GLOBAL SKIN HEALTH

MANAGEMENT OF SKIN HYDRATION BY INGREDIENTS AND FORMULA: COMBINING MECHANICAL APPROACH AND MOLECULAR ASPECTS OF THE SC

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Introduction: The biomechanical barrier of the skin, principally supported by the stratum corneum (SC), is altered when the barrier and the water permeability are affected. We previously associated mechanical properties of the SC with the skin hydration level. Cholesterol, a key component in the intercellular lipids of the SC, plays an important role in stabilizing the SC structure. Its altered level could be linked with SC barrier abnormalities.

Objective: We investigated whether cosmetic molecules or formula, topically applied to the skin, could modulate SC biomechanical properties and by the way improve the hydration of the SC.

Material and Methods: We investigated skin dryness and hydration, by studying ex vivo, on an isolated model of the SC submitted to standardised dehydration, the behaviours of SC components during water desorption, using spectroscopic measurements. A relationship between the atmospheric relative humidity, the different states of water molecule in the SC, and the induced modification of the lipid matrix compactness were set up. We demonstrated that hydration level directly influenced molecular structure modification of the SC and its mechanical properties.

Results: We demonstrated that a plant sterol, betasitosterol, and its combination with emollient molecules, caused a significant modulation of the drying stress behavior of the SC, by reducing both the maximal peak stress height and average plateau of the drying stress profile during a kinetics of dehydration. Raman spectra analyses demonstrated that the combination could interfere with the supra-molecular organisation of the SC, allowing high water retention capacity within the SC, while the lipid conformational order was enhanced.

Conclusion: The drying process of SC involves a complex interplay of water binding, molecular modifications, and mechanical stress. Our study highlights the advantage of combining a biomechanical approach together with Raman spectroscopy in engineering a suitable combination of molecules for improving skin hydration.