P15321

Evaluation of a ceramide-containing lotion on skin hydration and cellular morphology assessed by Reflectance Confocal Microscopy (RCM)

Nathalie De Carvalho[1], MD, Beatriz Santanna[2], Izabella Martorelli[2], Nada Baalbaki[3] and Gene Colón[4]

[1]Department of Dermatology, University of Modena and Reggio Emilia, Modena, Italy; [2]L'Oréal Brazil, Rio de Janeiro, RJ, Brazil; [3]L'Oreal Research and Innovation, Clark, NJ, USA, [4]CeraVe, New York, NY, USA

INTRODUCTION

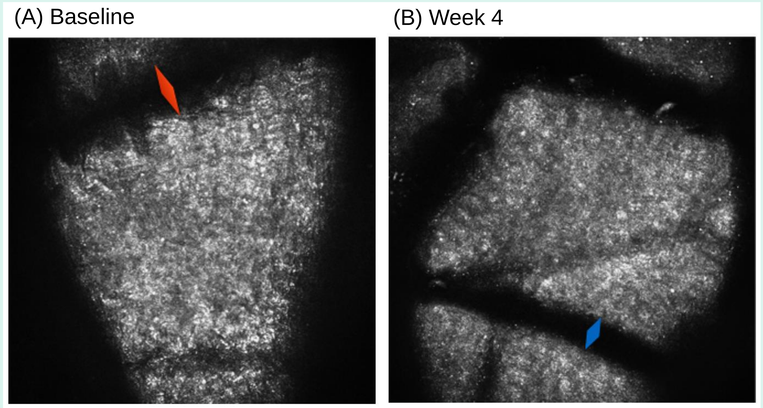
The water concentration in the stratum corneum (SC) is a gradient with an estimated 70% water at its interface with the lower layers of the epidermis and decreasing to 20-30% at the uppermost layers of the SC.[1] Water in the SC originates from within the body, hydrating the dermis and epidermis then diffusing through and evaporating from the SC. The SC serves as a barrier to transepidermal water loss (TEWL); the intercellular lipid bilayers and natural moisturizing factor (NMF) are critical to this protective function. Traditional moisturizers increase skin hydration by decreasing TEWL through occlusive agents in combination with humectants to hold water in SC.[1,2] The tested lotion also includes skin identical ceramides AP, NP and EOP to help restore the skin's barrier. Beyond a transient increase in water when the product is applied, an effective moisturizer will have an impact on cell morphology, impacting cellular volume and morphology at the surface and in deeper layers of the SC. In this study, the SC morphology of dry skin before and after treatment with a ceramide-containing lotion was evaluated *in vivo* using Reflectance Confocal Microscopy (RCM).

METHODS

Thirty-three female patients from 18 to 45 years old, presenting dry skin (corneometry value ≤ 40 a.u.), were instructed to apply a ceramide-containing lotion twice daily to one forearm whereas the other was kept untreated for comparison. Subjects were submitted to corneometer and RCM evaluations at baseline, day 7 and day 28. RCM features analysed were: corneal and epidermal thickness, irregularity of stratum corneum, size and morphology of epidermal folds, and morphology of keratinocytes in granular layer.

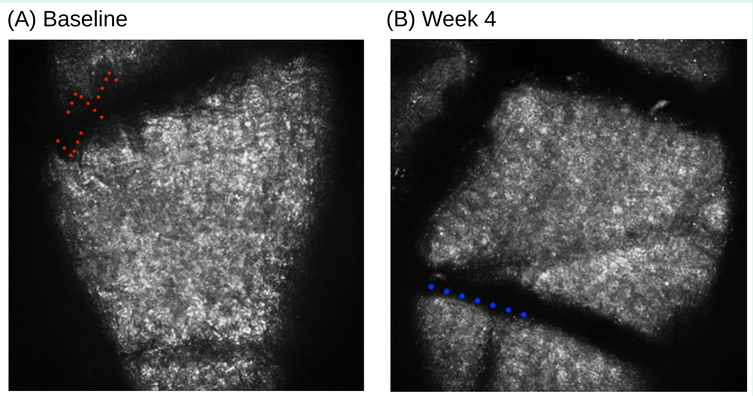
[1]Barel, A. O., Paye, M., & Maibach, H. I. (2014). Handbook of cosmetic science and technology. CRC Press.
[2]Spencer, T. S. (1988). Dry skin and skin moisturizers. Clinics in dermatology, 6(3), 24-28.

Figure 1: Epidermal fold size were significantly reduced (P<0.005) after 4 weeks.



