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In vivo epidermal thickness measurement: ultrasound vs. confocal imaging.

Nouveau-Richard S, Monot M, Bastien P, de Lacharrière O.; Skin Res Technol. 2004 May;10(2):136-40.

ABSTRACT

BACKGROUND/PURPOSE: In this study, in vivo skin imaging methods, ultrasound (US) and confocal microscopy (CM) were compared with regards to their accuracy in measuring the epidermal thickness.

In addition an attempt was made to clarify the biological significance of the second echo-rich line observed on US skin images, i.e. whether it represents the dermal-epidermal junction or the papillar-reticular dermis limit.

METHODS: US images were obtained with an in-house device (22 MHz probe) and the CM images with the VivaScope 1000 (Lucid Inc., Rochester, NY, USA).

Skin from the dorsal forearm, the back of hand and the palm skin of 11 subjects (25-40 years) were examined.

Repeatability of the procedure and reproducibility of the results were evaluated on repeated measurements taken at 1-month interval.

RESULTS: Both techniques are correlated. When a CM measurement is performed from the stratum corneum (SC) surface to the bottom of the papillae, results obtained with US and CM are very similar.

Thus, the second echo-rich line on US skin imaging is likely to reflect a virtual line joining the bottom of the papillae.

CM is limited to the measurement of a relative thin epidermis, due to the signal-to-noise ratio, which decreases with depth.

US technique offers a better repeatability and reproducibility, particularly for SC measurement.

This is mainly due to the small size of the investigated field of view in CM.

CONCLUSIONS: This study confirms the accuracy of US and the feasibility of CM imaging techniques for in vivo epidermal thickness measurement.

Echography probably measures a maximal epidermal thickness since it encompasses the bottom of the papillae.