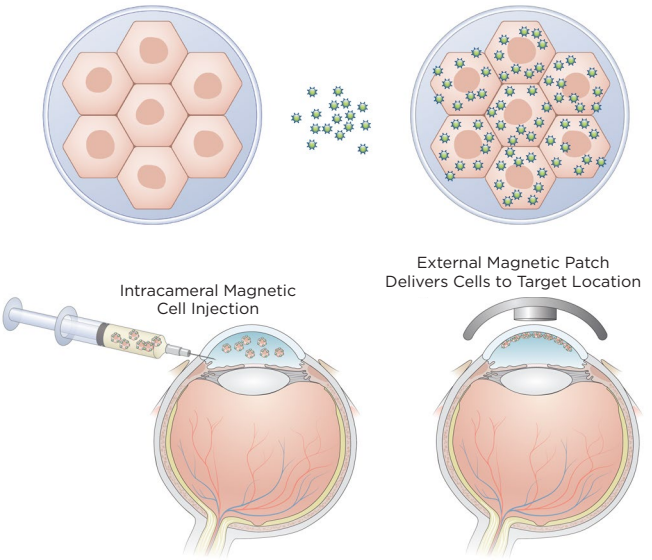
News in Review

COMMENTARY AND PERSPECTIVE

This month, News in Review highlights selected papers from the original papers sessions at AAO 2023. Each was chosen by an Annual Meeting Program Committee subspecialty chair because it presents important news or illustrates a trend in the field. Only four subspecialties are included here; papers sessions will also be held in five other fields. For more information, see the Mobile Meeting Guide (aao.org/mobile).



MAGNETIC CELL THERAPY. *An illustration indicates where injection and patch are placed.*

Emmecell

CORNEA

Magnetic Cells in Endothelial Cell Transplantation

DATA GATHERED BY RESEARCHERS in a phase 1 clinical trial suggest that the use of magnetic cells in endothelial cell transplantation may have a role in the treatment of corneal edema. The specialized cells contain magnetic nanoparticles that allow them to be localized and retained on the endothelium when an external magnetic field is applied to the eye for a short period after cell injection.

Cultured cell injection. Study author Ellen Koo, MD, at the University of Miami Bascom Palmer Eye Institute, said the prospective, open-label study was conducted at seven sites, two associated with Bascom Palmer and the other five located at sites across the United States. The primary goal was to determine the safety profile and tolerability of EO2002, magnetic cultured human corneal endothelial cells (hCEC). The researchers were also interested in secondary outcomes, including improvement in BCVA and changes in corneal thickness.

Study participants had all been diagnosed with corneal edema related to endothelial dysfunction. In Group 1, differing cell doses were injected into 21 patients across seven cohorts. "We had groups that were assigned to Descemet membrane stripping, endothelial brushing, no brushing or stripping, or, for example, injection only," said Dr. Koo. Each participant received an EO2002 injection with the cells (made by biotechnology company Emmecell) at a dose of either 0.05×10^6, 0.15×10^6, 0.5×10^6, or 1×10^6 cells. The injections were made into the anterior chamber by several experienced cornea surgeons. This was followed by the application of an external magnetic eye patch. The researchers are currently enrolling another 21 participants, in Group 2, as part of a double-masked, randomized trial that is investigating any outcome variation associated with different cell doses, said Dr. Koo, noting that all enrolled participants receive an injection of cells—there is no control group in the study.

Dose-dependent gains. All patients in Group 1 remained free of adverse reactions, such as unstable intraocular pressure and inflammation at 26 weeks, with none requiring keratoplasty. BCVA scores indicated a positive dose-dependent response; patients who received higher-dose injections experienced the largest increase in vision gain.

Safety check. According to the authors, no safety issues were identified during the trial. What's more, prior studies show that the magnetic nanoparticles used in the cell delivery technology clear the body and pose no risk to patients undergoing MRI scans.[1]

Promising alternative. Current treatments for corneal edema secondary to endothelial dysfunction include keratoplasty or corneal transplant, said Dr. Koo, noting that serious complications can result from these procedures, including graft failure, graft rejection, and fungal keratitis. By contrast, the magnetic-hCEC transplants, delivered through a straightforward procedure that requires no additional surgical training, have a very low rejection risk, she said.

