costly inefficiencies exist in the current fragmented donation and transplantation ecosystem: systems operate in silos without seamless sharing of key data. A modern, interoperable digital system can directly increase the number of eyes procured and transplanted.

**Methods** We hypothesize that the use of the comprehensive iTransplant™ platform increases the number of eyes procured and transplanted. The platform is a modern web-based system which provides comprehensive workflow coverage for eye banking, advanced communication tools, a portal for eye surgeons to submit requests, and secure digital interfaces with external systems such as hospital EMRs, medical examiner/coroner case management systems, and laboratory LIS systems. With these interfaces, referrals, hospital charts and test results are received securely in real-time.

**Results** At over 80 tissue and eye banks in the United States, the use of iTransplant™ has led to a significant increase in referrals and eyes transplanted. Over a period of 19 months in 1 hospital system, during which the major only process change was the adoption of the iReferral™ electronic interface to automate donor referrals, the annualized average shows a 46% increase in referrals and a 15% increase in tissue/eye donors. Over the same time period, the integration with lab systems saved over 1,400 hours of staff time and increased patient safety by eliminating manual transcription of lab results.

**Conclusions** Continued successful results are achieved internationally in increasing the number of procured and transplanted eyes as a result of: (1) the automated, seamless, and electronic receipt of referrals and donor data by eye banks in their iTransplant™ Platform, (2) the elimination of manual data transcription, and (3) the increase in the quality and timeliness of patients’ data being available to donation and transplantation professionals.

### Theme 3 – Corneal storage and microbiological safety measures before/after transplant

**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 1129.1 ± 6.8 in MI and 820.2 ± 5.1 μm in MII. The mean CCTa was 1149.2 ± 27.6 and 811.2 ± 24 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-AM-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-AM-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
days of graft storage. Implementing an additional post-preparation step in the eye bank to evaluate cell density before graft release for transplantation may help to reduce postoperative DMEK complications.

**Abstracts**

**18 A PORCINE CORNEA AND LAMELLAR TISSUE MODEL TO INVESTIGATE EFFECTS OF STORAGE CONDITIONS ON CORNEAL PRESERVATION**

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Background
globally, more than 12 million people are awaiting corneal transplantation and corneal donor reduction has been observed since the outbreak of the COVID-19 pandemic, negatively influencing the availability of human corneas for research purposes as well. Therefore, the exploitation of ex vivo animal models in this field is of great value.

The present study aimed at the development of a novel experimental model of porcine cornea ex vivo and lamellar tissue preparation to investigate the effects of storage conditions on corneal preservation.

Methods
Twelve fresh porcine eye bulbs were disinfected by immersion in 10 mL of 5% povidone-iodine under orbital mixing for 5 minutes at room temperature. The corneoscleral rims were dissected, and stored in Tissue-C (Alchimia S.r.l., mixing for 5 minutes at room temperature. The corneoscleral rims were dissected, and stored in Tissue-C (Alchimia S.r.l., n=6) at 31°C and in Eusol-C (Alchimia S.r.l., n=6) at 4°C up to 14 days.

The evaluation of Endothelial Cell Density (ECD) and endothelial mortality was performed using vital dye Trypan Blue staining (TB-S, Alchimia S.r.l.). Digital 1X pictures of dissected endothelial lamellae were taken and the endothelial morphology were evaluated at day 0, 3 and 14 days.

Medium turbidity detected by naked eye was considered as proof of tissue contamination.

Additionally, non-vital staining of the endothelium with Alizarin Red (AR) was performed and the endothelial morphology was investigated at day 14 in both whole corneas and dissected endothelial lamellae.

Results
The contamination rate of porcine corneas corresponded to <10% and 0% in Tissue-C and Eusol-C after 14 days, respectively.

Porcine corneas stored in Tissue-C and Eusol-C showed <10% and <20% mortality in Tissue-C and Eusol-C respectively at the end of storage.

Preliminary ECD determination (range 3700-4100 cells/mm2) at Day 0 aligned with data present in the literature (Meltendorf et al., Graefe’s Arch Clin Exp Ophthalmol, 2007).

Whole cornea and dissected lamellae stained with TB and AR showed comparable endothelial morphology after incubation in Tissue-C and Eusol-C for 14 days. The lamellar tissue allowed endothelial morphology analysis at higher magnification compared to whole cornea.

Conclusion
The presented ex vivo porcine model allows evaluation of the performance and safety of storage conditions. Future perspectives of this method will be the extension of the porcine corneas storage up to 28 days.

19 KILLING EFFICACY OF A NEW HYPOTHERMIC CORNEAL STORAGE MEDIUM KERASAVE AT 4°C AGAINST NINE MICRO-ORGANISMS FREQUENTLY FOUND IN DONOR CORNEAS

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Purpose
The aim of the present study was to determine the killing efficacy of Kerasave (AL.CHI.MI.A Srl), a corneal cold storage medium provided with antimycotic tablet against nine contaminants associated corneal infections.

Methods
The killing efficacy of Kerasave was determined after 0, 3 and 14 days of incubation at 4°C in Kerasave after inoculation of the medium with 10(5)-10(6) (CFU) of Candida albicans (CA), Fusarium solani (FS), Aspergillus brasiliensis (AB), Staphylococcus aureus (SA), Enterococcus faecalis (EF), Bacillus subtilis spizizenii (BS), Pseudomonas aeruginosa (PA), Enterobacter cloacae (EC) and Klebsiella pneumoniae (KP).

Log10 reductions at different time intervals were determined by the serial dilution plating technique.

Results
After 3 days, Kerasave induced the highest log10 decrease in the concentrations of KP, PA, CA and EC. The 2 log10 decrease was observed for SA and EF. The lowest log10 decrease was observed in BS, AB and FS concentrations. After 14 days, the microbial count of CA, FS, SA, EF, PA and EC further decreased.

Conclusions
Corneal cold storage medium Kerasave effectively reduced the microbial concentration of almost all tested microorganisms after 3 days and represents a valuable tool to control the microbial contamination of human donor corneas intended for transplantation.

20 FACTORS INFLUENCING THE DISCARD OF CLINICAL TISSUE AND NHSBT METHODS TO MAINTAIN A LOW DISCARD RATE

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Introduction
NHS Blood and Transplant Tissue and Eye Services (TES) is a human multi-tissue, tissue bank supplying tissue for transplant to surgeons throughout the UK. NHSBT has two Eye Banks. These are NHSBT Filton, based in Bristol and NHSBT David Lucas Eye Bank, which is based in Speke Liverpool.

Materials and Methods
NHSBT monitors our monthly discard rates with the aim to review for any patterns. Due to the NHSBT Eye Banks using a computer system called PULSE we can categorise all our discard for further analysis. Focusing on key areas such as Contamination, Corneal Assessment failure such as Low Endothelial Cell count, Medical deferrals and blood sample quality.

Results
2019- NHSBT Procured 5705 Eyes and Issued 4725. This is a discard rate of 19%.
2020- NHSBT Procured 3725 Eyes and Issued 2676. This is a discard rate of 28%.
2021- NHSBT Procured 4394 Eyes and Issued 3555. This is a discard rate of 19%.

Based on the EEBA Statistical report of Eye Banking Activity in Europe for 2019- 42663 Eyes/Corneas in situ were