RELIABILITY AND EFFICIENCY OF CORNEAL THICKNESS MEASUREMENTS USING STERILE DONOR TOMOGRAPHY IN THE EYE BANK

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Purpose To evaluate the reliability and efficiency of sterile corneal thickness measurements of donor corneas stored in a plastic culture flask filled with organ culture medium I (MI) or II (MII) based on tomographic data using two different software: the built-in software of the anterior segment OCT (AS-OCT) and a MATLAB self-programmed software.

Methods Twenty-five (25) donor corneas (50%) stored in MI and 25 (50%) in MII were imaged 5 times consecutively using an AS-OCT. The central corneal thickness (CCT) was measured both with the manual measurement tool of the AS-OCT (=CCTm) and with a MATLAB self-programmed software allowing (semi-)automated analysis (=CCTa). We analyzed the reliability of CCTm and CCTa using Cronbach’s alpha (α) and Wilcoxon signed-rank test.

Results Concerning CCTm, 68 measurements (54.4%) in MI and 46 (36.8%) in MII presented distortions in the imaged 3D-volumes and were discarded. Concerning CCTa, 5 (4%) in MI and 1 (0.8%) in MII were not analyzable. The mean (± SD) CCTm was 1129 ± 6.8 in MI and 820 ± 5.1 μm in MII. The mean CCTa was 1149 ± 2.7 and 811 ± 2.4 μm, respectively. Both methods showed a high reliability with a Cronbach’s α for CCTm of 1.0 (MI/MII) and for CCTa of 0.99 (MI) and 1.0 (MII). Nevertheless, the mean SD of the 5 measurements was significantly higher for CCTm compared to CCTa in MI (p = 0.03), but not in MII (p = 0.92).

Conclusions Sterile donor tomography proves to be highly reliable for assessment of CCT with both methods, however, due to frequent distortions regarding the manual method, the (semi-)automated method seems to be more efficient and should be preferred.

CELL VIABILITY AFTER DMEK PREPARATION

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Purpose To evaluate the effect of graft preparation and organ culture storage on endothelial cell density (ECD) and viability of Descemet membrane endothelial keratoplasty (DMEK) grafts.

Methods DMEK grafts (n=27) were prepared at Amnitrans EyeBank Rotterdam from 27 corneas (15 donors) that were eligible for transplantation but could not be allocated due to the COVID-19-related cancellation of elective surgeries. Cell viability (by Calcein-AM staining) and ECD of 5 grafts originally scheduled for transplantation, were evaluated on the originally planned surgery day, whereas 22 grafts from paired donor corneas were evaluated either directly post-preparation or after 3-7 days of storage. ECD was analyzed by light microscopy (LM ECD) and Calcein-AM staining (Calcein-ECD).

Results Light microscopy (LM) evaluation of all grafts showed an unremarkable endothelial cell monolayer directly after preparation. However, median Calcein-ECD for the 5 grafts initially allocated for transplantation was 18% (range 9.73%) lower than median LM ECD. For the paired DMEK grafts, Calcein-ECD determined by Calcein-AM staining on the day of graft preparation and after 3-7 days of graft storage showed a median decrease of 1% and 2%, respectively. Median percentage of central graft area populated by viable cells after preparation and after 3-7 days of graft storage was 88% and 92%, respectively.

Conclusions Cell viability of most of the grafts will not be affected by preparation and storage. Endothelial cell damage may be observed for some grafts within hours after preparation with insignificant additional ECD changes during 3-7