EBAA 2026 ANNUAL MEETING

2026 SYMPOSIA PROGRAM

June 6, 2026 | Indianapolis, IN

#EBAA2026

EBAA SYMPOSIA

2026 Annual Meeting
Saturday, June 6, 2026
Indianapolis, IN

Scientific Symposium
8:00 am – 11:45 am

Physician Luncheon
12:00 pm – 1:00 pm

Medical Directors Symposium
1:15 pm – 4:30 pm

EBAA 2026 ANNUAL MEETING

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SCIENTIFIC PROGRAMS COMMITTEE

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LEARNER NOTIFICATION

Eye Bank Association of America
2026 Annual Meeting Symposia
June 6, 2026 | Indianapolis, IN

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Objectives - After Attending This Program You Should Be Able To

1. Learn new developments and techniques in eye banking and corneal transplantation.
2. Understand updates in eye banking standards and practices.
3. Cite new research findings in corneal transplantation, preservation, preparation, and processing.

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The following table of disclosure information is provided to learners and contains the relevant financial relationships that each individual in a position to control the content disclosed to Amedco. All of these relationships were treated as a conflict of interest, and have been resolved.

All individuals in a position to control the content of CE are listed in the program book. If their name is not listed below, they disclosed that they had no relevant financial relationships with a commercial interest.

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Saardhak Bhrugubanda	Veina Inc.: Owner Veina Inc.: Patent Holder
Winston Chamberlain, MD, PhD	Abbvie: Consultant BrightStar: Consultant Emmecell: Scientific/Medical Advisory Board Member Glaukos: Consultant GlaxoSmithKline: Consultant ImmunoGen: Scientific/Medical Advisory Board Member Kowa: Research Grant Site Principal Investigator Neumora: Scientific/Medical Advisory Board Member Oyster Point Pharma/Viatris: Consultant ReGenTree: Research Grant Site Principal Investigator Santen: Scientific/Medical Advisory Board Member TelomEye: Scientific/Medical Advisory Board Member
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Harry Menegay	Transcend Medical: Institution received payment to perform masked image analysis
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Christina Prescott, MD	Glaukos: Consultant Johnson and Johnson vision: Consultant
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Ching Yuan, PhD	BrightStar Therapeutics: Consultant BrightStar Therapeutics: Patent Holder

PROGRAM SCHEDULE

PROGRAM SCHEDULE

SCIENTIFIC SYMPOSIUM 8:00 AM – 11:45 AM

8:00 am – 8:02 am	**Welcome and Introductions** Joann Kang, MD, *Montefiore Einstein* and Zeba Syed, MD, *Wills Eye Hospital*
8:03 am – 8:14 am	***Improving a Model for Automated Determination of Endothelial Cell Density (ECD) with High-Quality Auto-Generated Masks*** Ved Shivade, *Case Western Reserve University*
8:15 am – 8:26 am	***Stepwise Cell Loss from Preparation of Endothelium-In DMEK*** Peter Bedard, MS, CEBT, *Lions Gift of Sight*
8:27 am – 8:38 am	***Improved Feasibility of Grading Fuchs Dystrophy using Retroillumination Photography*** Anshuman Agrawal, *Wilmer Eye Institute, Johns Hopkins University School of Medicine*
8:39 am – 8:50 am	***Machine Learning Survival Modeling for Keratoplasty Graft Risk Prediction*** Sujin Kang, MD, *Bascom Palmer Eye Institute*
8:51 am – 9:02 am	***DEKS Donor and Donor Preparation Factors Impacting Donor Preparation Outcomes*** Michael S. Titus, CEBT, *Eversight*
9:03 am – 9:14 am	***Predicting Corneal Tissue Suitability for Transplantation from Donor and Procurement Characteristics*** Karthik Reddy, *University of Michigan Medical School*
9:15 am – 9:26 am	***XTRA4 Real World Experience: Tissue Characteristics and Processing Outcomes*** Malik J. Edwards, *VisionGift*
9:27 am – 9:28 am	***Research Grant Announcement*** Joann Kang, MD and Zeba Syed, MD
9:29 am – 9:30 am	***Section I Wrap Up*** Joann Kang, MD, and Zeba Syed, MD
9:30 am – 10:00 am	**Refreshment Break**
10:00 am – 10:01 am	**Welcome Back** Joann Kang, MD, and Zeba Syed, MD
10:01 am – 10:12 am	***Mitochondrial Responses to Hyperglycemia and Insulin Rescue in Human Corneal Endothelium*** Elisha Monson, BS, *University of Iowa Carver College of Medicine*

