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Fractional ER: YAG laser as a novel method for enhancing ocular drug permeation

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Ocular drug delivery is currently one of the most challenging areas in modern drug delivery due to the unique anatomy and physiology of the eye and the presence of the ocular barriers. Accordingly, novel drug delivery methods have been investigated to enhance ocular drug permeation and increase the intraocular bioavailability. In this project, P.L.E.A.S.E. (Precise Laser Epidermal System; Pantec Biosolutions AG) laser technology was investigated, for the first time, to enhance ocular drug permeation. Two effects were revealed after laser treatment of ocular tissues. At high fluences, micropores were created with scar formation around the pores due to the photo thermal effect of laser radiation. Lower fluences showed the formation of shallow pores and the disruption of the collagenous structure of ocular tissues. The effect of increasing the fluence and density of applied laser was investigated. Confocal microscopy studies revealed more intense dye distribution of rhodamine B, FITC-Dextran 70 KDa and FITC-Dextran 150 KDa after laser application. The transscleral and transcorneal permeation of rhodamine B was increased after laser application of 8.9 J/cm² fluence and increasing the density of laser application. The transscleral water loss studies showed increased water loss after laser application which was decreased after 6 hours of application. As a conclusion, fractional ER: YAG laser is a promising and safe microporation technique that can be used to enhance the permeation of topically applied drugs. Tissue imaging, permeation, distribution studies and transscleral water loss studies showed that the laser application at low energies is promising for enhancing ocular drug permeation.

Biography

Samer Adwan has completed his PhD 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 otic and ophthalmic diseases.

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