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Dissolving microneedles: An attractive approach to transdermal drug delivery

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The microneedle-mediated transdermal delivery system has been developed to provide minimal invasive self-administration method with patient friendly manner. Especially, dissolving microneedles, which deliver the target drugs as the drug-loaded microneedle dissolves into the skin, have been spotlighted recently. Droplet-born air blowing (DAB) fabrication method has advantages in stability with precise dose control because DAB provides quick manufacturing process with ambient temperature. The purpose of this study is to show the characteristics of dissolving microneedles, which were manufactured in our mass production system. Microneedle was fabricated by DAB method. The loaded amount of vitamin C and vitamin B3 was analyzed by HPLC/UV system was used to assay the loaded amount within microneedles; and delivered amount of drug into the skin was analyzed using Franz diffusion cell (Logan, FDC-6T). We optimized the DAB process parameters and scaled up. 350 μm and 500 μm length of HA microneedles were fabricated and dried within 10 min without applying any heat. The stability of EGF within HA microneedle was investigated during 2 months at 25, 45°C and was confirmed. The anti-oxidant was stable within HA microneedle during 2 months at 25°C and 45°C. *In vitro* and ex vivo studies using Franz diffusion cell showed excellent delivery efficiency compared to topical solution. Most of the loaded anti-oxidants was delivered through the skin after 24 hr (98.0±2.0%, n=3). The microneedles dissolution in skin was confirmed, so the drugs within microneedle should be delivered into the intradermal region. Based on the method, we loaded lots of active ingredients with precise dose control, and confirmed the stability of labile drugs such as peptide drugs and anti-oxidants within microneedles. We are investigating the formulations for biopharmaceutics using this platform technology.

Biography

Na Keum Jang received her BS degree in Animal Biotechnology and MS degree at the Department of BIN Fusion Technology, Chonbuk National University, Republic of Korea. Her research interest includes synthesis of polymeric biomaterials for regenerative medicine and sensors applications. Now she is studying microneedle patch for transdermal drug delivery system at Raphas Co. Ltd.

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