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Novel approaches to characterize age-related remodelling of the dermal-epidermal junction in 2D, 3D and in vivo.

Newton VL, Bradley RS, Seroul P, Cherel M, Griffiths CE, Rawlings AV, Voegeli R, Watson RE, Sherratt MJ. Skin Res Technol. 2016 Aug 9. doi: 10.1111/srt.12312.

ABSTRACT

BACKGROUND/PURPOSE: The dermal-epidermal junction (DEJ) forms epidermal protrusions down into the dermis (rete ridges) and dermal projections up into the epidermis (dermal papillae). Usually visualized in two-dimensions (2D), our knowledge of how the DEJ changes with ageing is limited. We aimed to characterize how this structure exists in 3D and changes with age. **METHODS:** Photoprotected and photoexposed skin were imaged using reflectance confocal microscopy (RCM) in young and aged individuals. Biopsies of the imaged areas were processed for histological sectioning and for imaging using micro-computed X-ray tomography (microCT). **RESULTS:** Images obtained from RCM and microCT were used to 3D reconstruct the DEJ. DEJ heights obtained from microCT images showed strong correlation with histology-measured heights. We proposed a novel definition of rete ridges (RRm) and dermal papillae (DPm), which allowed easier automated measurement of reduced DPm and RRm volumes in aged skin from microCT reconstructions. An algorithm to map DPm connectivity showed reduced lengths of DPm branches with age. **CONCLUSION:** Three-dimensional images illustrated the complex topography of the DEJ and highlighted the distinct morphology of dermal papillae compared with rete ridges, which is not evident when evaluating 2D sections. Ex vivo imaging was more successful in differentiating DEJ architecture with respect to age. © 2016 The Authors. Skin Research and Technology Published by John Wiley & Sons Ltd. **KEYWORDS:** X-ray computed tomography; dermal papilla; dermal-epidermal junction; photodamage; reflectance confocal microscopy; rete ridge; skin ageing PMID:27502896 DOI:10.1111/srt.12312