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角層（角層細胞）の最新計測技術

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A New Method for the Measurement of Stratum Corneum (Corneocytes)

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Abstract

Past morphological studies on individual corneocytes have mainly focused on their two-dimensional characteristics, particularly on their projected area (PA). PA of corneocytes increases with age. It is larger in summer and autumn than in winter and spring, and larger on the upper arm than on the cheek. Furthermore, PA is correlated with the turnover time of the stratum corneum (SC). Therefore, PA has been a major parameter to express the skin condition, to which the turnover time of the SC was attributed. Sometimes, however, a poor correlation has been observed between PA and actually measured turnover time, and also the parameter of skin barrier function, trans-epidermal water loss (TEWL), because of the variation of PA. In order to find a new and accurate parameter, we performed detailed three-dimensional measurements of corneocytes using an atomic force microscope. As a result, it was revealed that each of the corneocytes showed an individual difference in the volume. Thus, we created a new parameter, namely, the flatness index (FI), which represents flatness of corneocytes. FI showed not only a good correlation with age as well as PA, but a better correlation with TEWL than PA. FI changed more clearly than PA in the corneocytes obtained by consecutive tape strippings. Moreover, FI showed better correlations with TEWL and skin hydration than PA when the usefulness of moisturizing cream on SDS-damaged skin model was evaluated. These findings suggest that the three-dimensional characteristics of corneocytes provide more accurate information on the skin condition than the two-dimensional projected area.

Key words: corneocytes, flatness index, morphology, three-dimensional, turnover.