The use of this proprietary technology in ophthalmology could prove to be a more accessible and affordable nonsurgical treatment for patients with corneal edema than other current treatments, said Dr. Koo. This new approach "could potentially be revolutionary in addressing eyes that have had previous graft failures and are at risk for future endothelial keratoplasty failure," said Dr. Koo, noting that this method, if it passes future research phases, could also help address the global shortage of donor cornea grafts.

—Julie Monroe, MSN, RN, CIC

1 Ruhparwar A et al. *Thorac Cardiovasc Surg.* 2006;54(7):447-451.

Relevant financial disclosures: Dr. Koo—Emmecell: S.

Phase 1 Multicenter Study of Endothelial Magnetic Cell Therapy for Corneal Edema (event code Pa038). **When:** Sunday, Nov. 5, 11:42-11:49 a.m., during the cornea, external disease original papers session (11:30 a.m.-12:30 p.m.). **Where:** West 2006. **Access:** AAO 2023 registration.

NEURO-OPHTHALMOLOGY

IIH Rose 35% in Seven Years

PROMPTED BY THE LACK OF RECENT data on the prevalence of idiopathic intracranial hypertension (IIH) in the United States, researchers from Case Western Reserve University in Cleveland conducted an investigation into IIH among Americans. Their findings indicate that IIH prevalence increased between 2015 and 2022. The study also revealed that the condition appears to be linked to the obesity epidemic, which disproportionately affects girls and Black women.

While the overall goal was to gain a better understanding of IIH prevalence, lead author Jacqueline Shaia, MS, said, "We also wanted to determine the prevalence among minority populations and to see if minority populations are disproportionately affected."

Methodology. The researchers analyzed data from a large national database, the TriNetX registry, which included more than 85 million Americans and 57 health care organizations. Using ICD-10 codes and strict exclusion criteria, they stratified occurrence rates by age, sex, race, and ethnicity.

Key findings. The analysis revealed three key findings. 1) IIH prevalence increased by 1.35 times over the seven-year period, with the number of affected individuals per 100,000 rising from 7.3 to 9.9. 2) In 2022, 22.7 of every 100,000 Black females were diagnosed with IIH versus 15.4 of every 100,000 in the all-female group. 3) IIH cases also increased significantly, by 10 individuals per 100,000, among female pediatric patients ages 11 to 17.

Discussing the findings. The author said that the finding that Black women appear to be most affected is important "because there has been conflicting literature on whether IIH disproportionately affects individuals of different races or ethnicities."

Associated with obesity. Ms. Shaia said that in this study IIH is highly associated with obesity. "We looked at the obesity and BMI rates of individuals within the TriNetX registry and found that Black females have a higher BMI on average than the white female population and the average population," she said. The findings suggest that increasing rates of obesity, particularly in female, Black, and pediatric groups, may be driving the increased IIH prevalence in the United States, disproportionately affecting these populations.

Social determinants of health, such as access to health care and healthier foods, may play a role in IIH prevalence, but more research is needed to better understand whether obesity is driving the increased prevalence of IIH. Ms. Shaia said that the findings also highlight the need for regular and consistent vision health care in the United States and that ophthalmologists can play a crucial role in identifying IIH earlier.

Study limitations. A key limitation of this study involves the challenge in diagnosing IIH. "IIH is a diagnosis of exclusion, making it challenging to identify without the entire identifiable medical record. Since we didn't have this data, we could not confirm if the patients truly had disease," Ms. Shaia said.

An expert weighs in. "This study provides an important update on the prevalence of IIH and the demographics of people with IIH. Neuro-ophthalmologists have been concerned that a rise in IIH would occur with increasing obesity rates, and this study confirms that suspicion," said Prem Subramanian, MD, PhD, at the University of Colorado, who was not involved in this research.

