NUS National University of Singapore | Department of Pharmacy Faculty of Science

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S4A Level 3 Rooms A & B

Ophthalmic Drug Delivery Systems: Formulation considerations using polymeric biomaterials

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Biography: Dr. Yashwant Pathak completed his education M.S., Ph.D. in Pharmaceutical Technology from India and EMBA and MS Conflict Management from Sullivan University, USA. He is Associate Dean for Faculty Affairs at the newly launched College of Pharmacy, University of South Florida. Tampa, Florida. With extensive experience in academia and industry, he has over 150 publications research papers, abstracts, chapters and reviews, 7 books in Nanotechnology and drug delivery systems, 6 in Nutraceuticals and several books in cultural studies. His areas of research include drug delivery systems, nanotechnology applications in pharmacy and Nutraceuticals. He has travelled extensively over 80 countries and is actively involved with many Pharmacy colleges in different countries.

Abstract: Ocular drug delivery presents unique challenges due to specific attributes of the eye. Layers of tissue, blood barriers, choroidal flow, lymphatic drainage and lacrimation are some of the factors that limit therapeutic concentrations of drugs from reaching diseased tissues. Currently, my lab research is being directed towards the identification and discovery of drug delivery systems such as nanoparticles, liposomes, and adhesive gels to circumvent barriers and obtain sustained levels of therapeutics at target ocular sites. Ocular biocompatibility and ocular biodegradability are one of the few important characteristics which dictate the selection of such polymeric materials to be used as ODD carriers. In our study, triamcinolone acetonide (TA) was encapsulated by poly (ethylene glycol)-ylated (PEGylated) poly-(lactide-co-glycolide) (PLGA) nanoparticles (NPs) and incorporated into a PLGA-PEG-PLGA thermoreversible gel. The TA-loaded NPs showed an average particle size of 208.00±1.00 nm and polydispersity index of 0.005±0.001. The 20% (w/v) thermoreversible gel was prepared using the cold method. *In vitro* release analysis demonstrated that free TA was completely released within 48 hours; whereas 94% of TA was released from drug delivery system after 7 days. We also investigated a sustained drug delivery system to minimize injection frequency and circumvent the related side effects utilizing loteprednol etabonate, poly(ethylene glycol)-ylated (PEGylated) poly-(lactide-co-glycolide) (PLGA) nanoparticles (NPs) and a PLGA-PEG-PLGA thermoreversible gel. The loteprednol NPs were then incorporated into a 20% (w/v) thermoreversible gel prepared using the cold method.Characterization data showed an average particle size of 168.60 ± 23.18 nm, polydispersity index of 0.0142 ± 0.0023 nm, and encapsulation efficiency of 82.6%. Preliminary *in vitro* release results demonstrated a 5.48% release of free loteprednol and 3.08% from the drug delivery system after 24 hours. The proposed delivery system for loteprednol could be an effective sustained release treatment for ocular dysfunction.

Hosted by A/P Giorgia Pastorin