IN VIVO MULTIPHOTON MICROSCOPY ASSESSMENT OF TOPICAL CORTICOSTEROID-INDUCED SKIN MODIFICATIONS WITH AGE

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Skin atrophy is a well-known side effect of topical corticosteroids, resulting in the appearance of prematurely aged skin. Characterizing, in vivo, skin alterations at both cellular and extracellular levels requires the use of 3D non invasive imaging methods. Accordingly, multiphoton microscopy seems an appropriate tool since providing simultaneous and non invasive visualization of different skin constituents with a sub-micrometer resolution and allowing kinetic studies of skin alterations.

In a recent pilot study, we showed that multiphoton microscopy allowed corticosteroid-induced skin side effects to be early detected [1]. The aim of this new study was to assess the dynamics of onset of these effects according to age. Two groups of 6 female volunteers each, of different age range (18-25y; 70-75y) were topically treated with clobetasol propionate (Dermoval®) and control product (Diprobase®) onto 2 small inner forearm regions under occlusion for 9 days. Images were acquired at day D0, D2, D9 and D28 using the DermaInspect™ device. Several quantitative parameters were extracted from epidermis and superficial dermis thanks to 3D image processing tools recently developed [2]. Main results after treatment were the following:

(i) A decrease of epidermis thickness in the 2 groups at D9,
(ii) A flattening of the dermal-epidermal junction in the younger group,
(iii) A slight decrease in melanin content in the younger group, sometimes associated with a clinically visible whitening,
(iv) An increase in the content of elastic fibers in the younger group (elastotic aspect),
(v) An alteration of the stratum corneum in the 2 groups, more pronounced in the older group,
(vi) All these alterations were reversible at D28,
(vii) Occlusion with the control product did not lead to any change in these parameters.

This short-term induced reversible cutaneous atrophy combined with multiphoton microscopy could provide a non invasive in vivo model for the assessment of the atrophogenic potential of corticosteroids or of anti-atrophogenic effects of products applied before or after this cortico-induced atrophy. This tool could also be used to record changes in the melanin content of the skin.