"Prior research has shown that IIH outcomes may be worse in Black patients, and the finding here that Black women are disproportionately affected by IIH provides opportunities for clinicians to identify and reduce barriers to care that IIH patients may face," he said. *—Patricia Weiser, PharmD*

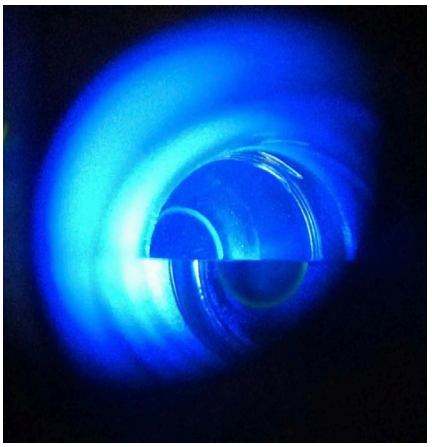
Relevant financial disclosures: Ms. Shaia—Cleveland Eye Bank Foundation: S; National Center for Advancing Translational Sciences: S; NEI: S; Research to Prevent Blindness: S. Dr. Subramanian—None.

The Prevalence of IIH and Its Racial Disparities Among Millions of Americans (Pa007). **When:** Saturday, Nov. 4, 9:45-9:52 a.m., during the neuro-ophthalmology original papers session (9:45-11:00 a.m.). **Where:** West 2006. **Access:** AAO 2023 registration.

GLAUCOMA

Reusing Some Supplies May Trim Costs

REUSING GONIOSCOPY AND TONOM- etry supplies can lead to substantial cost savings, according to new research by scientists at Columbia University Irving Medical Center. The total savings for the average ophthalmology practice associated with reusing these supplies tallied nearly $122,000 over one year



PRISMS. *Semicircles of the Goldmann-type applanation tonometer.*

and $1,225,000 over 10 years.

"This study highlights significant excess cost and waste generation in ophthalmology that is insidiously becoming common practice," said lead investigator Alexis Kassotis, MD, at Columbia University Medical Center. The savings associated with reusable ophthalmology equipment could be redirected to support patient care and other aspects of practice, she said.

Study approach. The researchers wanted to evaluate and compare costs associated with disposable and reusable ophthalmological devices, and they chose to focus on gonioscopy lenses and tonometry tips because both reusable and disposable versions of these are used in the United States, making a cost analysis and comparison possible.[1] The team used scenario analysis to estimate the cost of using disposable and reusable gonioscopy lenses and tonometry tips over one, five, and 10 years at a single medical center.

The brands used included iCare IC100 rebound tonometer and tips, Haag-Streit Goldmann applanation tonometry prisms, Tono Safe disposable tips, Volk reusable gonioscopy lenses, and Katena disposable gonioscopy lenses. Assuming all of these brands were available, Dr. Kassotis said, "The mean cost of all commonly used devices was calculated." For reusable tonometry tips and gonioscopy lenses, the cost of sanitation after each use and the need for replacement every few years—due to device dysfunction or loss and waste—was taken into account, said Dr. Kassotis.

Findings. Over the course of one year, reusing tonometry tips saved $97,037 compared to disposables, yielding an 89.9% cost savings. Adoption of reusable gonioscopy lenses saved $24,907 over one year, a 66.0% cost savings compared to disposable lenses. Over 10 years, using reusable tonometry tips saved $908,368 and using reusable gonioscopy lenses saved $316,275—a 96.5% and 91.6% cost savings, respectively.

Cost savings for reusable applanation tonometry prism tips and gonioscopy lenses combined led to an estimated total savings of $121,944 over a year's time. After a decade, the savings ballooned to more than $1.2 million. "A single disposable tonometry tip or gonioscopy lens is cheap. However, the cumulative cost of disposable devices is far greater than that of reusable versions because reusable options can be sanitized and reused many times," Dr. Kassotis said.

A potential drawback to reusable equipment is the theoretical risk of contact with mucous membranes and the spread of infection, said Dr. Kassotis. She added, however, that there is no high-quality evidence that reusable devices, when properly sanitized, increase infection transmission.

Additional considerations. Although this study focused solely on cost, both infection control and ease of use should be factors when choosing between disposable and reusable equipment, she said, adding, "The environmental impact of disposable devices should also be considered."

—Christos Evangelou, PhD

1 Junk AK et al. *J Glaucoma.* 2020;29(7):507-512.

Relevant financial disclosures: Dr. Kassotis—None.

