cheaper, environmentally friendly and would reduce the overall traffic load.

**Methods** We conducted an interdisciplinary workshop as part of a larger project called EULE (European UAV-based solutions for transportation of medical goods), funded by the German Ministry for Digitalization and Traffic (BMV), Together with the Cornea Bank based at the RWTH University Hospital in Aachen, Germany and several project partners specialized in drone technology and aerial transportation, we identified the specific requirements of such a concept.

**Results** Typical transport routes have been identified that correspond to the range of the UAV. Initially, the payload area of the intended flight system was too small. As a result, the transport vessel for corneal tissue had to be downsized to be placed horizontally in the payload area. Also, the packaging material needed to be modified for the same reason. In addition, sensors had to be integrated to monitor the conditions during transport.

**Conclusion** Because of the mentioned modification in the transportation packaging and the lack of clarity on possible side effects of this novel kind of transportation on human corneal tissue, a field study needs to be conducted on corneal samples not intended for transplantation to evaluate the proposed concept. We plan on conducting 20 test flights and compare the condition of corneal tissue samples before and after each flight. Also, paired corneal samples will be transported by a car in a control group. We will begin with the first test flights after acquiring permission to fly on the designated route, expected in first quarter of 2023.

## EEBA 2023 Session VII – Surgical Innovations and Clinical Outcomes

### P42-A105 STERILE DONOR TOMOGRAPHY FOR IMPROVEMENT OF REFRACTIVE RESULTS AFTER KERATOPLASTY

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**Purpose** To evaluate the efficiency of using anterior segment optical coherence tomography (AS-OCT) as a non-invasive and sterile screening method in the eye bank to detect corneal grafts with curvature and/or thickness anomalies, thus improving the graft selection for corneal transplantation.

**Methods** 1222 donor corneal tissues mounted in sterile organ culture flasks were imaged using an AS-OCT (CASSIA 2 – Tomey, Nagoya, Japan) between January 2018 and September 2022. The corneal tissues were preserved at least 12 hours in organ culture medium 2 (containing 6% dextran T-500) before the measurement in order to allow deswelling prior to the examination. Depth scans were performed sterilely through the organ culture flask from the posterior surface of the corneal tissues within a 7 mm central zone to create 3D volume data. The volume data set was imported to MATLAB (MathWorks Inc., Natick, Massachusetts, USA) and, after preprocessing the data and defining the region of interest (ROI), the edge of the front and back surfaces of the corneal tissues was detected. Subsequently, the adaptation of a spherocylindrical surface model was carried out with raytracing. The radii of curvature for the front and back surfaces and the central corneal thickness were determined according to the method proposed by Mäurer, Eppig, Langenbucher et al at the Institute of Experimental Ophthalmology, Homburg/Saar, Germany.

**Results** The mean steep/flat front surface radius was 7.46 ± 0.29 (6.07 – 9.29)/7.69 ± 0.24 (6.70 – 9.50) mm, the corresponding values for the back surface being 6.48 ± 0.32 (5.30 – 8.00)/6.80 ± 0.31 (5.81 – 8.00) mm and the mean central thickness was 611.5 ± 85.6 (378.5–1457.2) µm. Anomalies (beyond ± 2 or ± 3 standard deviations SD) were found in 111 or 41 corneas (9.1% or 3.4%) for anterior surface curvature, 135 or 38 for corneas (11.0% or 3.1%) for the posterior surface, and 53 or 15 corneas (4.3% or 1.2%) for central corneal thickness.

**Conclusion** The AS-OCT provides an objective, sterile and semi-automated screening method to identify corneal morphological and refractive alterations (e.g., keratoconus, status post keratorefractive surgery) to further optimize corneal donor selection in the eye bank. Corneal donors with curvature or thickness anomalies +/- 3 SD (eminence-based) do not have to be discarded but can be used for posterior lamellar keratoplasty, especially DMEK in Germany.

### P43-A106 EYEBANK STRIPPED VS. SURGEON STRIPPED TISSUE FOR DMEK

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During the recent years Descemet membrane endothelial keratoplasty (DMEK) has replaced penetrating keratoplasty and more or less Descemet stripping automated endothelial keratoplasty (DSAEK) as the goldstandard for the treatment of endothelial corneal diseases. Following DMEK the clinical recovery is faster and patients reach higher visual acuities with a lower risk for graft rejection. However, the technique of preparing the graft for DMEK is more demanding and less standardised than the preparation of a DSAEK graft. Therefore, the preparation may take longer and risk of a preparation failure seems higher. For this reason surgeons look for prestripped tissue for DMEK to avoid the potential inconveniences with the graft preparation. However, prestripped tissue might not always be advantageous as the graft might loose endothelial cells during storage and transportation and the surgeon is not aware of the specific properties of the graft. Advantages and disadvantages of eyebank stripped and surgeon stripped tissue will be discussed.

