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## Nanoparticulate ophthalmic drug delivery systems using polymeric thermo-reversible materials

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Ocular drug delivery (ODD) presents unique challenges due to specific attributes of the eye. Currently, our lab research is focused to identify ODD such as nanoparticles, using thermo-reversible gels. Nanotechnology offers advantage in ODD. The ocular route of drug delivery is determined based on disease application. Ocular biocompatibility and biodegradability are important characteristics in the selection of polymers for ODD. In our study, triamcinolone acetonide (TA) was encapsulated by PLA-PEG-PLGA nanoparticles (NPs) and further incorporated into a PLGA-PEG-PLGA thermo-reversible gel. The TA-loaded NPs were prepared by nano-precipitation and were characterized. 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) thermo-reversible gel was prepared using the cold method. MTT cytotoxicity data showed that the drug delivery system was not cytotoxic on ARPE-19 cells as opposed to an equivalent concentration of TA alone. 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. Other drug we used Loteprednol Etabonate (LE), PLA-PEG-PLGA nano particles (NPs) and a PLGA-PEG-PLGA thermo-reversible gel. The LE-loaded NPs were prepared using the nano-precipitation method. The LE-NPs were then incorporated into a 20% (w/v) thermo-reversible 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%. MTT cytotoxicity data showed that the drug delivery system had no effect on cell viability in human retinal pigment epithelial cells (ARPE-19) after 24-hour exposure. In vitro release results demonstrated a 5.48% release of free Loteprednol and 3.08% from the drug delivery system after 24 hours. In vivo studies conducted in mice shown positive results in reduction of macular degeneration.

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