00468 Bio-inspired Epsilon Polylysine (ePL) Coated Antimicrobial Contact Lenses

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Aims: The overall objective is to develop simple and durable antimicrobial contact lenses using bioinspired catecholamine coating. To evaluate optical properties, antimicrobial activity and in vitro and in vivo biocompatibility of εPL- coated lenses.

Methodology: Standardised contact lenses, 1-DAY ACUVUE® MOIST of power -3.00, base curve of 8.5 mm and diameter of 14.2 mm, were coated in a shaking incubator with varying concentrations of εPL and dopamine. The antimicrobial properties of εPL- coated and bare lenses were assessed via microbroth growth dilution assays against strains of Staphylococcus aureus, Methicillin-resistant Staphylococcus aureus, Pseudomonas aeruginosa, Candida albicans and Fusarium species. The εPL- coated lenses were exposed to human conjunctival epithelial cells and corneal fibroblasts for 24 hours and the biocompatibility was ascertained by adenosine triphosphate (ATP) and lactate dehydrogenase (LDH) assays. To confirm that light transmittance through the εPL- coated lenses was not significantly altered, ultraviolet–visible spectroscopy (UV-VIS) tests were performed. In vivo studies were also conducted over a period of 7 days on rabbit models (n=4 rabbits/group) to monitor for any changes in the intraocular pressure (IOP), ocular surface and corneal inflammation.

Result: εPL- coated contact lenses displayed > 2-7 log10 decrease in the viability of various Grampositive, Gram-negative and fungal pathogens in comparison to bare contact lenses. The εPLcoated lenses were non-cytotoxic for both epithelial and fibroblast cells, as ≥80% viability was observed. No loss of transparency after coating was also noted. Images captured from in vivo studies showed that εPL- coated lenses did not show any apparent adverse effects on ocular surface and corneas as compared to bare lenses. Normal IOP (15-23 mmHg) was also maintained throughout the course of the study.

Conclusion: εPL- coated lenses prove to be biocompatible in vitro and in vivo and display antimicrobial properties against common ocular surface pathogens without compromising optical transparency.