Reusable Gonioscopy Lenses and Tonometry Tips Are Associated With Significant Potential Cost Savings (Pa064). **When:** Monday, Nov. 6, 10:21-10:28 a.m., during the glaucoma original papers session (9:45-11:00 a.m.). **Where:** West 2006. **Access:** AAO 2023 registration.

OCULOPLASTICS

Blepharoplasty FAQs: ChatGPT Has Patients Covered

MOTIVATED BY THE REALITY THAT artificial intelligence (AI), including chatbots like ChatGPT, are becoming a permanent part of the ophthalmological landscape, Arjun Watane, MD, at Yale School of Medicine, set out to learn more about how AI may be utilized by patients who are interested in undergoing upper eyelid blepharoplasty surgery. It turns out that ChatGPT-4 does an excellent job at answering patients' questions about the procedure, Dr. Watane said.

"For many years, the internet has been a primary source of medical information, and a lot of patients turn to it for health information for themselves, their families, and their friends," Dr. Watane said. In the last several years, he said, "a lot of health websites and search engines have incorporated or have plans to incorporate AI, like ChatGPT or ChatGPT-like language models, in their search algorithms. So, we wanted to look at how ophthalmology is impacted."

The research. Dr. Watane and his colleagues compared ChatGPT's responses to six frequently asked questions (FAQs) about upper eyelid blepharoplasty to the responses of three American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS)–trained oculofacial plastic surgeons.

The questions were: What is an upper eyelid blepharoplasty? Why is it performed? What are the risks and complications of the procedure? Where is it performed? What kind of anesthesia is used? What is recovery like?

For the ChatGPT portion of the study, the researchers ran the FAQs through ChatGPT-4 three times. For the human portion, each surgeon answered the questions using an online questionnaire. Last, two additional "graders"—ASOPRS-trained oculoplastic surgeons—blindly evaluated all the responses based on a Likert scale where

© American Academy of Ophthalmology

1 = strongly disagree and 5 = strongly agree.

Results. The authors said the results from ChatGPT were noninferior to those of the oculofacial plastic surgeons. ChatGPT achieved a mean score of 3.8 in accuracy, 3.6 in comprehensiveness, and 3.2 in personal answer similarity (meaning the ChatGPT answer's similarity to the grader's answer), while the surgeons received a mean score of 3.6 in accuracy, 3.0 in comprehensiveness, and 2.7 in personal answer similarity.

"Our primary finding was that ChatGPT may provide more comprehensive answers to frequently asked questions compared to human oculofacial plastic surgeons," Dr. Watane said. "However, the graders found no significant difference between their personal answer similarities, as well as the accuracy of the answers between the two."

The upshot. These findings have important implications for eye surgeons and patients in their clinical practices, primarily that ChatGPT can be beneficial for patient education. "The surgeons themselves will always need to provide the final answers, but ChatGPT does provide admissible information and may be appropriate as an adjunct but not a replacement for medical advice," Dr. Watane said.

Ultimately, this technology may help improve physician workflow, he said. "These are very common questions, but each question needs a full and comprehensive explanation. If patients are primed with these answers, they may already come in with a pretty broad working knowledge of the procedure. And physicians may only have to fine-tune or confirm the answers rather than offer a full explanation," Dr. Watane said.

He said that overall, ChatGPT could improve efficiency, reduce time, and decrease the burden on an already overburdened health care system.

Caveats. Of course, there are limitations to keep in mind, he said. The current study only looked at specific questions about upper eyelid blepharoplasty, so the findings can't be generalized to other questions or procedures. Additionally, ChatGPT and other language-learning models are limited to what that AI model is trained on, which may not always include the most current guidelines or information. "For an established procedure like blepharoplasty surgery, that may not be much of an issue," Dr. Watane said.

—Ashley Welch

Relevant financial disclosures: Dr. Watane—None.

ChatGPT and Frequently Asked Patient Questions for Upper Eyelid Blepharoplasty Surgery (Pa072). **When:** Monday, Nov. 6, 12:30-12:37 p.m., during the ocular pathology and oculoplastics original papers session (11:30 a.m.-12:45 p.m.) **Where:** West 2006. **Access:** AAO 2023 registration.

See the financial disclosure key, page 8. **For full disclosures,** including category descriptions, view this News in Review at aao.org/eyenet.

