

## Eudragit® Nanoparticles Based on Drug–polymer Coprecipitation for Ocular- Controlled Delivery of Erythromycin: In-vivo Evaluation in Rabbit

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### Abstract

**Introduction:** Frequent use of highly concentrated solutions may induce toxic side effects and cellular damage at the ocular surface. To enhance the amount of active substance reaching the target tissue or exerting a local effect in the cul-de-sac, the residence time of the drug in the tear film should be lengthened. The purpose of the study was to formulate biodegradable film loading nanoparticles (NPs) as ophthalmic insert, which could be easily placed into the cul-de-sac, and be capable of delivering therapeutic concentrations of Erythromycin for a prolonged period of time in a much lower dose.

**Methods and Results:** A Novel quasi-emulsion solvent diffusion method to prepare the controlled-release nanoparticles of drug model with Eudragit polymers has been developed. FTIR and scanning electron microscopy (SEM), loading analyses of the nanoparticles, mechanical properties, water vapor permeability, thermal stability of the films were analyzed. An agar well diffusion bioassay method for determination of erythromycin in ophthalmic samples, using *Micrococcus Luteus* ATCC 9341 as the assay organism, was carried out. In vivo studies were performed in New Zealand albino rabbits using a film loading nanoparticles. SEM revealed irregularly shaped particles. Mean particle size of nanoparticles ranged between 118 and 203 nm, while zeta potential ranged between +15 and +22 mV. The inserts were found to be uniform, tough, elastic and bioadhesive. In-vitro release studies were performed and slowed release up to 28 h with non-Fickian diffusion behavior. Drug levels in the ocular tears in rabbit were significantly higher in comparison to treatment with a pomade formulation.

**Conclusions:** Erythromycin NPs loaded Eudragit were successfully prepared by spontaneous emulsification technique. The insert would degrade during the specified time with no residue to be removed after the medication.

**Keywords:** Nanoparticles, Ophthalmic drug delivery, Ocular insert, Erythromycin