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## Possibility and effectiveness of drug delivery to skin by needle-free injector.

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### Abstract

We evaluated a needle-free injector (NFI), which has been studied as an administration device to the subcutaneous tissue, as a device to deliver drugs into skin tissues. ShimaJet used for self-injection of insulin was selected as a spring-powered NFI in this study. Weak (NFI-w) and strong (NFI-s) injectors were evaluated. Rhodamine 6G, as a model compound, was injected onto the skin surface of hairless rats and the skin distribution and amount released from the skin of the compound were followed. A modified nozzle (able to inject at an angle of 45 degrees ) was prepared in addition to the conventional dedicated nozzle. The spring constants, nozzle shapes and penetration enhancer, 1-[2-(decylthio)ethyl] azacyclopentane-2-one (HPE-101), affected not only the skin distribution, but also the release profiles of rhodamine 6G. In addition, the release profiles of rhodamine 6G after injection using NFI-w or NFI-s obeyed diffusion-controlled or membrane-controlled kinetics, respectively. This difference was probably due to the skin site (depth) of rhodamine 6G delivered by the NFI. Furthermore, HPE-101 increased the retention time of rhodamine 6G in the epidermis. The present results suggested that an NFI can be a useful tool for enhanced drug delivery into skin.

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