

preliminary investigations and can be used for testing new media, substances, drugs, or preservation conditions and their impact on corneal tissue quality and safety. Furthermore, the quantitative method to assess whole endothelium mortality can be implemented at eye banks for the evaluation of corneas intended for transplantation.

P13-A113 THE EVEIT BIOREACTOR SYSTEM AS PLATFORM FOR ARTIFICIAL CORNEA PROTOTYPES

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Purpose Corneal donor tissue is in short supply. Only a fraction of the demand is satisfied. The tissues can vary in quality and sometimes have limited use. To address the issue, the generation of artificial corneal grafts is intensively researched.

Various aspects of these prototypes need to be tested, ranging from structural integrity to cellular morphology. Our Ex Vivo Eye Irritation Test (EVEIT) is based on an air-lift organ culture system, where we currently are using rabbit corneas from food industry. We constantly expanded our capabilities in quantifying various parameters concerning metabolism, structural integrity and optical properties. This also opens up the possibility of using the system as a testing platform for prototypical artificial corneal constructs.

Methods Various ophthalmological aspects can be investigated using the EVEIT system:

- Self-healing of superficial injuries and morphological characteristics can be observed over several days by live-tissue staining microscopy.
- Metabolic parameters are recordable via the endothelial nutrient supply mechanism.
- Acute changes in internal pressure can be measured in the artificial anterior chamber with high resolution.
- Corneal barrier functions and pharmacokinetic properties can be quantified using photometric analysis methods.
- Dry-Eye model and established corneal edema models can be employed to test the efficacy of potential therapeutics
- Advanced 3D design and printing methods allow us to quickly adapt the bioreactor, for example, to incorporate human corneas or to improve the mobility of the system.
- In order to comply with the 3Rs principle, testing of several different chemicals on one cornea is now also possible with the aid of automated multi-application
- Recent developments of the EVEIT system include the engineering of an artificial eyelid model.

Results Our long experience in using and optimizing the EVEIT system led to a unique adaptability to accommodate different testing conditions and requirements. Established disease models such as corneal edema and in dry eye syndrome (in process) are involved in testing new drugs.

Conclusion Our established EVEIT system, in addition to its experimental capabilities, could contribute to the development of artificial corneal grafts in the future, as we have shown in previous work. The flexibility of the system allows us to adjust and improve an enormous range of test conditions and parameters.

P14-A117 ASSESSMENT OF PERFORMANCE AND SAFETY OF CORNEAL CHAMBER HYPOTHERMIC STORAGE AND PSS-L CORNEAL RINSING IN HUMAN AND PORCINE CORNEAS

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Purpose To prove the safety and performance of the hypothermic corneal storage medium Corneal Chamber, containing Eusol-C solution (AL.CHI.MI.A. S.r.l.) and of the rinsing solution PSS-L (AL.CHI.MI.A. S.r.l.) in support to the new CE certification process in accordance to the EU 2017/745 Medical Device Regulation

Methods Fifteen (n=15) human donor corneas unsuitable for transplantation and n=11 porcine corneas were evaluated for the following quality parameters: ECD, HEX%, CV%, endothelial morphology, endothelial mortality and transparency at day 0 and after 14±1 days (day 14) of storage in Corneal Chamber at 2-8°C. Then, corneas were rinsed in PSS-L for 1' at room temperature (RT) and the same parameters were assessed Post Rinsing (Day 14PR). In order to evaluate the antimicrobial carryover after the corneal storage in Corneal Chamber(14 days at 4°C), gentamicin sulphate was quantified in human and porcine corneas homogenates by UHPLC.

Results Human and porcine corneas stored in Corneal Chamber at 2-8°C for 14 days showed a good overall quality of the tissue according to quality parameters evaluated. In particular, mean ECD, HEX% and CV% did not show statistically significant changes at the end of storage and endothelial mortality increased of 3.1±3.3% in human corneas and 7.8 ±3.5% in porcine corneas. Slight variations in endothelial morphology score and corneal transparency were observed. Rinsing with PSS-L did not negatively affect the quality parameters evaluated before and after rinsing and gentamicin sulfate residues were completely removed.

Conclusion The storage of corneal tissues in Corneal Chamber at 2-8°C for 14 days and the corneal rinse with 30 ml of PSS-L at RT for 1 min are safe and effective procedures allowing the preservation of the corneal quality parameters including ECD, endothelial mortality, endothelial morphology, HEX%, CV%, and corneal transparency and the elimination of gentamicin sulfate from the tissues before transplantation.

P15-A112 DESCOMET'S MEMBRANE ENDOTHELIAL KERATOPLASTY (DMEK) GRAFT PREPARATION IN PORCINE CORNEA

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Purpose Descemet's membrane endothelial keratoplasty (DMEK) is a frequently used treatment option for patients with corneal endothelial dysfunction. The aim of this study was to set up a method to prepare porcine DMEK grafts and to simulate DMEK surgery in porcine eye bulbs in order to establish an ex-vivo-model for laboratory investigations on DMEK surgery conditions.

Methods Ten (n=10) porcine eye bulbs from domestic pigs (*Sus scrofa domestica*), between 6 and 8 months old, were recovered at a local slaughterhouse, transported on ice and