10:13 am – 10:24 am	***Postmortem Conjunctival Microbial Milieu: Culture Findings and Exploratory ITS Fungal Profiling*** Aravind Roy, MD, *L V Prasad Eye Institute*
10:25 am – 10:36 am	**Development of Novel Corneal Storage Solution with Rho Kinase Inhibitor (ROCKi)** Onkar Sawant, B.Pharm, PhD, *Eversight*
10:37 am – 10:48 am	***Impact of Postmortem Blood Draw Site on Blood Sample Suitability for Serology Testing and Donor Eligibility Determination*** Dana Owens, CEBT, *Eversight*
10:49 am – 11:00 am	**Hemolysis in Donor Blood Samples: Evaluation of a Novel Collection Device** Saardhak Bhrugubanda, *Johns Hopkins University*
11:01 am – 11:12 am	**Extending Corneal Viability During Transport with Enhanced Packaging to Mitigate Temperature Excursions** Jacob Schwarz, *Lions Gift of Sight*
11:13 am – 11:14 am	**Section II Wrap Up** Joann Kang, MD, and Zeba Syed, MD
11:15 am – 11:39 am	***Invited Session: Current and Future Applications of Collagen Crosslinking*** Joseph B. Ciolino, MD, *Harvard Medical School / Mass. Eye and Ear / Schepens Eye Research Institute*
11:40 am – 11:43 am	**Best Paper of Session Award** Win Chamberlain, MD, PhD, *VisionGift*
11:44 am – 11:45 am	**Closing Remarks** Joann Kang, MD, and Zeba Syed, MD

PHYSICIAN LUNCHEON 12:00 PM – 1:00 PM

Moderators: Ellen Koo, MD, and Amy Lin, MD

MEDICAL DIRECTOR SYMPOSIUM 1:15 PM – 4:15 PM

1:15 pm – 1:16 pm

Welcome
Joann Kang, MD, *Montefiore Einstein*

1:17 pm – 1:37 pm

Regulatory Updates: What the Medical Director Needs to Know for 2026
Shahzad Mian, MD, *Eversight*

1:38 pm – 1:48 pm

Accreditation Board Update
Amy Lin, MD, *Utah Lions Eye Bank*

1:49 pm – 2:29 pm

Adverse Events in Eye Banking: Role of the Medical Director & Case Studies
Moderator: Sean Edelstein, MD, *Mid-America Transplant*

Panelists:
Susan Hurlbert, CEBT, MD, *Eversight*
Carrie Lembach, DO, *Central Ohio Lions Eye Bank*
Elmer Tu, MD, *Eversight*

2:30 pm – 2:45 pm

Break

2:46 pm – 3:31 pm

Fungal Infections after Keratoplasty: Prevention and Prophylaxis
Topics:
Management of Positive Donor Cultures
– Ellen Koo, MD, *Bascom Palmer Eye Institute*
Advances in Molecular Diagnostics (PCR, Next-Gen Sequencing) for Early Fungal Detection
– Nakul Shekhawat, MD, *Johns Hopkins Wilmer Eye Institute*
Anti-Fungal Supplementation in Storage Media: Efficacy, Risks, and Controversies
– Bennie Jeng, MD, *Scheie Eye Institute Penn Medicine*

3:32 pm – 4:12 pm

Medical Director Dilemmas: What Would You Do?
Moderator:
Jennifer Li, MD, *University of Michigan*

Panelists:
Clara Chan, MD, *Eye Bank of Canada—Ontario Division*
Win Chamberlain, MD, PhD, *VisionGift*
Joann Kang, MD, *Montefiore Einstein*

4:13 pm – 4:15 pm

Symposium Closing
Joann Kang, MD, *Montefiore Einstein*

4:15 pm – 4:20 pm

Annual Meeting Closing Remarks
Kevin Corcoran, CAE, *Eye Bank Association of America*

SCIENTIFIC SYMPOSIUM INVITED SESSION

INVITED SESSION

Invited Session:
Current and Future Applications of Collagen Crosslinking

Joseph B. Ciolino, MD,
Harvard Medical School / Mass. Eye and Ear / Schepens Eye Research Institute

Dr. Ciolino is a member of the Cornea Service and the Henry Freeman Allen Cornea Scholar. His clinical focus is cataract surgery, keratoconus treatments such as corneal crosslinking and CTAK, and corneal transplants. As a clinician scientist, his research interests include translational projects such as ocular drug delivery, and research on keratoconus and corneal transplant.

