

Basket-Weave Structure in the Stratum Corneum is an Important Factor for Maintaining Physiological Properties of Human Skin

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Histological examination of normal human skin demonstrates that the Stratum Corneum (SC) comprises of two layers: an upper layer with a basket-weave pattern, and a lower compact layer. The basket-weave SC includes peripheral Corneo Desmosomes (CDs), an adhesion structure of the SC, resulting in expansion of the intracellular space where intercellular lipids can spread widely. In this study, the relationship between degradation of CDs, which is a necessary process for maturing basket-weave SC, and physical properties of the skin in 98 healthy Japanese female subjects was investigated. The outermost Corneocytes were obtained by tape-stripping, then degradation of Desmoglein 1 (Dsg1), a major and important component of CDs, was examined using Immunofluorescence microscopy. We found a significant positive correlation between the number of Dsg1 pixels and transepidermal water loss and a significant negative correlation between the number of Dsg1 pixels and the high-frequency conductance of the skin. Subjects with higher degradation of Dsg1, which indicates basket-weave SC, tended to show a higher SC barrier function and a higher SC hydration, respectively. Furthermore, a significant positive correlation was observed between the number of Dsg1 pixels and a change in resonant frequency state as determined by measurement with a tactile sensor. That is, subjects with higher Dsg1 degradation, indicating basket-weave SC, tended to show a softer SC. We tried to improve basket-weave SC to improve the physiological properties of the skin. Prepared emulsion-A, an oil-in-water emulsion, successfully generated the basket-weave SC in reconstructed human epidermis in which degradation of CDs was promoted. The intercellular space of the basket-weave SC generated by emulsion-A was filled with multilamellar lipid sheets. These results indicate that degradation of CDs is likely to play an important role in maintaining the physiological properties of the skin in healthy subjects.

Biography:

Dr. Akihiro Tada has done his MS degree in Pharmaceutical Science from University of Shizuoka in 1993/3. He worked as a researcher in POLA Laboratories from POLA Chemical Industries in 1993/4. He also worked as a visiting fellow for Department of Dermatology in the University of Cincinnati during 1996-1997. He has done his Ph.D. degree conferred in Pharmaceutical Science from the University of Shizuoka in 1999. Since 2005, he is working as a Senior Research Scientist in POLA Chemical Industries.