

Fabrication of nanoparticles for delivery across microneedle microporated ocular tissues

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Nanoparticles (NPs) have the advantages of targeted drug delivery for extended periods and being patient friendly. This is crucial in chronic ocular diseases where continuous treatment is required to maintain the therapeutic concentration for a prolonged time. Improved delivery of NPs by loading in microneedle (MN) arrays was demonstrated by many research groups. Conventional rhodamine B-loaded poly(lactic-co-glycolic acid) (PLGA) NPs were fabricated by the solvent displacement method. The delivery of the particles was investigated using [confocal laser scanning microscopy](#) after application of the MN-NP dual delivery system. The images showed deeper fluorescence in the scleral tissue and localisation around the pores formed in the cornea after the application of MNs. Polymer based MN arrays were investigated in this study for the [intrascleral delivery](#) of rhodamine B-loaded NPs. The MNs were rigid after the application of different mechanical forces (Figure 1). Franz cell diffusion model was utilised to study the distribution of rhodamine B in ocular tissue, after the delivery of the MN-NP dual delivery system. Confocal microscopy imaging showed a more intense and deeper distribution of the particles in the scleral tissue, and there was localisation around the micropores created on the surface of the scleral tissue. Microporation of the corneal tissue showed localisation of the fluorescence around the micropores. Clinically, this would be of considerable value to be able to deliver a depot of the drug by deposition of [drug-loaded NPs](#) in the micropores formed in the sclera.



Figure 1: Optical microscope images showing MN-NP dual system.

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1. Adwan, S., Abu-Dahab, R., Al-Bakri, A. G., & Sallam, A. (2015). Glycerol monooleate-based otic delivery system of ofloxacin: release profile and bactericidal activity. *Pharmaceutical development and technology*, 20(3), 361-366.
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Biography

Samer Adwan has completed his PhD at the age of 37 years from Queens University Belfast School of Pharmacy. He is working as assistant professor at Zarqa University School of Pharmacy. His research interest involves investigation of novel technologies and drug delivery systems for the treatment of ophthalmic diseases.

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