation and therefore TEWL, is based on the diffusion principle in an open chamber and is measured as $g/m^2/h$. The density gradient is measured indirectly by two pairs of sensors in the probe attachment, one for temperature and the other for relative humidity. This density gradient is then analysed by a microprocessor in the instrument. A 30 min. warm-up period was allowed before using the Tewameter.

1: DERMOPROTECTION AGAINST ENVIRONMENTAL POLLUTION: Various air pollutants such as ultraviolet radiation, polycyclic aromatic hydrocarbons, volatile organic compounds, oxides, particulate matter, ozone and cigarette smoke affect the skin as it is the outermost barrier. Air pollutants damage the skin by inducing oxidative stress. Although human skin acts as a biological shield against pro-oxidative chemicals and physical air pollutants, prolonged or repetitive exposure to high levels of these pollutants may have intense negative effects on the skin.
In this study design antipollution efficacy assessment of test products against skin pollution induced by particulate matter (2.5PM) was studied.

Antipollution Method:

An area of the qualified subject's inner volar forearm was marked and split into two sections. Coal dust particulate matter (PM) 2.5 was used to cause skin pollution. Prior to application of the test article, photographs were taken of each area followed by expert visual grading and these served as the baseline score. Test article (TA)-1 was applied to one of the sections and the other was left untreated. Following TA application, a 15-minute time was allowed for TA absorption into the skin. Following 15 mins, a trained clinical staff member exposed the areas to coal dust 2.5PM and an additional 15 mins were allowed for the dust to settle on the skin. Following this, the clinical photographer took images of the skin and an expert grader evaluated the visibility of the dirt/pollutant again.

Scoring scale for Visibility of Coal Dust PM:

Score	Description
0	No visible signs of PM 2.5
1	Barely visible

2	25% of the area remains
3	50% of the area remains
4	75% of the area remains
5	100% of the are remains.

A trained technician washed the treated section with a Cleansing Lotion and wiped it. The untreated site was washed with standard surfactant and graded at the same timepoints.
Images were taken by the clinical photographer and the volar forearm sites graded by a trained grader.

In the second portion of the experiment another test area was split into two sections. Prior to application of the test article, photographs were taken of each area followed by expert visual grading and these served as the baseline score. A trained clinical staff member exposed the areas to coal dust 2.5PM and an additional 15 mins were allowed for the dust to settle on the skin. Following this the clinical photographer took images of the skin and an expert grader evaluated the visibility of the dirt/pollutant. Thereafter, the trained technician applied the TA-2a) Cleansing Lotion and wiped the area followed by visual grading and the clinical photographic images being taken. After this the TA-2b) Gentle Cream Scrub was applied along with final grading of the volar forearm sites and the final clinical photograph images being taken. The untreated site was washed with the standard surfactant and graded.

2. DERMOPROTECTION AGAINST CLIMATE INDUCED DRY SKIN: Skin dryness happens because of an abnormality of the desquamation process which causes corneocyte shedding and results in rough texture, rough appearance, discomfort and itchiness. If unattended, with time, this can lead to skin irritation and even skin inflammation. Dryness and barrier disruption are seen in Atopic Dermatitis and other similar diseases. Moisturizers help repair the skin barrier by retaining and helping increase the water content of the skin and by reducing the trans-epidermal water loss.

Our objective was to test the efficacy of cosmetic product on dry skin in winter over an 8-hour wear period following a single application. This double-blind study was conducted, on subjects with at least moderate dry skin dryness (score of ≥2) at each test site following a washout period of five days with Ivory soap. A single application of the test article-A was made, and assessments conducted over an 8-hour wear period. At the baseline visit, subjects who met eligibility criteria including visual dryness and roughness and tactile roughness scores of 2 or greater continued onto the treatment phase. Subjects remained at the study facility until the final assessments were completed post 8 hours of TA application. One test site 5cmx5cm was marked on both the right and left lateral leg. Clinical assessments of visual dryness and tactile roughness and instrumental measurement of skin hydration (Corneometer®) and TEWL (Tewameter®) were taken at baseline prior to first application and then post application at 10 mins, 4 and 8 hours.

Test article application:
Lotion Test code A**:**
Test article was dispensed on the test site at 2ul/cm^2 by a study technician and applied using a fresh finger cot. The technician ensured even spread of the test article across the test site.

3. DERMOPROTECTION AGAINST CHEMICAL INSULT: SLS is a common ingredient in skin care products and, depending on its concentration and exposure, can cause skin dryness, erythema and inflammation.

