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# Formulation and characterization of dissolvable microneedle arrays containing free and nanoencapsulated *ketoprofen*

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In the last decade, a number of different drug delivery systems have been formulated to enhance the transport of therapeutics across the skin barrier. In this study, we combined Dissolvable Microneedles (DMN) and liposomes as simple and minimally invasive strategy to deliver free or nanoencapsulated drug into or across the skin. Physicochemical properties of liposomes, in particular particle surface charge and size, have a significant effect on their permeation and subsequent distribution through microchannels created in the skin by DMN. Hence, the main focus of this work was to assess the effects that microneedle fabrication process may have on liposome characteristics and stability. *Ketoprofen*-loaded liposomes were formulated using thin film hydration, extrusion and lyophilisation methods. Micromolding technique was used to fabricate DMN containing free *ketoprofen* and *ketoprofen*-loaded liposomes. The vesicles surface charge and size were evaluated before and after DMN fabrication and used as a measure of the liposomes ability to maintain their structure during stress conditions of DMN fabrication process. The results revealed that *ketoprofen*-loaded liposomes can be successfully incorporated within DMN and used for microneedle-mediated intradermal and transdermal drug delivery. The rigorous processing conditions during DMN fabrication didn't affect liposomes characteristics. However, the amount of drug that could be delivered using DMN when *ketoprofen* is encapsulated in liposomes is probably not sufficient to achieve a therapeutic effect in comparison to free drug, despite a high *ketoprofen* encapsulation efficiency of 83.9%. Further work is required to improve the loading efficiency of microneedles containing liposomal nanoencapsulated drug and to understand the behaviour of these formulations within the biological environment. Our findings contribute to the further development of effective, painless and minimally invasive technologies for intradermal and transdermal drug delivery.

## Biography

Silvia Mellace is a PhD student at the University of Calabria. Her PhD is in Translational Medicine, with the main research interests in design and characterization of novel micro/nano drug delivery systems for the improvement of therapeutics delivery. In particular, her studies are focused on formulations for topical application. Currently, she is doing an internship at the School of Pharmacy, University College of Cork, investigating in vitro and in silico methods for the effective prediction of drug dermatopharmacokinetics using dissolvable microneedles arrays.

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