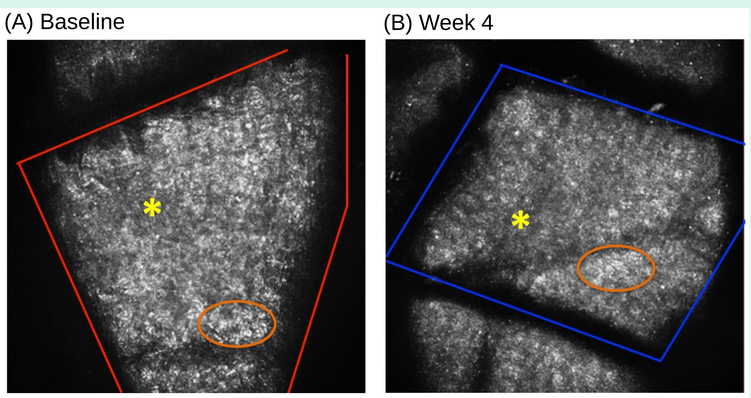
Red and blue arrows highlight epidermal fold distance

Figure 2: Epidermal fold morphology was significantly more linear (P<0.001) after 4 weeks.



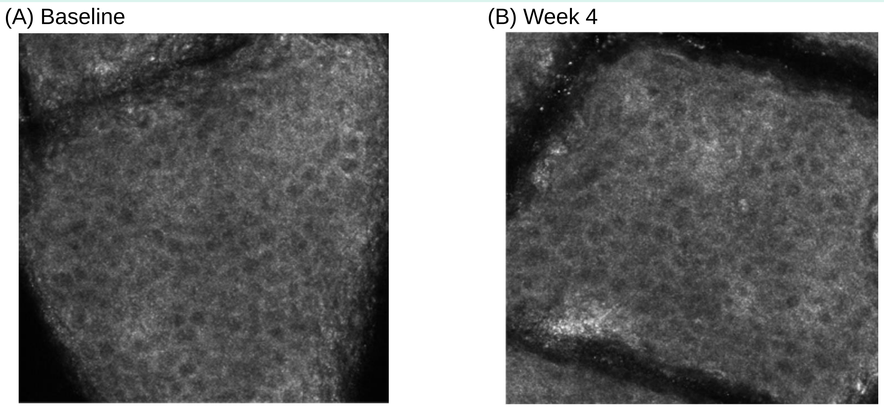
Red and blue dotted lines trace the edge of the epidermal fold.

Figure 3: Skin surface was significantly more regular (P<0.001) after 4 weeks.



The morphology of keratinocytes' islands is more regular (red vs blue linear contours), and a reduction in the quantity of SC (orange circles) and spinous layer (yellow asterisks) in the same image is denoted.

Figure 4: Granular layer cell morphology was significantly more homogeneous (P<0.005) and reflectance was significantly greater (P<0.05) after 4 weeks.

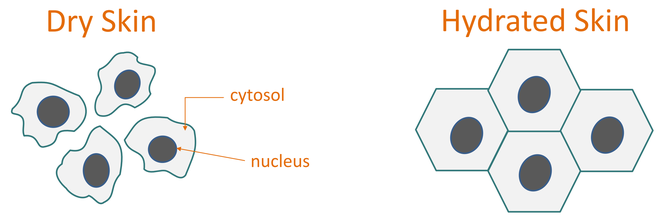


RESULTS

A statistically significant increase in hydration for the treated compared to the untreated forearm at day 28 was accompanied by:

- A significant reduction in the size of epidermal folds, and in the distance between islands (Fig. 1). The epidermal folds also displayed more linear, and less 'sawtooth-like' morphology (Fig. 2). These changes are associated with hydration via cell plumping.
- The treated site showed a reduction in the thickness of stratum corneum and improvement in regularity of skin surface. Fig.3 denotes this improvement - more regular morphology of keratinocytes' islands in upper layers and reduction of stratum corneum and spinous layer in the same image.
- At the granular level, the treated site displayed more homogeneous keratinocyte morphology and an increase in reflectance of keratinocytic contour (single cells were easier identified) - improving the honeycomb pattern when the cytosol is 'plumped' with water (Fig. 4).

Figure 5: Illustration of the effect of hydration on granular cells



CONCLUSIONS

RCM is a useful imaging tool for analyzing the effect of topical formulations on cellular morphology. The improvement in morphological features when using a ceramide-containing lotion reflects an increase in hydration at stratum corneum and epidermal layer.

Support provided by L'Oréal. NDC is a consultant for L'Oréal. BS, IM, NB & GC are employees of L'Oréal.

Presented at the Annual Meeting of the American Academy of Dermatology 2020; Denver, Colorado, USA