The objective of this study was to compare the TEWL and skin hydration pre and post use of specific moisturizer applied twice daily for 15 days. Additionally, TEWL was measured pre- and post-application of SLS to compare moisturizer treated and untreated sites. The study followed a randomized double blind untreated control design. The study consisted of a three-day run-in phase and two-week treatment phase. Verbal and written instructions were given to the subjects for the run-in period. No skin products were allowed throughout the study except washing once in the morning with water.

After the run-in phase potential subjects reported to the testing facility at an assigned time on Day 1 of the treatment phase. The first 35 subjects with dryness scores of 1.0 or greater and who met the inclusion/exclusion criteria continued to the treatment phase. The treatment phase was two weeks in duration. One 6X6cm site was assigned to each outer leg of subjects. No skin products were allowed during the study except washing once in the morning with water. Subjects were required to visit the laboratory twice daily (7-9 hours apart) for application to the designated test site by study personnel (a total of 27 applications). Subjects continued to shower or bathe in the morning and were to use only water to wash the legs (not within three hours prior to study visit). Verbal and written instructions were given to the subjects for the treatment phase.

Following the final application of the moisturizer on Day 14 AM and instrument readings, half of each test site received an application of SLS (1% w/v) via an occlusive patch. After 12 hours, patches were removed by study staff and the sites were rinsed and allowed to dry overnight.

Visual assessments were performed on Days -3, 1 and 15 (SLS and non-SLS treated sides of test sites). Skin surface hydration measurements were taken with the Corneometer on Days -3, 1 (pre-application 1 and post-application 2), 13 (pre-application 2), 14 (post final application in the morning and ~12 hours after final application) and 15 (~24 hours after final application on side of sites not patched with SLS). TEWL measurements with Tewameter were conducted on Days -3, 1, 4, 7, 10, 13, 14 (all measurements were taken prior to application) and 15 (approximately 24 hours post application of SLS after an overnight wait). Additionally, TEWL was measured pre and post application of SLS to compare moisturizer treated and untreated sites. At each applicable visit, instrument assessments followed the visual evaluations. Instrument readings were collected after an acclimation period of at least 30 minutes in room conditions of 20-25°C and 25-40% relative humidity.

Test Article application:

0.1mL of the test article was applied by spreading the test article with a clean finger cot and allowed to dry. No treatment was made to the untreated control site.

STUDY FLOW

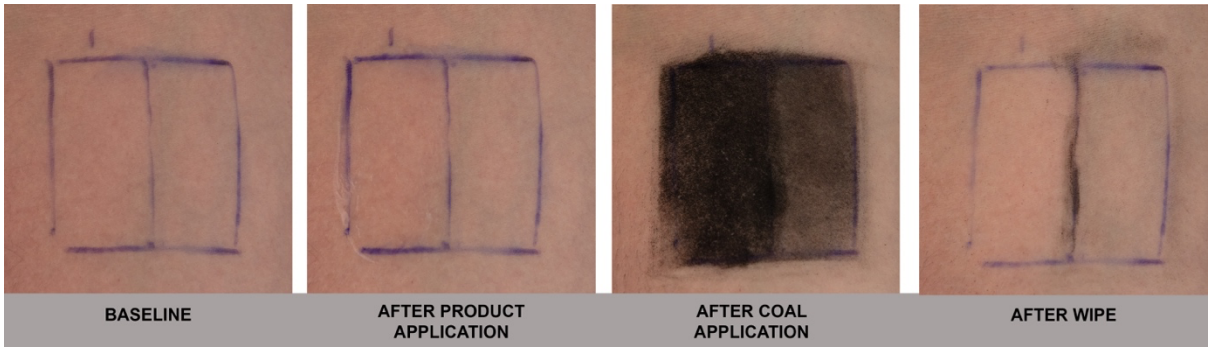
	RUN IN	TREATMENT PHASE						
Study Time Point	Day -3	Day 1	Day 4	Day 7	Day 10	Day 13	Day 14	Day 15
Visit		1	2	3	4	5	6	7
Informed Consent	√							
Inclusion/Exclusion Criteria	√							

Medical History/Con meds	√													
Demographics	√													
Visual Assessment	√	√												√
Corneometer	√	√*	√**							√*		√**	√**		√ [3]
TEWL	√	√		√*		√*		√*		√*		√*			√ [3]
TA application-twice daily 7-9 hours apart		√	√	√	√	√	√	√	√	√	√	√			
		√	√	√	√	√	√	√	√	√	√	√			
SLS 1% application												[1]	[2]		[3]
AE review	√	√	√	√	√	√	√	√	√	√	√	√	√		√