Dr. Ciolino earned his medical degree from Georgetown University School of Medicine and subsequently pursued an ophthalmology residency at Albany Medical College, where he served as Chief Resident in his final year. Returning to Boston for a two-year fellowship in the Cornea, Refractive Surgery and External Disease Service, he received the nationally recognized Claes Dohlman Fellowship Award. He then joined Harvard Medical School's full-time faculty at Mass. Eye and Ear under the K12 Harvard-Vision Clinical Scientist Development Program, a highly competitive institutional program funded by the National Institutes of Health.

Working with collaborators at Boston Children's Hospital and Massachusetts Institute of Technology, Dr. Ciolino has developed a drug-eluting contact lens capable of delivering various pharmaceutical agents, such as antibiotics, antifungals, and glaucoma medication. These drug-eluting lenses have the potential to improve surgical outcomes for patients with keratoprosthesis by both protecting the ocular surface of the eye and by preventing post-operative infections, and they may one day replace eye drops.

SCIENTIFIC SYMPOSIUM ABSTRACTS

8:03 am – 8:14 am

Improving a Model for Automated Determination of Endothelial Cell Density (ECD) with High-Quality Auto-Generated Masks

Ved Shivade*[1] ; Naomi Joseph[1]; Onkar B. Sawant, PhD[2]; Jameson Clover, CEBT[3]; Michael S. Titus, CEBT[2]; Jonathan H. Lass, MD[4]; Beth Ann Benetz, MA, FOPS[4]; David L. Wilson, PhD[1]

[1] Case Western Reserve University; [2] Eversight; [3] Lions VisionGift; [4] Case Western Reserve University & University Hospitals Eye Institute

Purpose:
To improve our automated approach for segmentation of corneal endothelial cells (EC) in donor cornea specular microscopic images, doubling (on average) automated cell counts compared to our previous method, and re-calculating ECD.

Methods:
Our previously published EC segmentation pipeline was used to generate cell border masks and ECDs for 13,203 images, with an additional 1,939 held out for testing. We selected 200 varying quality masks from the former: 50 with the highest, 100 near the median, and 50 with the lowest number of cells analyzed. These were used to finetune our ViT/UNetR model to generate new masks for the test set. An improved post-processing pipeline was used to re-calculate ECD. Performance was quantified using Pearson's correlation coefficient, mean absolute error, and total analyzable cells per image.

Results:
Finetuning on varying quality masks improved agreement with manual ECD and increased segmentation coverage. The updated model nearly doubled the average number of segmented cells per image, improved correlation with manual ECD compared with our previous model published in 2024 ($R = 0.827$ to $R = 0.905$) and reduced systematic center bias seen in our previous approach.

Conclusion:
Using a small set of variable-quality auto-generated masks for finetuning can substantially improve EC segmentation coverage and strengthen concordance with manual ECD.

*Master's Degree Student

SCIENTIFIC SYMPOSIUM ABSTRACT

8:15 am – 8:26 am

Stepwise Cell Loss from Preparation of Endothelium-In DMEK

Authors:
Peter Bedard, MS, CEBT[1]; Ching Yuan, PhD[1]; Joshua H. Hou, MD[2]
[1] Lions Gift of Sight; [2] University of Minnesota Department of Ophthalmology & Visual Neurosciences

Purpose:
Preloading DMEK endo-in is a technique that facilitates intraoperative unscrolling in DMEK surgery by leveraging the graft's natural tendency to unscroll from an endo-in conformation. Evaluating global cell damage from preloading endo-in is critical for validating the safety of this technique. Quantification of global cell loss across each processing step in endo-in prep is still lacking, despite its growing popularity. The purpose of our study was to evaluate global cell loss associated with endo-in DMEK prep.

Methods:
DMEK tissues were either: (1) pre-stripped, (2) pre-stripped & tri-folded, (3) prestripped, tri-folded & dragged into loading position for insertion, or (4) prestripped, trifolded, loaded & unloaded via pull through. All conditions were tested in triplicate. Grafts were stained with CalceinAM at baseline. After each step, grafts were gently unrolled and flattened using BSS and stained again. Weka segmentation was used to determine percent area of cell damage (%ACD) based on change in CalcienAM signal from baseline. Stepwise cell damage was calculated from differences in ACD before and after each step. Endo-in DMEK was compared to endo-out for 2 glass cannulas.

Results:
Endo-in DMEK resulted in 8.2±1.5% of added cell damage. Stepwise, the fold step was responsible for adding 1.7±1.1%, dragging added 1.1±1.0%, while loading + unloading contributed 5.4±2.8%. Endo-out DMEK averaged 3.7% less damage (4.5±1.3%, p=0.06) compared to endo-in.