Light Adjustable Lens™

INDICATIONS FOR USE AND IMPORTANT SAFETY INFORMATION

INDICATIONS: The Light Adjustable Lens™ and Light Delivery Device™ system is indicated for the reduction of residual astigmatism to improve uncorrected visual acuity after removal of the cataractous natural lens by phacoemulsification and implantation of the intraocular lens in the capsular bag in adult patients with preexisting corneal astigmatism of ≥ 0.75 diopters and without preexisting macular disease. The system also reduces the likelihood of clinically significant residual spherical refractive errors.

IMPORTANT SAFETY INFORMATION

CONTRAINDICATIONS: The Light Adjustable Lens is contraindicated in patients who are taking systemic medication that may increase sensitivity to ultraviolet (UV) light as the Light Delivery Device (LDD®) treatment may lead to irreversible phototoxic damage to the eye; patients who are taking a systemic medication that is considered toxic to the retina (e.g., tamoxifen) as they may be at increased risk of retinal damage during LDD treatment; patients with a history of ocular herpes simplex virus due to the potential for reactivation from exposure to UV light; patients with nystagmus as they may not be able to maintain steady fixation during LDD treatment; and patients who are unwilling to comply with the postoperative regimen for adjustment and lock-in treatments and wearing of UV protective eyewear. **WARNINGS**: Careful preoperative evaluation and sound clinical judgment should be used by the surgeon to decide the risk/benefit ratio before implanting an IOL in a patient with any of the conditions described in the Light Adjustable Lens and LDD Professional Use Information document. Caution should be used in patients with eyes unable to dilate to a pupil diameter of ≥ 7 mm to ensure that the edge of the Light Adjustable Lens can be visualized during LDD light treatments; patients who the doctor believes will be unable to maintain steady fixation that is necessary for centration of the LDD light treatment; and patients with sufficiently dense cataracts that preclude examination of the macula as patients with preexisting macular disease may be at increased risk for macular disease progression. **PRECAUTIONS**: The long-term effect on vision due to exposure to UV light that causes erythropsia (after LDD treatment) has not been determined. The implanted Light Adjustable Lens MUST undergo a minimum of 2 LDD treatments (1 adjustment procedure plus 1 lock-in treatment) beginning at least 17-21 days post-implantation. All clinical study outcomes were obtained using LDD power adjustments targeted to emmetropia post LDD treatments. The safety and performance of targeting to myopic or hyperopic outcomes have not been evaluated. The safety and effectiveness of the Light Adjustable Lens and LDD have not been substantiated in patients with preexisting ocular conditions and intraoperative complications. Patients must be instructed to wear the RxSight-specified UV protective eyewear during all waking hours after Light Adjustable Lens implantation until 24 hours post final lock-in treatment. Unprotected exposure to UV light during this period can result in unpredictable changes to the Light Adjustable Lens, causing aberrated optics and blurred vision, which might necessitate explantation of the Light Adjustable Lens. **ADVERSE EVENTS**: The most common adverse events (AEs) reported in the randomized pivotal trial included cystoid macular edema (3 eyes, 0.7%), hypopyon (1 eye, 0.2%), and endophthalmitis (1 eye, 0.2%). The rates of AEs did not exceed the rates in the ISO historical control except for the category of secondary surgical interventions (SSI); 1.7% of eyes (7/410) in the Light Adjustable Lens group had an SSI ($p < .05$). AEs related to the UV light from the LDD include phototoxic retinal damage causing temporary loss of best spectacle corrected visual acuity (1 eye, 0.2%), persistent induced tritan color vision anomaly (2 eyes, 0.5%), persistent induced erythropsia (1 eye, 0.3%), reactivation of ocular herpes simplex Infection (1 eye, 0.3%), and persistent unanticipated significant increase in manifest refraction error (≥ 1.0 D cylinder or MRSE) (5 eyes, 1.3%). **CAUTION**: Federal law restricts this device to sale by or on the order of a physician. **Please see the Professional Use Information Document for a complete list of contraindications, warnings, precautions, and adverse events.**

©2023 RxSIGHT. All Rights Reserved. COM-1016 Rev B

RxSIGHT