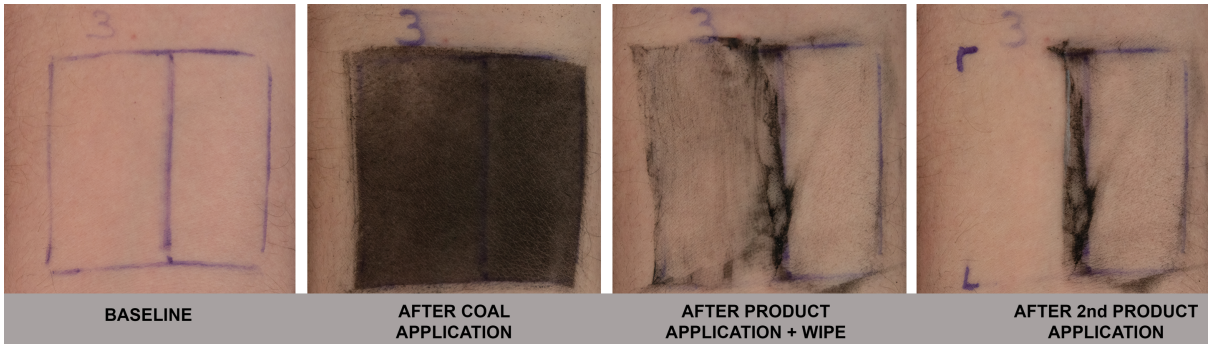
*pre application; **Post application; [1]site not patched with SLS; [2]site patched with SLS; [3]24hr post SLS

RESULTS:

1) ANTIPOLLUTION EFFICACY OF DERMOPROTECTIVE PRODUCT:



Dermo protection-Application of Test Article Code 1 before PM application



Dermo protection-PM application followed by
1)Test Article Code 1 Cleansing Lotion application and wiped.
2) Later Test Article Code 3 -Gentle Cream scrub and wiped

Images were used to evaluate the amount of PM adherence to skin in relation to untreated skin (baseline =0, lighter) the higher the score the greater the PM adherence to the skin (darkest=100).

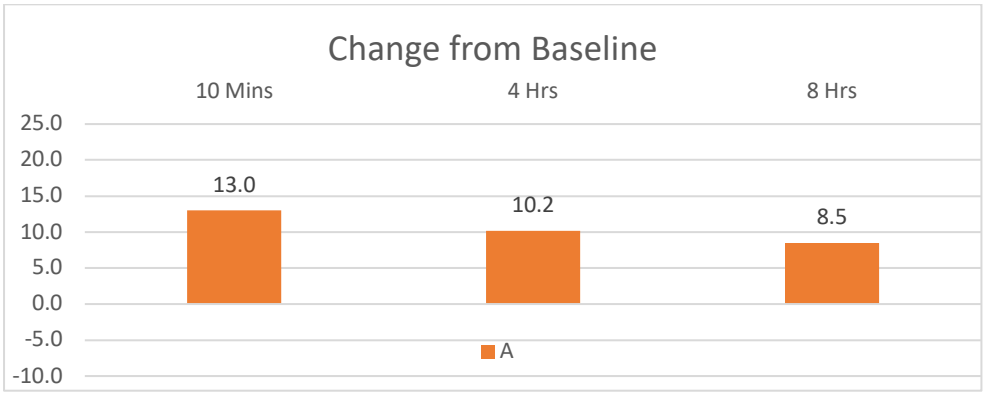
- 85% particulate removal was seen at the site with prior TA application followed by cleansing
- 98% particulate removal was seen at the site with prior TA application followed by cleansing with a cleansing lotion and Gentle cream scrub.