Conclusion:
Endo-in DMEK incurs 3–4% more cell damage than endo-out, due to the extra manipulation. This added cell damage should be weighed against its potential to mitigate intraoperative manipulation during DMEK surgery by facilitating unscrolling.

SCIENTIFIC SYMPOSIUM ABSTRACT

8:27 am – 8:38 am

Improved Feasibility of Grading Fuchs Dystrophy using Retroillumination Photography

Authors:
Anshuman Agrawal, BS[1]; Brandon Jung[1]; Aisha A. Mumtaz, MD[2]; Elyse McGlumphy, MD[1]; Allen O. Eghrari, MD, MPH[1]
[1] Wilmer Eye Institute, Johns Hopkins University School of Medicine; [2] University of Maryland School of Medicine

Purpose:
Novel cell-based therapies aim to address the global donor cornea shortage, with many clinical trials targeting Fuchs endothelial corneal dystrophy (FECD). However, the Krachmer score has poor inter-rater reliability, which limits longitudinal assessment of treatment response. Alternatively, manual guttae counting on digital retroillumination photos is highly precise and reproducible but time intensive. We evaluated whether partial counting with predictive modeling can reduce grading workload while maintaining accuracy.

Methods:
Manual guttae counts by clock-hour were obtained from 20 FECD eyes (Krachmer ≥3). 12 partial sampling schemes were tested. Total guttae were predicted with linear regression. Accuracy, agreement and non-inferiority (5% margin) were assessed by absolute percent error (APE), Lin's concordance correlation coefficient (CCC), and Holm-adjusted paired t-tests.

Results:
Schemes sampling 2 to 10 clock-hours yielded mean APE 14% to 1.9% and CCC 0.96 to 0.99. Sampling the first clock-hour from each quadrant balanced performance (median APE 2.8%, CCC 0.99) with 67% workload reduction and was non-inferior to all others ($p<0.01$).

Conclusion:
Quadrant sampling is a meaningful step towards feasible retroillumination-based FECD severity assessment in clinical trials. Future work on automated guttae counting can use this to lower computing needs and enable scalable deployment in clinical and research settings.

**Medical Student

SCIENTIFIC SYMPOSIUM ABSTRACT

8:39 am – 8:50 am

Machine Learning Survival Modeling for Keratoplasty Graft Risk Prediction

Authors:
Sujin Kang, MD+[1]; Sonia Yoo, MD[1]; Ellen Koo, MD[1]
[1]Bascom Palmer Eye Institute

Purpose:
To develop and compare machine learning (ML)-based survival models for keratoplasty graft failure prediction and to evaluate how prior non-tube glaucoma surgery alters model performance and learned risk structure.

Methods:
This retrospective cohort study included 2,454 eyes undergoing penetrating or endothelial keratoplasty (2014–2025), stratified by prior non-tube glaucoma surgery (n=104) vs. no glaucoma surgery (n=2,350). Graft failure was defined as repeat keratoplasty. Cox proportional hazards (Cox PH), random survival forest (RSF), and gradient-boosted survival models were trained on 2014–2020 data and temporally validated on 2021–2025 data. Model discrimination, calibration, and feature importance were assessed using AUC, PR-AUC, time-dependent Brier scores, and bootstrap resampling.

Results:
Five-year graft survival was lower in eyes with prior non-tube glaucoma surgery (63.6% vs. 77.4%, P=0.025). In non-glaucoma eyes, models consistently identified keratitis and Black race as dominant risk features, while Fuchs dystrophy and keratoconus were protective. In non-tube glaucoma eyes, penetrating keratoplasty associated with lower hazard in the model, and RSF revealed a reorganized feature hierarchy emphasizing corneal scars, age, and ocular surface disease. Discrimination was similar across models in non-glaucoma eyes, whereas RSF demonstrated superior performance in glaucoma surgery eyes (AUC 0.632; PR-AUC 0.461). Cox PH models showed stable calibration across time horizons.

Conclusion:
ML survival models reveal subgroup-specific risk structures for keratoplasty graft failure. Nonlinear ensemble methods better capture complex risk patterns in surgically altered eyes, supporting tailored predictive modeling strategies.

