Synopsis of Original Research Paper

Application of Microdialysis to In Vivo Kinetic Analysis in Dermis of Cosmetic Compounds and Biological Elements

Hitoshi Sasaki, Mikiro Nakashima

Department of Hospital Pharmacy, Nagasaki University School of Medicine

Microdialysis is a relatively new technique for sampling tissue extracellular fluid that is gaining popularity in kinetic and dynamic studies of drugs in experimental animals. Intradermal microdialysis permits us to measure directly the concentration in dermis of test substances applied to the skin without loss of fluid volume. In this study, we have attempted to use this technique for characterizing the kinetic behavior in dermis of cosmetic compounds applied to living skin and evaluating the effect of cosmetic compounds permeated through the skin on biological elements in the surrounding dermal tissue of the rats. In general, several cosmetic compounds showing pharmacological activity were formulated in commercially provided cosmetics with various additives. It is important to evaluate the adequacy of intradermal microdialysis to quantify the interest cosmetic compound in cutaneous tissue following the topical application of its commercial product including various the other cosmetic compounds. Therefore, first we used Sandimmun that is 10% oily pharmaceutical preparation of cyclosporin (CYA), a low skin-permeable peptide, as the model product reflecting commercial cosmetics and measured the dermal concentration of CYA applied topically alone or with absorption enhancers. As the results, intradermal microdialysis enabled us to monitor cutaneous CYA quantitatively in proportion to its applied concentration to the skin. In addition, we found suitability of glycerin as an enhancer in the cutaneous penetration of CYA from its commercial product. Subsequently, the effect of barrier perturbation by delipidization on the cutaneous penetration of salicylic acid (SA) and the effect of SA permeated through the skin on the dermal endogenous homovanillic acid (HVA) were examined. SA was chosen as the model cosmetic compound because it is extensively used in the commercial cosmetics. As the results, enhanced cutaneous penetration of SA was correlated with the increase in barrier perturbation activity by delipidization. However, the dermal endogenous HVA levels were virtually unaffected by the increase in cutaneous penetration of SA in the various delipidized skins. A correlation between the dermal endogenous HVA levels and the cutaneous concentrations of SA was not found in the barrier-damaged skins.

This technique must become an available tool for kinetic analysis in dermis of cosmetic compounds and evaluation of their effects on biological elements in the surrounding dermal tissue.