

KERATINOCYTE & SKIN PHYSIOLOGY

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Skin physiology in neonates and young children of different age groups compared to adults: a randomized study

The aim of this study was to investigate skin parameters (transepidermal water loss (TEWL), stratum corneum (SC) hydration, surface pH) and the biochemical skin composition (water profile and bulk NMF) to characterize neonatal skin in comparison to different children age groups and adults skin. The study was performed in healthy male and female volunteers (n=108) of 6 age groups (n= 18 each group: newborns (1-15 days), five-week, six-month, 1-2 yrs., 4-5 yrs and adults aged 20-35 yrs.). Biophysical parameters (TEWL, capacitance and surface pH) were measured on the volar forearms and water- and bulk NMF-profiles were assessed with Raman Spectroscopy (RS). The lowest SC hydration was noted in newborns compared to other age groups representing a dry SC in newborns. The mean skin surface pH-value was highest in newborns. A decrease of 1 pH unit was observed over the first 5 weeks and comparable to all other age groups, indicating a quick pH stabilization within the first weeks after birth. All mean TEWL values were below 10 g/m²/h reflecting a normal barrier function under basal conditions in all groups. An increase in SC hydration within the first weeks of life was detected in the water profile assessed with RS measurement. The increase in water content profile, correlated to increasing skin depth, was lower for newborns. Newborns showed greater bulk NMF concentrations- especially in a depth of 5 – 15 µm. Then NMF concentration was decreased, with significantly lower concentrations observed in the 6 months old group versus the other age groups. Neonatal and infant skin is mainly competent under basal conditions except SC water content and NMF components regulating the SC hydration level. Indeed, infant skin appears slightly able to absorb water and regulate mechanisms related to this process. Newborns seem to adapt to the dry environment by compensating the lack of water and the high pH via an increased production of NMF.

Fluhr JW, Darlenski R, Lachmann N, Baudouin C, Msika P, De Belilovsky C and Hachem JP. Infant epidermal skin-physiology: Adaptation after birth. *British Journal of Dermatology*. 2012; 166(3): 483-490