

〈原 著〉

ポータブル型密閉式水分蒸散量測定器による 角層のバリア機能の測定

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Evaluation of the Barrier Function of the Stratum Corneum with a Portable Device Based on a Closed Chamber System for Measuring Transepidermal Water Loss

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Abstract

Transepidermal water loss (TEWL) provides us accurate *in vivo* information about the integrity of the barrier function of the stratum corneum (SC). The largest drawback for using the conventional instruments is their high cost. Moreover, it is also required to conduct measurements in a special environment where there is no air turbulence because so far available instruments are based on an open chamber system that measures the water vapor pressure gradient produced above the skin surface by the vapor passing through the SC barrier. Recently, we have had a chance to test a newly devised portable equipment (Model H 4300-S; NIKKISO-YSI CO., LTD., Tokyo, Japan) with a closed chamber system whose measuring principle is based on a computed TEWL estimation from a time-wise increase in relative humidity in the space of the probe that is applied on the skin surface. We conducted an *in vivo* comparative study by using the new portable device and the conventional method using the DermaLab[®] (Cortex Technology, Hadsund, Denmark) in healthy individuals and dermatological patients. We found that the sensitivity of the new device was not inferior to the conventional one because it could detect the poor SC barrier function of normal facial skin as compared to the skin of the extremities. Moreover, barrier disruption that is present in the lesional skin of AD or psoriasis was demonstrable in a severity-dependent fashion. Only one difference from the conventional one is that the obtained values measured with this new device were lower than those obtained with the DermaLab[®], probably due to the difference in the methodological principles. It was also unable to measure TEWL at the sites with measured values less than 1 g/sq-m/h. However, there was a good correlation between the data obtained with different methods ($p < 0.001$). The biggest advantage to use the closed system is that, because water evaporation from the skin takes place in any position, we can perform TEWL measurements without paying attention to the position of the skin surface in contrast to the conventional open system that requires the position of the skin surface to be horizontal. Thus, we can conclude that the closed chamber system is much more practical than the conventional open cylinder system. It can be carried easily to any place and enables us to conduct TEWL measurements without requiring any special environment preventive against air turbulence in addition to its cheaper price.

Key words: barrier function, portable instrument, transepidermal water loss.