

〈原 著〉

## 洗顔料の選択洗浄性評価

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### Selective Detergency of Facial Cleansing Products to Skin Surface Lipids

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#### Abstract

In this study, we investigated washing selectivity of eight surfactants *in vitro* and *in vivo*. In the *in vivo* studies, we determined the amount of squalene: sebum, and cholesterol: epidermal lipid, eluted into the surfactant solutions which were applied to the human forearm, to investigate their selective detergency to skin surface lipids. Eluting rates of lipids into the surfactant solutions were compared with the blank (tap water treatment). The comparative studies of eluting rates with eight surfactants showed that acyl-DL-alanine salt and sodium laurate (SL) had high selective detergency. Three-dimensional (3 D) skin models were used *in vitro* studies to examine the eluting of cholesterol and ceramide by the surfactant solutions. Their ability to induce hemolysis was also investigated *in vitro*. Regarding the eluting rates of cholesterol into the surfactant solutions applied to 3 D skin models, the results were consistent with that of the *in vivo* studies. The eluting rates of cholesterol obtained with the 3 D skin model studies showed the similar with *in vivo* studies. Namely, the cholesterol-eluting rate of acyl-DL-alanine triethanolamine (AAT) was low whereas that of sodium lauryl sulfate (SLS) was high. In regard to eluting rate of ceramide, AAT had the similar result. These results suggested that AAT had low ability to elute intercellular lipids. The 50% hemolytic concentration of each surfactant was correlated with the eluting rate of cholesterol in the *in vivo* study ( $r=0.84$ ). The result of this experiment suggests that there may be a correlation between destruction of membrane and elution of epidermal lipids. The human forearm was actually washed with a facial cleansing preparation containing AAT, in order to investigate its selective detergency. The ratio of the eluting rate of squalene to that of cholesterol was 6.7. This ratio leads to the conclusion that AAT has excellent selectivity in washing the skin surface lipids. The transepidermal water loss (TEWL) after washing the skin with the AAT-containing preparation was less than that with an SLS-containing preparation. These findings suggest that facial washing preparations containing surfactants with high selective detergency could remove sebaceous lipids exclusively without reducing barrier function of skin.

**Key words:** surfactant, selective detergency, lipids, facial cleansing product.