Poster 886

A Gel Matrix-Based Moisturizer Delivers Significant Hydration, High Aesthetics, and Skin-Barrier Benefits

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Abstract

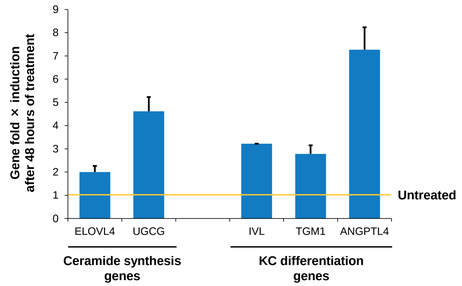
Dry and xerotic skin can result in a compromised skin barrier, which can be improved with therapeutic use of a moisturizer. Unfortunately, greasy formulations and poor moisturizer absorption may result in poor patient compliance. A moisturizer with a unique structure that forms liquid crystals within a gel matrix was developed. Upon application to the skin, this gel matrix breaks apart to rapidly release water and humectants entrapped within the liquid crystals. The formula was specifically designed to utilize emulsifiers that mimic skin barrier lipids and to minimize the inclusion of oils or liquid esters commonly found in moisturizers, which can produce undesirable greasy or oily aesthetics which affect patient compliance. Studies investigated the activity of the gel matrix moisturizer with liquid crystals on skin barrier gene expression. To determine whether the gel matrix with liquid crystals could improve skin barrier function, the moisturizer was studied in a randomized clinical trial of subjects with xerotic skin.

Methods

- The efficacy of the gel matrix moisturizer was established via *in vitro* studies and further confirmed in *in vivo* clinical studies.
- Increased expression of ceramide synthesis genes and epidermal differentiation markers.
  - Samples were isolated from skin equivalents using the QIAGEN RNeasy Kit with DNase I digestion (QIAGEN, Venlo, Limberg, the Netherlands). Reverse transcription was performed using High Capacity cDNA kit (Life Technologies, Grand Island, NY). TaqMan® gene expression assays were purchased from Life Technologies. All gene expression data were normalized by reference genes: POLR2A or/and GAPDH. Relative gene expression was calculated by comparative computed tomography.
- A transepithelial electrical resistance (TEER) assay was run.
  - The Millicell® ERS-2 Voltohmmeter (EMD Millipore, Billerica, MA) was used to measure resistance across the surface of epidermal skin equivalents. The cytokine cocktail was added into media and gel matrix moisturizer was applied topically. After 24 hours, TEER measurements were recorded and normalized to the baseline values for that specific tissue. The effect of the study treatments were analyzed by calculating change (in percent) of TEER from baseline.
- A 48-hour kinetic moisturization study was conducted.
  - The objective of this study was to assess the efficacy of the test-gel matrix moisturizer to deliver moisture to the skin after a single application on the lower leg.
  - Test product was applied on leg of male or female subjects (18–55 years of age) with clinically determined, moderately dry skin (n = 52).
  - Skin conductance on the test site and an untreated adjacent site was assessed at baseline, 1, 4, 8, 12, 24, and 48 hours after application.
- A 4-week in-use clinical study was also conducted.
  - Female subjects with a self-perceived history of dry skin used the test-gel matrix moisturizer once daily on the face for 4 weeks.
  - Epidermal tape strips were obtained from the cheeks of a subset of treated subjects (n = 12) at baseline and 4 weeks to assess for the presence of ceramides (analyzed by high-performance thin-layer chromatography).

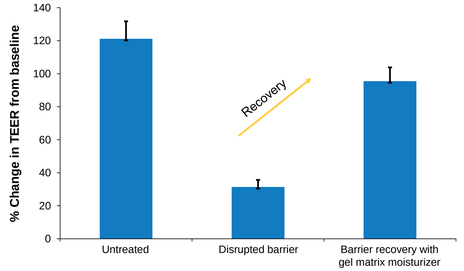
In vitro Results

1 Gel matrix moisturizer significantly increases the expression of barrier-related genes



Plot shows increases in the expression of barrier-related genes (ELOVL fatty acid elongase 4, UDP-glucose: ceramide glucosyltransferase [UGCG], involucrin [IVL], transglutaminase [TGM1], and angiopoietin-like 4 [ANGPTL4]), which are involved in lipid synthesis and epidermal differentiation.

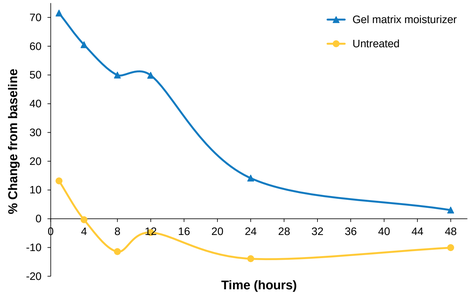
2 Gel matrix with liquid crystals resulted in recovery of disrupted barrier



In a functional *in vitro* assay measuring skin barrier properties using TEER, the gel matrix resulted in recovery of barrier properties. The barrier of immature 3D epidermal skin equivalents were disrupted using a cytokine cocktail (comprising of TNF-α and TH2 cytokines), resulting in low TEER. Treatment with the gel matrix moisturizer led to recovery of TEER, suggesting barrier recovery.

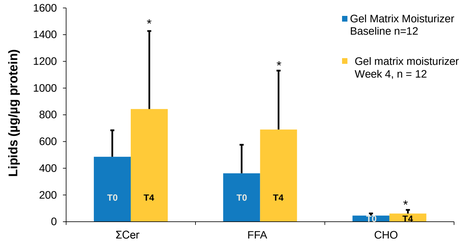
Clinical Results

3 Gel matrix moisturizer provides lasting moisturization



Increased kinetic skin conductance measurements indicate prolonged moisturization efficacy of the gel matrix moisturizer.

4 Treatment with gel matrix moisturizer results in intrinsic generation of ceramides in a clinical study



Tape strip analysis shows that treatment with the gel matrix moisturizer resulted in intrinsic ceramide and free fatty acid generation.

* *P* < 0.05, between time 0 and end of the study. ΣCer, total ceramides; FFA, free fatty acids; CHO, cholesterol.

Conclusions

- The skin benefits of this gel matrix moisturizer have been validated using *in vitro* methods and clinical assessments:
  - The gel matrix moisturizer helps repair disrupted barrier and improve skin barrier function;
  - The moisturizer is clinically shown to increase intrinsic ceramide generation after 4 weeks of daily treatment; and
  - It provides long-lasting moisturization benefits in subjects with xerotic skin.
- Its lightweight aesthetic provides an option for xerotic patients and may enhance compliance.

Disclosure: This study was supported by JOHNSON & JOHNSON Consumer Products Company, Division of JOHNSON & JOHNSON Consumer Companies, Inc., Skillman, NJ, USA

Presented at the 73rd Annual Meeting of the American Academy of Dermatology; March 20–24, 2015; San Francisco, CA, USA