Viability of Preloaded Descemet Membrane Endothelial Keratoplasty Grafts with 96-Hour Shipment

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Conflict of interest statement

Competing interests: CC, EC, KAB and AOE have ownership interest in Treyetech.

Abstract

Purpose: To assess safety and compare the effects of 96-hour shipment of Descemet membrane endothelial keratoplasty (DMEK) grafts as a scroll or a tri-fold on cell viability.

Methods: DMEK grafts were prepared at the Rocky Mountain Lions Eye Bank. Twenty pre-stripped DMEK grafts, paired from 10 donors, were either tri-folded in an endothelium-in configuration using microforceps and loaded into a plastic Treyetech cartridge, or suctioned in a scrolled endothelium-out configuration into a modified Jones tube. Transport conditions were simulated for 96 hours by shipping packaged grafts to a secondary location and back, for 48 hours each way. After shipping, grafts were removed from inserters onto glass slides and unfolded using viscoelastic with endothelium facing upwards. Calcein AM stained grafts were imaged with a fluorescent microscope and endothelial cell loss (ECL) was measured using trainable segmentation in Fiji by a masked grader.

Results: A total of 20 grafts were shipped for 96 hours, split between preloaded tri-folded (n=10) and preloaded scrolled (n=10) tissues. No significant difference in endothelial cell loss was observed across groups after prolonged shipping (14.8% vs 13.7% ECL respectively, p=0.68).

Conclusion: For preloaded DMEK after 96 hours, both scrolled and tri-folded tissue demonstrated clinically acceptable levels of ECL. The data suggest a wider window of time for endothelial cell viability and is promising for the prospect of international shipment of preloaded grafts.