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4 | Non-invasive assessment of tryptophan fluorescence and confocal microscopy provide information on skin barrier repair dynamics beyond TEWL.

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ABSTRACT

The stratum corneum (SC) serves a primary function of skin barrier and understanding the kinetics of SC formation may provide great insight for skin diagnosis and evaluation of therapies. Besides trans-epidermal water loss (TEWL), few methods have been characterized to assess skin barrier non-invasively in vivo, particularly for dynamic measurements on the same specimen over time. The objective of this study was to characterize alternative non-invasive methods to evaluate the dynamic processes involved in the recovery of normal human SC after total removal. TEWL, tryptophan fluorescence and reflectance confocal microscopy (RCM) were used to determine skin barrier function, cell turnover and epidermal morphology over a period of 10 days after total removal of the SC by tape stripping. The results show a biphasic recovery of TEWL over time, which contrasted with a linear increase of 2.3 ?m/day in SC thickness. Tryptophan assessment of cell turnover also demonstrated a biphasic pattern attaining a maximum three to four times the levels of the control site 3 days after injury that slowly returned to baseline and displayed great correlation (R(2) > 0.95) to viable epidermis thickness that also achieved a maximum about 3 days after injury with an approximate increase of 55%. When plotting the change of TEWL versus SC thickness, a single exponential function is observed [?-TEWL = 55 exp (-0.157×)] which contrasts with other proposed models. These methods were able to present rates for SC recovery processes beyond skin barrier (TEWL) that may provide new insights on kinetics of barrier formation for evaluation of skin conditions and treatments.