26. Jahrestagung in Tübingen: Poster-Abstracts

Topical formulations and their dual effect on skin hydration and stratum corneum thickness

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Introduction: Skin hydration is an important parameter for skin health and well-being [1]. Therefore, in skin formulation development, it is also an important parameter to test whether a formulation provides good or relatively poor skin hydration properties. Skin hydration can be measured in vivo using skin probes that measure the capacitance of the skin [2]. However, these skin probes can only measure the conductivity at the surface of the skin. Hence, it is hypothesized that the measurements can have bias, for example due to remaining formulations on top of the skin that hold water and/or form films which hinder direct contact of the skin probe with the skin. Consequently, the measurement may reflect the water content in the formulation on top of the skin rather than the water content of the skin itself. Sweat or massage that squeezes water from the skin can also introduce artifacts, leading to inflated skin hydration measurements. An additional method to measure skin hydration is the ex vivo measurement of stratum corneum thickness (SCT). A thicker stratum corneum represents greater skin hydration and vice versa [3].

Aim: The aim of this study was to assess surface skin hydration from differently treated skin areas with in vivo skin probes and to compare the results with SCT measurements.

Materials and Methods: Different formulations were prepared. A hydrogel served as a base in which different types of particles were added. The particles differed in size and type of surface coating. The formulations were applied to ex vivo skin (fresh porcine ears) and the surface skin hydration (measured with a Corneometer® CM 825 and the MoistureMap MM 200, Courage+Khazaka electronic GmbH, Cologne, Germany) was assessed 1 hour after application, immediately after the formulations were gently wiped off with a soft tissue. SCT was assessed by analysing 20 µm cryosections from skin biopsies taken from the different skin areas using inverted epifluorescence microscopy and digital image-analysis software. The results obtained from the different skin hydration measurements were compared and correlated using JASP software [4].

Results: Skin hydration measurements showed significant differences in skin hydration for the differently treated skin areas. However, the trends seen between the different skin hydration parameters were not correlated with each other. Thus, surface parameters yielded different trends than SCT parameters, and even the surface parameters did not always show the same trend. The

results confirm the hypothesis that SCT and surface hydration measurements are not identical. Each method yields valuable results but answers different questions. Surface measurements assess hydration at the surface of the skin. Corneometer measurements sample small areas, and the MoistureMap measures larger areas and thus provides a broader view of the distribution of water within the measured skin area. SCT measures hydration within the skin, particularly within the stratum corneum. The results provide evidence that formulations that effectively hydrate the SC do not necessarily hydrate the surface of the skin. A prominent example in this study is particles added to the gel: they decreased surface skin hydration but did not alter inner skin hydration (i.e., SCT).

Conclusions: Surface skin hydration measurements alone cannot provide absolute information about the skin hydration potential of a formulation. Additional measurements are suggested to understand and judge a formulation's ability to hydrate the skin more holistically.

References:

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