## 00032 Nano-hydroxyapatite Coating on the Optic of a Corneal Prosthesis Induces Mild Tissue Responses and Improves Biointegration of the Host Cornea

*Andri Riau[1], Nyein Chan Lwin[1], Bo Liedberg[2], Subbu Venkatraman[2], Jodhbir Mehta[3]*

[1]Singapore Eye Research Institute, [2]Nanyang Technological University, [3]Singapore National Eye Centre

**Aims:** Biointegration of a keratoprosthesis (KPro) occurs between the haptic skirt (corneal graft) and the central optical cylinder (PMMA) and is critical in reducing various post-operative complications. We have recently established a new dipcoating method to immobilize hydroxyapatite (HAp) nanoparticles on the PMMA surface. In this study, we aimed to evaluate the safety, tissue responses, and biointegration of the HAp-coated PMMA in rabbit corneas.

**Methodology:** We coated HAp nanoparticles on 3-mm diameter, 380-µm thick PMMA optical cylinders and implanted them in the corneal stroma of the rabbits (n=4). Some rabbits were implanted with non-coated PMMA to serve as controls (n=4). The rabbits were followed-up for 5 weeks. Following euthanization of the animals, tissue responses were studied by immunohistochemistry.

**Result:** In vivo confocal microscopy revealed no toxicity to the epithelial, stromal, and endothelial cells around the HAp-coated and non-coated implants. However, there were more stromal cells found migrating near the wall of the coated implants at week 5 compared to that of the non-coated implants. Fundus photography showed no changes to the optic nerve and retina over the duration of follow-up in both groups. Immunohistochemical staining of the corneal tissues revealed higher expression of wound healing markers (fibronectin and tenascin-C), fibroblast marker (Thy-1), myofibroblast marker (α-smooth muscle actin) and inflammatory marker (CD18), and more TUNEL-positive cells at the interface between the non-coated PMMA and tissue.

**Conclusion:** The results suggested that the coating is biocompatible in vivo and the corneas elicited a milder response to the HAp-coated PMMA surface than to the non-coated surface. The milder tissue responses and the presence of stromal cells near the HAp-coated surface were an indication of the improved biointegration of the HAp-coated cylinders with the host corneas. A further safety and device performance study in non-human primates using clinical KPro that has been dipcoated with HAp nanoparticles is now warranted.