+Fellow

SCIENTIFIC SYMPOSIUM ABSTRACT

8:51 am – 9:02 am

DEKS Donor and Donor Preparation Factors Impacting Donor Preparation Outcomes

Authors:
Michael S. Titus, CEBT[1]; Mark C. Soper, CEBT[2]; Marianne O. Price, PhD, MBA[3]; Zachariah W. Reed[4]; Craig Kollman, PhD[4]; Robin L. Gal, MSPH[4]; Loretta B. Szczotka-Flynn, OD, PhD[5]; Amy Ansin[6]; Jameson M. Clover, CEBT[6]; Lindsey Elbanhawy, CEBT[7]; Gregory Schmidt, MBA, CEBT[8]; Anthony Vizzerra, CEBT[9]; Roy W. Beck, MD, PhD[4]; Jonathan H. Lass, MD[5]
[1] Eversight; [2] VisionFirst; [3] Cornea Research Foundation of America; [4] Jaeb Center for Health Research; [5] Case Western Reserve University; [6] VisionGift; [7] CorneaGen; [8] Iowa Lions Eye Bank; [9] Saving Sight

Purpose:
Assess association between DEKS donor characteristics and prep parameters with prep failure and, among successfully prepared lenticules, post-prep endothelial cell (EC) damage.

Methods:
Prospectively collected donor and donor prep parameters were analyzed for associations with lenticule prep failure, and if prep successful, post-prep EC damage with trypan blue staining.

Results:
1,469 donor corneas, prepared by both eye banks and surgeons, resulted in 48 failures (3.3%). Consistent with prior reports, donors with diabetes had a higher prep failure rate (6.1%) vs. donors without diabetes (1.6%), while donor age and death to preservation time were not significantly associated with failure. For the 1,210 eye-bank-prepared donor lenticules, separation difficulty was highly correlated with prep failure, while technician experience, preservation time, and peeling method were not. Donor diabetes was associated with increased separation difficulty. Greater EC damage was associated with longer death to preservation time, higher diabetes severity, greater separation difficulty, Kerasave storage solution, and non-submerged prep techniques.

Conclusion:
The DEKS has identified key donor and prep-related factors that contribute to increased lenticule preparation failure and post-prep EC damage. These insights may guide improved lenticule prep standards.

SCIENTIFIC SYMPOSIUM ABSTRACT

9:03 am – 9:14 am

Predicting Corneal Tissue Suitability for Transplantation from Donor and Procurement Characteristics

Authors:
Karthik Reddy[**1]**; Susan Hurlbert[2]; Michael S. Titus, CEBT[2]; Jennifer Li, MD[3]; Shahzad Mian, MD[3]
[1] University of Michigan Medical School; [2] Eversight; [3] Kellogg Eye Center, University of Michigan

Purpose:
Eye banks face challenges in optimizing donor selection. Limited large-scale analyses have examined whether donor and procurement factors can predict surgical tissue suitability.

Methods:
Data was abstracted from Eversight (Ann Arbor, MI). Donors whose tissues were approached for surgical use were included. Generalized linear mixed-effects models were adjusted for between-eye correlation, demographics, medical history, and procurement factors.

Results:
226,509 tissues were identified. Only 106,640 (47.1%) were determined to be surgically suitable. Donor age (OR: 0.98, $P < .001$) was associated with reduced suitability. Compared with White participants, odds were lower for Asian (OR: 0.86), Black (OR: 0.82), and Hispanic (OR: 0.83) participants (all $P \leq .002$). During admission, known ventilator use (OR: 0.89, $P < .001$) or sepsis (OR: 0.72, $P < .001$) was associated with lower suitability. Relative to death from heart disease, tissue suitability was lower for cancer (OR: 0.86) and respiratory disease (OR: 0.93), while trauma (OR: 1.06) was higher. Ocular cooling was associated with higher suitability (OR: 1.32; all $P < .001$).

Conclusion:
Only 47.1% of tissues were surgically suitable. Increased donor age, non-white race, known ventilator use or sepsis, cancer, among other factors, were associated with lower suitability. Identification of these predictors may optimize donor selection and improve procurement efficiency.

**Medical Student

SCIENTIFIC SYMPOSIUM ABSTRACT

9:15 am – 9:26 am

XTRA4 Real World Experience: Tissue Characteristics and Processing Outcomes

Authors:
Malik J. Edwards[1]; Mark S. Ellison, BS, BA[1]; Cerys A. Easton[1]; Philip K. Dye, CEBT[1]; Khoa D. Tran, PhD[1]
[1] *VisionGift*

Purpose:
To compare tissue characteristics and processing outcomes of corneas stored in XTRA4 versus Optisol-GS.

