Medical > In Vivo > Other material

40 | Unsupervised delineation of stratum corneum using reflectance confocal microscopy and spectral clustering.

ABSTRACT

BACKGROUND: Measuring the thickness of the stratum corneum (SC) in vivo is often required in pharmacological, dermatological, and cosmetological studies. Reflectance confocal microscopy (RCM) offers a non-invasive imaging-based approach. However, RCM-based measurements currently rely on purely visual analysis of images, which is time-consuming and suffers from inter-user subjectivity. METHODS: We developed an unsupervised segmentation algorithm that can automatically delineate the SC layer in stacks of RCM images of human skin. We represent the unique textural appearance of SC layer using complex wavelet transform and distinguish it from deeper granular layers of skin using spectral clustering. Moreover, through localized processing in a matrix of small areas (called 'tiles'), we obtain lateral variation of SC thickness over the entire field of view. RESULTS: On a set of 15 RCM stacks of normal human skin, our method estimated SC thickness with a mean error of 5.4 ± 5.1 ?m compared to the 'ground truth' segmentation obtained from a clinical expert. CONCLUSION: Our algorithm provides a non-invasive RCM imaging-based solution which is automated, rapid, objective, and repeatable. © 2016 John Wiley & Sons A/S. Published by John Wiley & Sons Ltd. KEYWORDS: reflectance confocal microscopy; spectral clustering; stratum corneum; unsupervised segmentation PMID:27516408 DOI:10.1111/srt.12316