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Design, development and investigation of dexamethasone sodium phosphate-containing dissolving microneedle arrays

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Microneedle arrays (MNAs) have been investigated for more than two decades. These tiny matrices consist of a few dozens of sub-millimetre needles which tend to penetrate through the *stratum corneum* layer of the skin and deliver hardly penetrating drugs to the systemic circulation. The application of these dosage forms shows several advantages like simple use and negligible pain caused by needle punctures compared to conventional subcutaneous injections. There are four main types of MNAs: solid, coated, dissolving, and hollow. Dissolving MNAs (DMNAs) look the most promising forms due to their high drug content, biocompatibility, and ease of use [1]. Present study aimed to develop and characterize drug loaded DMNAs using a 3/1/8 type factorial design focusing on the optimization of DMNA production and adequate drug content. For the preparation of DMNAs carboxymethylcellulose and trehalose was used in certain amount as a matrix for dexamethasone sodium phosphate (DEX) [2]. The investigation of the produced DMNAs included mechanical analysis via texture analyzer and optical microscopy, drug content and drug distribution determination with HPLC and Raman microscopy, dissolution studies via HPLC, and *ex vivo* qualitative permeation studies by Raman mapping. It can be concluded, a DEX-containing, mechanically stable, biodegradable DMNA system was successfully developed in two dosage strengths of which both efficiently delivered the API to the lower layers (*dermis*) of the human skin.

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