Methods:
Retrospective study of corneas recovered into XTRA4 (n=658) or Optisol-GS (n=891) for transplant. Subsets were processed for DMEK (n=338), DSAEK (n=147), and sterile tissue (n=77). Central stromal thickness (CST), stromal edema, and Descemet folds were examined at initial evaluation. Corneas placed for DSAEK and sterile tissue usage had CST measured immediately prior to processing. Corneas placed for DSAEK and DMEK were analyzed for processing success rate.

Results:
Donor characteristics were similar between cohorts. Edema and fold rating results were consistent with previous laboratory studies. The initial CSTs of corneas in XTRA4 were 21 µm thicker than in Optisol-GS ($P<0.01$). Corneas processed for DSAEK (~5 days post recovery) were thicker within both cohorts compared to initial (XTRA4 +10µm, Optisol-GS +17µm, both $P<0.01$). For DSAEK cuts, deviation from target thickness and processing success rate were the same between cohorts ($P=0.07$ and $P=0.71$, respectively). For sterile tissue (~18 days post recovery), XTRA4 corneas increased by 22µm while Optisol-GS increased by 120µm (both $P<0.01$). For DMEK preparations (~4.5 days post recovery), the duration of processing, proportion of corneas preloaded, preloaded double scroll success rate, and overall DMEK success rate were the same between cohorts ($P=0.24$, $P=0.39$, $P=0.49$, and $P=0.66$, respectively).

Conclusion:
XTRA4 maintains corneal characteristics consistent with previous laboratory studies. Corneas stored in XTRA4 are successfully processed for DSAEK and DMEK per eye bank standards.

SCIENTIFIC SYMPOSIUM ABSTRACT

10:01 am – 10:12 am

Mitochondrial Responses to Hyperglycemia and Insulin Rescue in Human Corneal Endothelium

Authors:
Elisha Monson, BS[1]; Jessica M. Skeie, PhD[1]; Hanna Shevalye, BS[2]; Timothy M. Eggleston, BS[2]; Gregory Schmidt, MBA, CEBT[3]; Mark A. Greiner, MD[1]
[1] University of Iowa Carver College of Medicine; [2] University of Iowa; [3] Iowa Lions Eye Bank

Purpose:
To quantify effects of hyperglycemia and insulin rescue on mitochondrial function in human immortalized and donor tissue corneal endothelial cells (CECs).

Methods:
Human immortalized CECs cultured in 5.5, 8.5, 13.0, and 30.5 mM glucose media for 2 weeks with and without 0.1 µM insulin were analyzed for mitochondrial respiration (pmol/min/10^3 cells), ROS production (RFU/cell) and membrane potential (JC-10 ratio, RFU/cell). Separately, 4 donor cornea pairs (all nondiabetic and eligible for keratoplasty) were exposed to 1 µM insulin daily for 5 days and analyzed for CEC mitochondrial respiration.

Results:
In cultured CECs at 30.5 mM glucose, mean maximal respiration (4.06±0.86), spare respiratory capacity (1.5±0.60), mitoROS (0.62±0.10), and JC-10 ratios (1.06±0.13) were all lower than mean values at 5.5, 8.5, and 13.0 mM glucose combined (5.20±1.19, 2.28±0.82, 0.46±0.11, and 1.26±0.19, respectively). Insulin in hyperglycemic CECs increased maximal and spare respiratory capacity at 5.5, 8.5, 13.0 mM glucose ($p \leq 0.0013$), and insulin in donor corneas increased spare respiratory capacity and maximal respiration.

Conclusion:
Hyperglycemia impairs mitochondrial function and insulin notably rescues mitochondrial function in both cultured and ex vivo human CECs. Findings support continued research into rescuing diabetic donor CEC function with insulin.

**Medical Student

SCIENTIFIC SYMPOSIUM ABSTRACT

10:13 am – 10:24 am

Postmortem Conjunctival Microbial Milieu: Culture Findings and Exploratory ITS Fungal Profiling

Authors:
Aravind Roy, MD[1]; Sujata Das[1]; Himansu Behera[1]
[1]*L V Prasad Eye Institute*

Purpose:
To compare ocular surface microbial milieu in donor eyes retrieved <12 h vs. ≥12 h after death, and to explore fungal microbiome shifts because of lack of antifungals in corneal storage media.

Methods:
Pre-disinfection conjunctival swabs from 74 donors (148 eyes) underwent bacterial/fungal culture. Eyes were grouped by death-to-retrieval time: <12h vs.. ≥12h. ITS fungal metagenomic sequencing was performed in 6 eyes with adequate DNA (4 <12 h; 2 ≥12 h).