2) MOISTURIZATION EFFICACY OF DERMOPROTECTIVE PRODUCT:

SKIN SURFACE HYDRATION (CORNEOMETER)

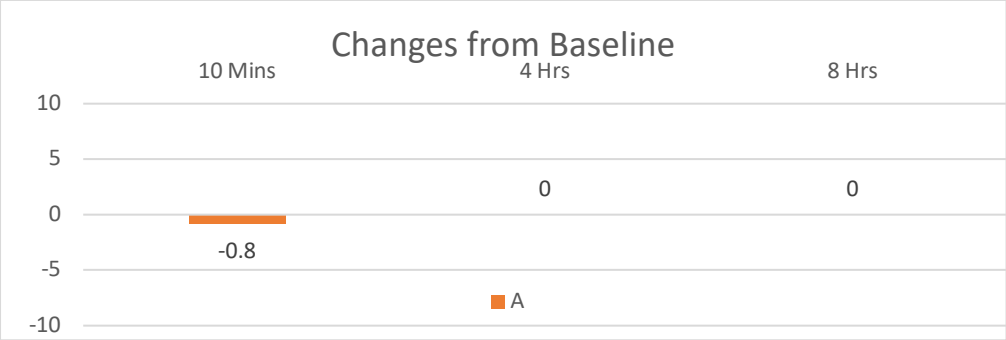
Treatment	Evaluation	Treatment Mean	Mean Difference from Baseline	Within Treatment T test p-value
A	Baseline	21.90		
	10 mins	34.90	13.00	<0.0001*
	4 Hours	32.10	10.20	<0.0001*
	8 Hours	30.40	8.50	0.0006*

* Statistically significant difference from baseline.

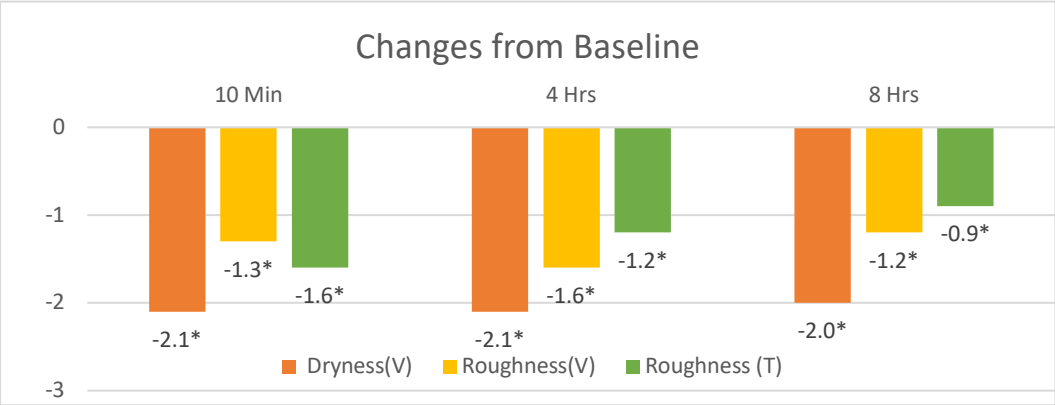


TRANS EPIDERMAL WATER LOSS (TEWAMETER)

Treatment	Evaluation	Treatment Mean	Mean Difference From Baseline	Within-Treatment t-test p-value
A	Baseline	10.69		
	10 Mins	9.93	-0.76	0.0521
	4 Hours	10.65	-0.04	>0.5000
	8 Hours	10.65	-0.04	>0.5000



SKIN DRYNESS (VISUAL), ROUGHNESS (VISUAL) & ROUGHNESS (TACTILE)



Analysis of clinical assessment of visual dryness showed statistically significant improvement in dryness at treatment site at all post-treatment time points. Analysis of visual roughness showed statistically significant decrease compared to baseline at treated site at all post-treatment time points. Analysis of tactile roughness showed statistically significant decrease in roughness compared to baseline at all timepoints at site treated with Test article Code A (at 10 minutes, 4 and 8 hrs). Skin surface hydration significantly increased after a single application of the test article at all time points

(10 minutes, 4 hours and 8 hours). Although TEWL was decreased at each timepoint, the decreases were not statistically significant.

3. EFFICACY OF DERMOPROTECTANT PRODUCT AGAINST CHEMICAL INSULT:

TEWL MEASUREMENTS:

Code	Visit	Mean Score	Mean Change from Baseline[1]	t-test p-value
B	Baseline	3.81		
	Day 4	3.46	-0.35	0.0994
	Day 7	3.40	-0.42	0.0394[3]
	Day 10	3.31	-0.50	0.0851
	Day 13	3.60	-0.28	0.3044
	Day 14	3.24	-0.45	0.0730
C	Baseline	3.69		
	Day 4	3.83	0.14	0.4974
	Day 7	4.53	0.83	0.0022[2]
	Day 10	4.02	0.32	0.1983
	Day 13	4.64	0.89	0.0020[2]
	Day 14	4.54	1.02	<0.0001[2]

