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The Art of Eyes

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Pushing back on BAK

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1. Durr et al. *Eye and Vision*. 2020. 2. Pidro A, Biscevic A, Pjano MA, Mravicic I, Bejdic N, Bohac M. *Acta Inform Med*. 2019 Dec. 3. Töteberg-Harms M, Hanson JV, Funk J. *BMC Ophthalmol*. 2013 Jun.

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The Art of Eyes 2024

This year's collection of ophthalmology-inspired images shows the profession's creative streak is as strong as ever

Ten years ago we published the inaugural edition of “The Art of Eyes,” which, among other things, demonstrated recent advancements in imaging technology. The issue’s cover depicted a cluster of nascent retinæ generated from 3D embryonic stem cell cultures. It was an homage to the beauty of the eye and the progress made from when the human retina was first photographed 128 years earlier.

Much has changed, even since 2014. The impact of artificial intelligence is arguably at its tipping point, many new products have been launched, and there have been notable improvements in the scope of practice. As for “The Art of Eyes,” we have broadened our horizons to a format more akin to a gallery, including illustrations, paintings, photography, digital images, and other forms of visual creative expression from ophthalmologists and ophthalmic practitioners.

In the world of the professional, the idea of artistry might be undermined by the notion that it is not a “serious” pursuit. But art, of course, can provide plenty of enrichment. A 2017 study from the American Academy of Ophthalmology identified that 86 percent of practicing US ophthalmologist members were very satisfied with ophthalmology as a career choice. And as the works submitted to us show, a practitioner can love the discipline of their profession while also drawing on art for more personal goals. For some, it is a personal pleasure; for others, it’s an education. Often, it is both.

Jamie Irvine,
Associate Editor




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Landmark nAMD Treatment

Could robot-assisted radiotherapy offer a new treatment choice for neovascular age-related macular degeneration?

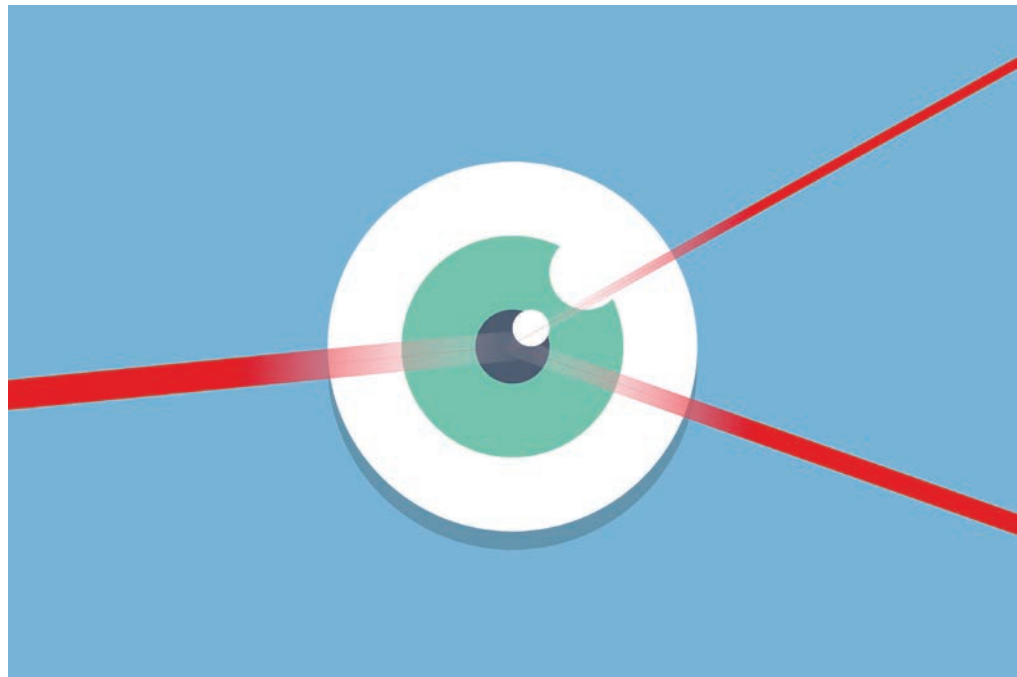
For the majority of patients, neovascular age-related macular degeneration (nAMD) demands long-term management of the condition. Existing literature notes that the current cornerstone treatment for nAMD – intravitreal injections of anti-VEGF agents, such as aflibercept, ranibizumab, or off-label bevacizumab, given roughly every one-to-three months – can be slightly more effective than a pro re nata (PRN) injection regimen (1).

But what if there was a way to further cut down intravitreal injection frequency for patients?

Well, now there might just be: a research team at King’s College London has successfully tested a custom-built, robotically controlled device that administers three beams of highly focused overlapping radiation at the macula of patients.

In a randomized, sham-controlled trial designed to test efficacy of the device (2), the researchers enrolled 411 participants between 2015 and 2019, with 274 receiving the stereotactic radiotherapy (SRT) treatment and 137 receiving the sham treatment. The study, published in *The Lancet*, reported a 22 percent reduction in the number of ranibizumab injections required in the SRT patients; the researchers estimate that these results indicate that the innovative treatment could potentially save 1.8 million injections per year globally.

“The key attraction [of SRT] is that it doesn’t involve an intravitreal injection and can be delivered in a simple, one-off,



outpatient procedure,” explains study lead Timothy Jackson, a consultant ophthalmic surgeon at King’s College Hospital, London. “[And] it only needs to be delivered once, so thereafter we do not rely on patient compliance to drive efficacy.”

Even taking into account the cost of SRT treatment, in the UK (where the study was conducted) the reduced dosing of ranibizumab led to net cost-savings of around £565 per patient over a two-year period.

