

# **Percutaneous Absorption of Cell Penetrating Peptide in Relation to the Lipid Composition of Stratum Corneum Intercellular Lipids**

**Kazutami Sakamoto**

*Faculty of Pharmacy, Chiba Institute of Science*

Skin is the largest organ in the body as a barrier to protect life from environment. Key element of the skin barrier function relies on the structure and function of Stratum Corneum Intercellular Lipids (SCLP). Impairment of SCLP in composition or structure and function causes malfunction of skin or even diseases such as Atopic dermatitis. On the other hand, controlled temporal perturbation of skin barrier function could lead desirable Trans Dermal Drug Delivery System (TDDS).

The objective of this study is to establish a novel method for the Percutaneous Absorption of Cell Penetrating Peptide (or Protein Transduction Domain : PTD) in Relation to the SCLP as an ideal TDDS. Key feature of this TDDS is the combination of SCLP composition and PTD's ability of non invasive membrane penetration. Based on the altered ratio of sphingosine (So) and sphinganine (Sa), which increases from normal to atopic skin condition, model SCLP mixtures are composed and evaluated in terms of barrier function and physicochemical properties.

Atopic Skin (AS) model showed impaired barrier function for the release of Rhodamine-B (RhoB) encapsulated in the SCLP liposome, though there are no differences on the physicochemical properties between AS and Normal Skin (NS) or 3M (Basic SCLP composition without Sphingo lipids). This result, caused by the scares changes of structure and function of SCLP as a whole, indicates the possibility to control barrier function by means of changing SCLP composition.

PTD is a good candidate to combine SCLP composition with its non-harmful spontaneous penetration through the cell membrane. But little is known for its spontaneous translocation mechanism. We have investigated the effect of surface curvature of cell membrane by means of changing outer osmotic pressure. As a result, positive curvature change by decreasing Osmotic Pressure stimulated PTD penetration. Our proposition of the mechanism that PTD introduces local and temporal dynamic transformation of the membrane structure to mesh phase is thus confirmed. Combination of SCLP composition change and PTD application would lead us to create a novel and ideal TDDS.