	Day 7	Day 10
ANCOVA p-value:	<0.0001[4]	0.0640
Significant Comparisons:	C vs. B	Not Applicable
	Day 14	
ANCOVA p-value:	0.0005[4]	
Significant Comparisons:	C vs. B	

[1] Mean changes from baseline were calculated such that negative values indicate reduction & positive values indicate an increase

[2] Significant increase in transepidermal water loss from baseline

[3] Significant decrease in transepidermal water loss from baseline

[4] Significant difference among treatments

TEWL MEASUREMENTS: Analysis of differences from Day 14 to Day 15 for SLS treated sites only

Code	Visit	Mean Score	Mean Change from Baseline[1]	t-test p-value[2]
B	Baseline (Day 14)	3.24		
	Day 15	9.38	6.14	<0.0001
C	Baseline (Day 14)	4.54		
	Day 15	14.02	9.49	<0.0001

[1] Mean changes from baseline were calculated such that negative values indicate a reduction & positive values indicate an increase.

[2] Significant increases in trans-epidermal water loss from baseline

[3] No significant differences among treatments

CORNEOMETER MEASUREMENTS: (Moisturization Ability)

Code	Visit	Mean Score	Mean Change from Baseline[1]	t-test p-value
B	Baseline	23.56		
	Day 1 Post-trt.	28.89	5.32	**<0.0001[2]**
	Day 13	16.14	-7.47	**<0.0001[3]**
C	Baseline	23.86		
	Day 1 Post-trt.	23.14	-0.72	0.2198
	Day 13	14.80	-8.77	**<0.0001[3]**

Between Treatment Analysis using changes from baseline		
	Day 1 Post Treatment	**Day 13**
ANCOVA p-value:	**<0.0001[4]**	0.0671
Significant Comparisons:	C vs.B	Not applicable

[1] Mean changes from baseline were calculated such that negative values indicate a reduction and positive values indicate an increase.

[2] Significant increase in skin surface hydration from baseline

[3] Significant decrease in skin surface hydration from baseline

[4]Significant differences among treatments

CORNEOMETER MEASUREMENTS: (Results pertaining to Long Lasting)

Code	Visit	Mean Score	Mean Change from Baseline[1]	t-test p-value
B	Baseline (Day 14 Time 0)	26.17		
	Day 14 (Time 12 Hrs.)	18.95	-7.22	<0.0001[2]
	Day 15 (Time 24 Hrs.)	19.65	-6.52	<0.0001[2]
C	Baseline (Day 14 Time 0)	22.74		
	Day 14 (Time 12 Hrs.)	19.24	-3.50	0.0001[2]
	Day 15 (Time 24 Hrs.)	20.38	-2.35	0.0117[2]

	Day 15 (Time 24 Hrs.)

ANCOVA p-value:	0.0014[3]
Significant Comparisons:	C vs. B

[1] Mean changes from baseline were calculated such that negative values indicate a reduction and
positive values indicate an increase.

[2] Significant decrease in skin surface hydration from baseline

[3] Significant differences among treatments

VISUAL SCORES:

VISUAL SCORES – Within-treatment Analysis				
Code	Visit	Mean Score	Mean Change from Baseline[1]	Signed Rank p-value[2]
B	Day 15 Non-SLS site	2.09		
	Day 15 SLS Site	2.01	-0.07	>0.5000
C	Day 15 Non-SLS site	2.19		
	Day 15 SLS Site	2.07	-0.12	0.2592
Rank Sum p-value: >0.5000		Significant Comparisons: Not Applicable		

Skin barrier function was assessed with TEWL readings on Days 1 (Baseline), 4, 7, 10, 13, and 14 during the treatment period. While TEWL decreased compared to baseline at sites treated with Code B, at all assessment timepoints, the improvement was statistically significant from baseline on Day 7 only. TEWL at untreated sites, however, worsened at all timepoints although was only significantly worse than baseline at three of the five time points during the treatment phase of the study. Comparison of test sites showed sites treated with Code B were favoured over Untreated (Codes C) sites at two time points, Days 7 and 14. This result shows that worsening was greater at the untreated sites than the improvement at the treated sites.
Following exposure of SLS (1.0% w/v), both treated and untreated sites exhibited significant worsening in TEWL compared to pre-SLS application (Day 14)
. While the increase in TEWL was greater at untreated sites, this difference was not statistically significantly different from treated sites.