### P44-A104 LOGISTICS AND RESULTS WITH PRECUT AND PRELOADED GRAFT FOR DMEK

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**Purpose** Descemet membrane endothelial keratoplasty (DMEK) preparation is technically demanding and is a limiting factor for uptake of this kind of surgery. Supply methods that simplify the procedure for surgeons are key to increasing uptake.
In this talk logistics and outcomes of Eye bank prepared DMEK tissue will be presented.

**Methods** Laboratory studies of two different shipping protocols for DMEK (endothelium trifolded inwards and endothelium rolled outwards) will be presented. Clinical outcomes and complications of patients underwent to DMEK surgery with Eye bank prepared or surgeon prepared tissue will be presented. A Cost analysis of eye bank versus surgeon prepared endothelial grafts will be also part of the presentation.

**Results** There was no difference in endothelial cell viability between surgeon or eye bank prepared tissue. Surgeon-stripped DMEK grafts in the laboratory investigation showed significantly higher elastic modulus and adhesion force compared to prestripped and preloaded tissues (p<0.0001). In the clinical data, rebubbling rates of 48%, 40% and 15% were observed in preloaded, prestripped and surgeon-stripped DMEK grafts, respectively. The cost analysis showed that eye bank prepared tissues had higher surgical expenses compared to those prepared by the surgeon, while the post-operative care expenses were similar between the two groups.

**Conclusion** The Eye bank prepared tissues are a valid alternative to Surgeon prepared tissue, however need to be highlighted that with current method there is a decreased adhesion forces and elastic modulus in eye bank prepared tissues that may contribute to increased rebubbling rates.

**P45-A154** **DMEK IN COMPLICATED EYES: INFLUENCE OF DONOR CHARACTERISTICS, OUTCOMES, AND PROGNOSIS**

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Descemet membrane endothelial keratoplasty (DMEK) has become the goldstandard in the treatment of Fuchs endothelial corneal dystrophy and early stages of (pseudophakic) bullous keratopathy due to the safer ‘closed globe’ surgery, the fast and excellent visual recovery and low complication rates. In those cases, DMEK can often be performed in a standardized manner. Given the outstanding clinical outcomes, the spectrum of indications has expanded in the past years; thus, also more complex cases, such as eyes with advanced corneal edema, altered anterior chamber anatomy, failed lamellar grafts, failed penetrating keratoplasty, as well as, phakic, aphakic and vitrectomized eyes are being treated with DMEK. Although DMEK surgery in complicated eyes proved feasible, the procedure is technically more challenging because of the impaired visualization during surgery and the unpredictable graft behaviour. Surgical strategies to accomplish DMEK in complex eyes have been suggested and customization of recipient/donor characteristics (donor age, graft size) may facilitate the surgery. Still, clinical outcomes appear not as good as in standard indications and there is uncertainty concerning the long-term graft survival.

**P46-A156** **OUTCOME AFTER DMEK: RESULTS FROM THE PROSPECTIVE DUTCH REGISTRY**

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The European Cornea and Cell Transplantation Registry (ECCTR) is a multi-national database for corneal transplantation surgery. ECCTR is co-founded by the Health Programme of the European Union, the European Society of Cataract and Refractive Surgeons (ESCRS), EuCornea and the European Eye Bank Association (EEBA). Objectives of the database are to ascertain donor tissue availability, and to analyse the safety, quality, and efficacy of corneal transplantation based on real-world outcomes including patient reported outcome measures.

We describe a web-based system with a software interface for the input and output of data relating to eye banking and corneal transplantation surgery. Output of reports or export of own data is available on the web. Data is anonymous to all users, with the exception that reporting eye banks and surgeons have access to their own data. The system was designed to allow both manual input of data via the web and transfer of data from national registries, eye banks, and electronic medical record systems.

Established in 2016, the ECCTR has collected data on more than 13,000 transplants from 15 European countries—including information on the recipient, donor and eye bank processing, transplant procedure, and two-year follow-up with graft survival and failure and patient-reported outcome measures (PROMs). We present the key findings from the registry and invite eye banks to engage with the registry.

**P47-A153** **TRANSPLANTATION OF CULTURED HUMAN CORNEAL ENDOTHELIAL CELLS**

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Multiple research groups now theorize that tissue engineering will provide novel therapies for treating corneal endothelial cell (CEC) decompensation. In 2013, we initiated first-in-man clinical research (not an Investigational New Drug [IND] clinical trial) of a CEC injection therapy at the Kyoto Prefectural University of Medicine in Japan. In a clinical trial, cultured CECs (CECs) supplemented with a rho-associated protein kinase (ROCK) inhibitor were injected into the anterior chamber. In all of our first 11 cases, the corneal transparency was restored with the regeneration of a monolayer sheet structure of corneal endothelium. As proof of concept of CEC injection therapy was obtained, we are currently developing a cellular product to deliver this therapy to all patients. To that end, we have established an efficient cell culture protocol and