Polymer hydrogel-based microneedles for metformin release

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Abstract

Drug delivery devices ensure the effective delivery of a broad range of therapeutics to millions of patients worldwide on a daily basis.[1] Microneedles are a class of drug delivery device that provide pain free transdermal delivery with improved patient compliance.[2-4] The release of metformin, a drug used in the treatment of cancer and diabetes, from polymer hydrogel-based microneedle patches was demonstrated in vitro. Tuning the composition of the polymer hydrogels enabled preparation of robust microneedle patches with mechanical properties such that they would penetrate skin (insertion force of a single microneedle to be ca. 40 N). Swelling experiments conducted at 20°C, 35°C and 60°C show temperature dependent degrees of swelling and kinetics (Fickian diffusion). Drug release from the hydrogel-based microneedles was fitted to various models (e.g., zero order, first order, second order, Korsmeyer-Peppas, Peppas-Sahlins), observing the best fit for the zero-order model. Such microneedles have potential application for transdermal delivery of metformin for the treatment of cancer and diabetes.

References

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