Moisturization ability was assessed with Corneometer readings on Day 1 following the second application and on Day 13 (following 12 days of applications). Treated sites exhibited significant improvement in skin surface hydration post-treatment on Day 1 whereas untreated sites showed no significant change from baseline. Skin moisturization assessments after 12 days of applications found significant decrease in skin surface hydration for both treated and untreated sites although the decreases were not statistically significantly different between the two.

Long lasting moisturization ability was assessed with Corneometer readings taken approximately 12 and 24 hours following the final application. Significant decreases in moisturization were found after

12 and 24 hours post application for treated and untreated sites. Twenty-four hours post-treatment, decrease in hydration was significantly greater at treated sites than untreated sites.

Visual assessment was performed on both halves (SLS and non-SLS) of the test sites on Day 15. Significant differences between the SLS and non-SLS portions were not found for treated and nontreated sites. Additionally, there were no significant differences between the treatments.

STATISTICAL ANALYSES: All statistical tests of hypothesis employed a level of significance of 0.05.

STUDY FINDINGS:

ANTIPOLLUTION: Pollution has devastating effects on skin. Differences seen between baseline and post cleansing was seen to reduce PM adhesion to levels near untreated skin but could not prevent the adhesion entirely. The test cleanser plus the Gentle cream scrub additional formula removed more pollution compared with the pollution removed by the cleanser alone. The antipollution effect was evident by preventive action by skin detox with a curative action with cleanser: cleansing, detoxification was seen to an extent with the cleansing lotion, followed by rebalance of the skin with a curative action of the Gentle cream scrub (soothing, barrier repair). Additives in the Gentle cream scrub enhanced removal of PM from skin and helped in maintaining and protecting the skin barrier, which could be an effective strategy in development of future antipollution formulations.

CHEMICAL INSULT: Skin moisturization assessments after 12 days of application showed significant worsening in skin surface hydration although treated site exhibited smaller decrease in hydration than untreated site. After exposure with 1% SLS under patch, skin barrier was compromised as evident by significant increase in TEWL. 1% SLS induces only sub-irritant exposure and not full irritation. The site that received no moisturizer application before SLS treatment showed significant reduction in hydration. TEWL values showed barrier function improvement on the test site with moisturizer treatment with no exposure to SLS.

ENVIRONMENTAL: In the winter season, special skin care is needed to combat the crisp and chill in the air which causes, dryness, roughness and scaliness. Daily application of a moisturizer can help combat these effects during winter conditions. A moisturizer helps hydrate the skin along with helping in reinforcing the skin barrier further protecting it from skin problems like xerosis, pruritus, ichthyosis, eczema and psoriasis. Besides benefitting normal skin, this is particularly relevant in sensitive skin.

RESULT FROM THE ABOVE CLINICAL TRIALS SHOW: In the three skin models and test methods presented here under standardized conditions, dermo-protection and its extent were evident with the application of test articles used in the three study models representing climatic, chemical and environmental conditions respectively. The dermo-protectants alleviated skin dryness, erythema and irritation, via hydration and reinforcement of barrier function.

CONCLUSIONS: Environmental pollutants impact our skin health and life quality and protection from these negative impacts is very important. In healthy skin, scrubs stimulate the cell renewal process and decrease the dry scales forming on the surface of the skin and enhance moisturization.

Use of a lotion can help protect the skin before exposure to pollution while after exposure to pollution a Gentle cream scrub providing moisture and exfoliation benefits along with a Gentle cleansing routine limits skin damage associated with pollution exposure.
Low outdoor temperatures and low relative humidity in the winter lead to decreased ability of SC to retain water and contribute to dry skin conditions which, if ignored, can lead to a variety of issues like pruritus, ichthyosis, eczema and psoriasis. Moisturizers are helpful in maintaining the skin barrier and help prevent dry skin.

Future:
Dermo-protectants can be exploited in dry skin, pollution, chemical insult arenas besides antiaging conditions which are often not given the same importance by professionals, so the consumer is left to self-treat. If the skin is left untreated it can lead to distressing skin conditions with reduced quality of life and isolation. Preapplication of the dermo-protectants with inclusion of noteworthy ingredients and these being in direct contact with the skin, helps better modulate skin characteristics and functioning. These unique and versatile delivery systems for dermo-protection with properties of improving hydration, impaired skin barrier recovery, desquamation stimulation, exfoliation, protein rejuvenation, antipollution, anti-aging and more, lead to outstepping their original boundaries of providing beauty alone.

CONFLICT OF INTEREST: None

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