In Vitro Evaluation of Cyclosporine: A Loaded Nano-Decorated Ocular Implant Formulations
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Purpose
Biodegradable implant systems have several advantages for ocular drug delivery; such as providing constant drug concentration at the target site, minimum systemic side effects, require no removal process. In this study the aim was to develop a sustained release nanoparticle loaded implant system to deliver Cyclosporine A (CsA) following subconjunctival implantation.

Methods
Two different nanoparticle formulations were prepared by solvent evaporation technique, using poly-lactide-co-glycolide (PLGA) 85:15 and Poly-\(\varepsilon\)-caprolactone (PCL). PLGA and PCL nanoparticles loaded implants were prepared by molding method using two different polymers, which were PCL and Poly-L- Lactide-Co-Caprolactone (PLLC). Morphology of the implants was investigated by scanning electron microscopy (SEM). Drug loading efficiency of the implant formulations was calculated. The in vitro degradation and in vitro release studies were performed for implant formulations and f1-f2 values were calculated. Cytotoxicity of formulations was also evaluated by MTT test using L929 fibroblast cells. One way ANOVA was performed using SPSS for statistical analysis of cell culture studies.

Results
SEM micrographs showed that the nanoparticle structure was kept in the implant formulations and the loading efficiency values were between 80.75 - 100.52%. The change in the pH values was observed for 60 days and the results showed that the pH values decreased from 7.4 to 7.25 according to the acidic degradation of the polymers. In vitro release studies indicated that the release from the formulations continue up to 60 days and slower drug release was observed in PCL nanoparticles loaded implant formulations. The cell viability was found between 77.4 - 99.5 % and the results were found to be similar according to the one way ANOVA.

Conclusion
The in vitro characterization studies were found to be promising for sustained release subconjunctival application. In vivo studies will be performed in dry eye mouse model to investigate the efficacy of the formulations.

This study was financially supported by the “Research Grant TUBITAK 111S136”.