Enhanced Transdermal Flux of a Model Dye by its Incorporation into Polylactic-co-glycolic acid (PLGA) Nanoparticles and Microneedle Application

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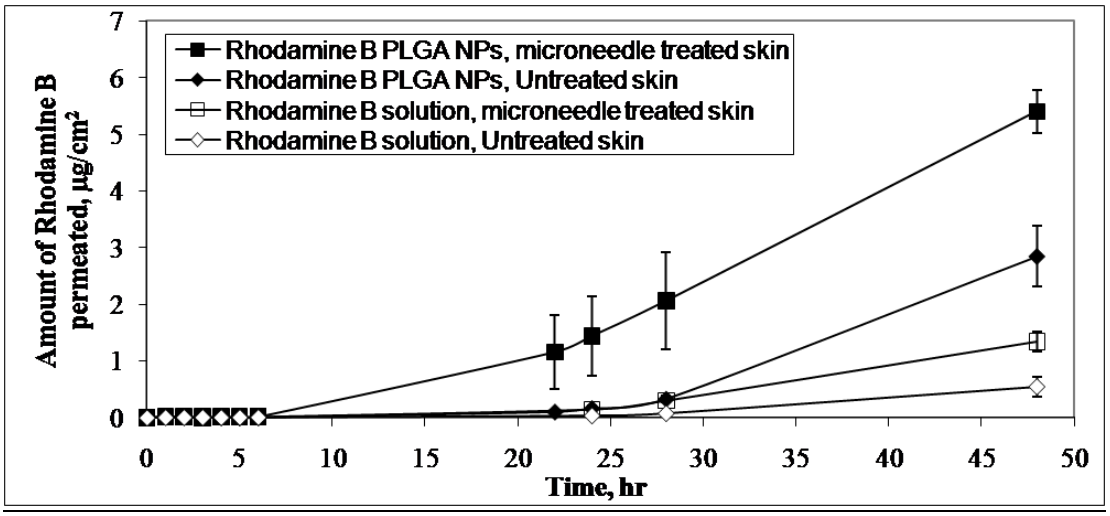
Introduction: The aim was to explore the combined use of MN skin applications and NPs formulations on the transdermal delivery of the model drug, rhodamine B. This is a water–soluble fluorescent dye with a MW of 479Da and logK (oct/water) of ~2[1].

Methods: PLGA nanoparticles (NPs) of ~100 nm diameter, loaded with rhodamine B, were prepared using an emulsion-diffusion-evaporation technique[2]. These NP suspensions were deposited on microneedle (MN)-pretreated full-thickness pig skin samples mounted in Franz cells. Three different control experiments were also undertaken. One consisted of skin samples that had not been MN-pretreated but were exposed to NPs-bound dye. Another control consisted of MN-treated skins exposed to a NPs-free solution containing an equivalent total concentration of rhodamine B. The third control consisted of untreated skin exposed to the NPs-free equivalent dye solution. In all cases, dye permeation was fluorescently assayed and plotted over 48h.

Results:



It can be seen that the combination of MN skin pretreatment and use of the NP-bound dye formulation yielded maximal transdermal flux. We are now conducting further investigations in order to determine the mechanisms involved.

References:

[1] Guss R et al., Invest Opthal Vis Sci 1984; 25: 758-762
[2] Mittal G et al., J Control Rel 2007; 119: 77-85