Results:
Culture positivity was 28/64 eyes (43.8%) in <12 h and 32/84 (38.1%) in ≥12 h. In the <12 h category, fungus-only was noted in 19 and bacteria-only in 9 (no mixed); hyaline/filamentous fungi were seen in 6 eyes and Candida in 5 eyes. In the ≥12 h category, fungus-only was 26, bacteria-only was 2, and mixed fungal–bacterial was 4; hyaline/filamentous fungi were noted in 8 eyes and Candida in 14 eyes. Utilization was 57/64 (<12 h) and 80/84 (≥12 h); no post-transplant infection attributable to the cultured organisms was reported. ITS metagenomic sequencing showed moderate diversity (Shannon ~2.0–2.6) with a higher Basidiomycota proportion in ≥12 h (~35% vs. 17%) and an enrichment of Cutaneotrichosporon; Candida parapsilosis was variably detected. Beta diversity showed marked inter-eye heterogeneity (pairwise 55–114 differential OTUs).

Conclusion:
Cultures suggest increased Candida and mixed growth after ≥12 h. A small ITS subset indicated a shift in the proportion of Basidiomycota with a high inter-eye variability. Larger sequencing studies are needed to confirm time trends in the ocular microbial milieu.

SCIENTIFIC SYMPOSIUM ABSTRACT

10:25 am – 10:36 am

Development of Novel Corneal Storage Solution with Rho Kinase Inhibitor (ROCKi)

Authors:
Pauline M. Dmitriev, MD[1]; **Onkar B. Sawant, PhD[2]**; Ann-Charlott Salabarria, PhD[2]; Jessica Ludwig[2]; Shahzad Mian, MD[1]
[1] University of Michigan Kellogg Eye Center; [2] Eversight

Purpose:
To investigate the effect of supplementing corneal storage solution (CSS) with ROCKi HA-1077 on corneal endothelial healing and corneal health during hypothermic storage.

Methods:
Central corneal endothelium was injured by brushing on day 0 to mimic trauma related to recovery and processing. Corneas were cultured with or without HA-1077 for 7 days at 37°C, 5% CO_2. Central corneal endothelium was analyzed for wound healing on day 7. Further, two independent studies compared mated corneas recovered into Eversight's novel CSS with HA-1077 (EversolPlus™) and without (Eversol™), or into Optisol-GS compared to EversolPlus™, stored at 2–8°C for 14 days. Central corneal thickness (CCT), endothelial cell density (ECD), hexagonality (Hex), and coefficient of variation (CV) of endothelial cells were assessed on days 1, 3, 7, 10, and 14.

Results:
Following endothelial brushing, corneas stored in HA-1077–supplemented media demonstrated improved endothelial regeneration (25% recovery) compared to controls (11%), indicating enhanced healing in the presence of HA-1077 (p=0.0403). During hypothermic storage, baseline CCT was comparable between Eversol™ (502 ± 16 µm) and EversolPlus™ (498 ± 16 µm). Over 14 days, both groups exhibited gradual stromal swelling, though the increase in CCT was smaller in the EversolPlus™ group (Δ106 ± 35 µm) compared to Eversol™ (Δ138 ± 31 µm), particularly up to day 7 (p=0.009). Initial ECDs, HEX and CV values were similar between the two groups and remained comparable over 14 days. Corneas recovered into EversolPlus™ (459 ± 77 µm) demonstrated significantly reduced CCT on day 0 compared to those recovered into Optisol-GS (508 ± 76 µm) (p=0.0007). This trend persisted up to day 7.

Conclusion:
Addition of HA-1077 into CSS promotes endothelial wound healing and maintains corneal endothelium health for 14 days in hypothermic storage. HA-1077 supplementation of corneal storage solution in eye banking could improve the quality and longevity of corneal tissue for transplantation.

SCIENTIFIC SYMPOSIUM ABSTRACT

10:37 am – 10:48 am

Impact of Postmortem Blood Draw Site on Blood Sample Suitability for Serology Testing and Donor Eligibility Determination: A Retrospective Multivariate Analysis

Authors:
Dana Owens, CEBT[1]; Indu Vadakkepattath[1]; Onkar B. Sawant, PhD[1]
[1] *Eversight*

Purpose:
To evaluate whether the postmortem blood draw site is associated with blood sample suitability for serology testing and donor eligibility determination after adjusting for donor and operational factors.

Methods:
A retrospective analysis was performed on 29,452 cadaveric donors with death dates between January 1, 2020 and July 31, 2025. Blood draw sites were grouped as femoral (n=4,002), subclavian (n=16,003), or near-heart (n=68) (including arterial, central line, and cardiac sources). Multivariate logistic regression was used to assess the association between blood draw site and suitability, adjusting for donor age, body mass index, gender, race, and death-to-recovery interval. To prevent donor over-representation, one record per donor was included. Donors were classified as suitable if at least one tissue met suitability criteria.

