

# Development of ionic liquids with safety and stability for transdermal absorption and their application to cosmetology materials

**Tatsuya Fukuta**

*Department of Physical Pharmaceutics, School of Pharmaceutical Sciences, Wakayama Medical University*

Ionic liquids (ILs) have attracted attention in the drug delivery fields since ILs achieve solubilization, stabilization, and enhancement of transdermal absorption of a variety of compounds. However, some species of ILs have been reported to exhibit high toxicity when applied to the skin, which poses a major challenge for application to the cosmetology field. Hence, development of new ILs with good performance with safety has been required. In this study, we aimed to prepare new ILs that allows for promotion for transdermal absorption without toxicity. We could prepare ILs by using amine having polyethylene-glycol moieties and geranic acid as cation and anion, respectively. The ILs achieved solubilization of some poorly water-soluble compounds, and also enabled efficient delivery of a macromolecule into the skin without skin damage. These results suggest that these ILs would be applied for cosmetology materials with safety. Also, we could develop ILs composed of an antioxidative compound, edaravone, in which interaction had been formed between edaravone anion and cation molecules. Through *in vitro* and *in vivo* experiments, the edaravone-ILs were shown to exhibit high antioxidative activity similar to edaravone regardless of forming ILs, suggesting that the ILs have a potential to exhibit antioxidative effect for beauty and anti-aging. In conclusion, use of ILs should be a safe and useful approach for transdermal drug delivery and development of new cosmetology materials.