Results:
After adjustment for donor characteristics, femoral blood draws were associated with significantly higher odds of suitability compared to subclavian draws (OR 1.115, $p = 0.0008$), representing an 11% increased likelihood of suitability. This association remained stable after adjusting for death-to-recovery timing. Near-heart blood draws demonstrated higher odds of suitability (OR 1.558); however, this association was not statistically significant ($p = 0.15$) due to limited sample size.

Conclusion:
Postmortem blood draw site is modestly but significantly associated with blood sample suitability in serology testing. Femoral blood draws demonstrated improved suitability outcomes by around 11% compared to subclavian draws under comparable donor conditions and testing methods. Our data demonstrate that if we completely transition to femoral blood draw, it could significantly expand donor suitability rate and tissue availability for corneal transplantation.

SCIENTIFIC SYMPOSIUM ABSTRACT

10:49 am – 11:00 am

Hemolysis in Donor Blood Samples: Evaluation of a Novel Collection Device

Authors:
Saardhak Bhrugubanda*[1]; Natasha Mody[1]; Peter Citro[2]; Jason Asher[2]; Andrew Officer[2]; Katie Solley[3]
[1]Johns Hopkins University; [2] Lions Eye Bank of West Central Ohio; [3] Eyedea Medical

Purpose:
Hemolysis during blood collection can compromise laboratory results used to determine donor eligibility for tissue transplant. This study evaluates hemolysis in donor recovery samples collected with the novel device compared to a standard syringe.

Methods:
In a paired-sample study, two 20 mL blood samples were collected from 10 corneal transplant donors (ages 40–80) at 4–14 hours post-mortem using a standard syringe and a novel blood collection device. Plasma was centrifuged and imaged under standardized lighting, and hemolysis was assessed via quantitative image-based analysis of plasma-free hemoglobin (mg/dL) and CDC-based visual grading. Mean hemolysis and the proportion of samples ≥50 mg/dL were compared between methods.

Results:
Preliminary analysis from the ongoing study shows consistently lower hemolysis in 100% of donor samples collected with the novel device compared to the standard syringe. Mean plasma-free hemoglobin was 12 mg/dL with the novel device versus 24 mg/dL with standard syringe collection, and no novel-device samples exceeded the 50 mg/dL hemolysis threshold used to flag potentially compromised specimens.

Conclusion:
Reduced hemolysis observed with the novel device suggests improved specimen quality in donor recovery blood draws. This approach may help minimize hemolysis-related testing concerns and support efficient eye bank operations.

*Master's Degree Student

SCIENTIFIC SYMPOSIUM ABSTRACT

11:01 am – 11:12 am

Extending Corneal Viability During Transport with Enhanced Packaging to Mitigate Temperature Excursions

Authors:
Jacob Schwarz, MS[1]; Sung Lee, BS[2]; Ching Yuan, PhD[2]; Joshua H. Hou, MD[2]
[1] Lions Gift of Sight; [2] University of Minnesota & Lions Gift of Sight

Purpose:
To extend the duration of internal temperature maintenance within the viable range (2–8°C) during tissue transport, in order to mitigate risks associated with shipping delays or extreme environmental temperatures.

Methods:
Using a standard validated 72-hour Styrofoam cooler (ID: 12″×12″×11.5″; 2″ wall thickness) as the control, we tested the efficacy of adding 3/16″ aluminum bubble liners, reflective sealing tape, and varying coolant configurations (crushed wet ice vs. solid block ice with water). Styrofoam containers packed with Ziplock bags, vacuum-seal bags, or large water reservoirs and six Corneal Viewing Chambers (CVC) were exposed to ambient (20–25°C) and heat-stress (>34°C) environments. Dataloggers recorded the duration the payload remained within the 2–8°C specification.

Results:
At ambient temperatures, the modified coolers maintained the 2–8°C range for 151 ± 2 hours using crushed ice, and 188 ± 17 hours using solid block ice. This performance represents at least 110% increase in cold storage duration over standard protocol. Even under heat stress (>34°C), the system maintained proper temperature for 85 ± 3 hours. The type of coolant bag and the use of external sealing tape were found to have no significant impact on thermal duration.

Conclusion:
Modifying standard shipping containers with internal insulation and optimized coolant configurations provides a robust, low-cost solution for extending tissue preservation time, significantly reducing the risk of tissue loss during transport.

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