Whereas *The Lancet* study focused exclusively on how ranibizumab anti-VEGF agent injection frequency is affected by SRT, Jackson states that “On biological principles, we would anticipate that [SRT] works with other anti-VEGF agents, but without data to prove that we need to be circumspect in asserting that is definitely the case.” In terms of next steps for the team, he notes that “After year 2 participants revert to standard care. However, they and investigators remain masked, so we will be able to collect robust real-world data out to year 4. That will be really useful data as it allows us to look at the durability of treatment effect, long-term safety, and how the treatment

performs off trial.”

When it comes to the global future of the SRT device, Jackson is optimistic about their development, but remains cautious about its broader implications: “Research has previously tried to find a better way to target radiotherapy to the macula... but so far nothing has been sufficiently precise to target macular disease less than 1 mm across. With this purpose-built robotic system, we can be incredibly precise. However, the positive and negative effects of radiation can manifest over a long time horizon, so it will be important to review the year 3 and 4 data before advocating widespread adoption.”

References

1. E Li et al., “Treatment regimens for administration of anti-vascular endothelial growth factor agents for neovascular age-related macular degeneration,” *Cochrane Database Syst Rev.*, 5 (2020). PMID: 32374423.
2. TL Jackson et al., “Stereotactic radiotherapy for neovascular age-related macular degeneration (STAR): a pivotal, randomised, double-masked, sham-controlled device trial,” *The Lancet* [Online ahead of print.] (2024). PMID: 38876132.



Explorers of Darkness

A drawing selected from The Museum of Optography, which, at its core, focuses on ‘The Last Image’ bleached onto the retina at the moment of death. Here, a group of explorers mount their way through the inner-retina.

Credit: Derek Ogbourne, Fine Artist and Founder of the Museum of Optography:
<http://museumofoptography.net/>

QUOTE of the month

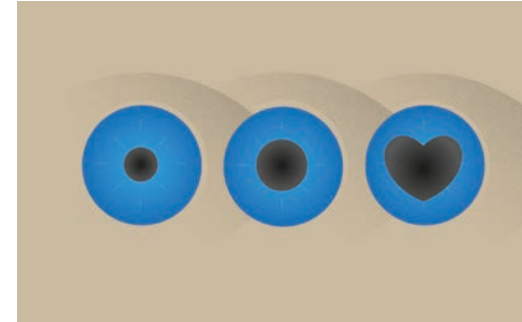
“First, identify your ideal patients and the problem you want to solve. Understand their demographics, needs, preferences, fears, frustrations, wants, and aspirations. Choose one avatar and one problem to solve. Avoid trying to solve many problems for different people.”

Rod Solar, “Sixteen Weeks to Launch”
 (top.txp.to/sixteen/weeks/to/launch)



Beauty in the Iris

New Cognition study reveals how pupil size can impact a person’s perceived attractiveness



Prompted by the idea that “beauty brings many social benefits,” researchers have investigated how pupil size can affect a person’s attractiveness.

“The primary goal of this study is to conclusively determine whether constricted pupils – compared to dilated pupils – enhance perceived attractiveness,” explains study author Martina Cossu.

The team enrolled over 3,000 participants, asking them to judge pairs of photos using a slider scale from 0 (“very unattractive”) to 100 (“very attractive”). The paired photos, although identical in every other way, were manipulated so that in one photo the models had constricted pupils, and in the other dilated pupils.

The findings indicate that “constricted pupils enhance physical attractiveness by making the eyes appear brighter,” confirms Zachary Estes, a co-author of the study.

Reference

1. M Cossu et al., “Beauty is in the iris: Constricted pupils (enlarged irises) enhance attractiveness,” *Cognition*, [Online ahead of print] (2024). PMID: 38850842.

XENIA Corneal Implant: A Sensible Alternative to Corneal Transplants for Keratoconus Patients

Experts outline the surgical benefits and improved patient outcomes using XENIA corneal implants for keratoconus

XENIA is a corneal implant which uses corneal collagen from pigs. The lamella structure of collagen in corneas is ubiquitous throughout the animal kingdom, with the exception of some elasmobranchs, i.e., sharks and rays. One could say that it has been successfully validated by Mother Nature over hundreds of millions of years. Indeed, as John Marshall, Emeritus Professor of Ophthalmology, Institute of Ophthalmology Faculty of Brain Sciences, UCL, London, points out, “the first cornea with today’s structure was in a fish – 580 million years ago. When nature gets something right, it sticks with it.”

With pig corneas, Marshall explains, “You’re dealing with an architectural structure identical to that of humans.” And when this material has undergone the process of decellularization to remove cells and antigens, “you are left with a biologically pure, non-immune-response generating system.” After washing and

compressing, the material undergoes a proprietary crosslinking process which stabilizes it. Thus, the material’s natural lamella infrastructure is preserved together with its transparency while its biomechanical properties may be enhanced, Marshall adds.

XENIA implants are used to avoid corneal transplantation in patients with keratoconus or to defer corneal transplantation as long as possible. Being significantly stronger than the patient’s own stroma, XENIA stabilizes the patient cornea and regularizes the patient corneal topography, flattening the cornea, as well as reducing higher order aberrations.



John Marshall



Mr. Marwan Ghabra



Mr. B. Ilango

XENIA in practice

Mr. Marwan Ghabra, Senior Consultant Ophthalmic Surgeon at Barts Health NHS Trust Whipps Cross University Hospital, London, and Mr. B. Ilango, Royal College Certified Laser & Multifocal Lens Implant Specialist at Wolverhampton Eye Infirmary, UK, are practicing surgeons with first-hand experience of using XENIA implants.

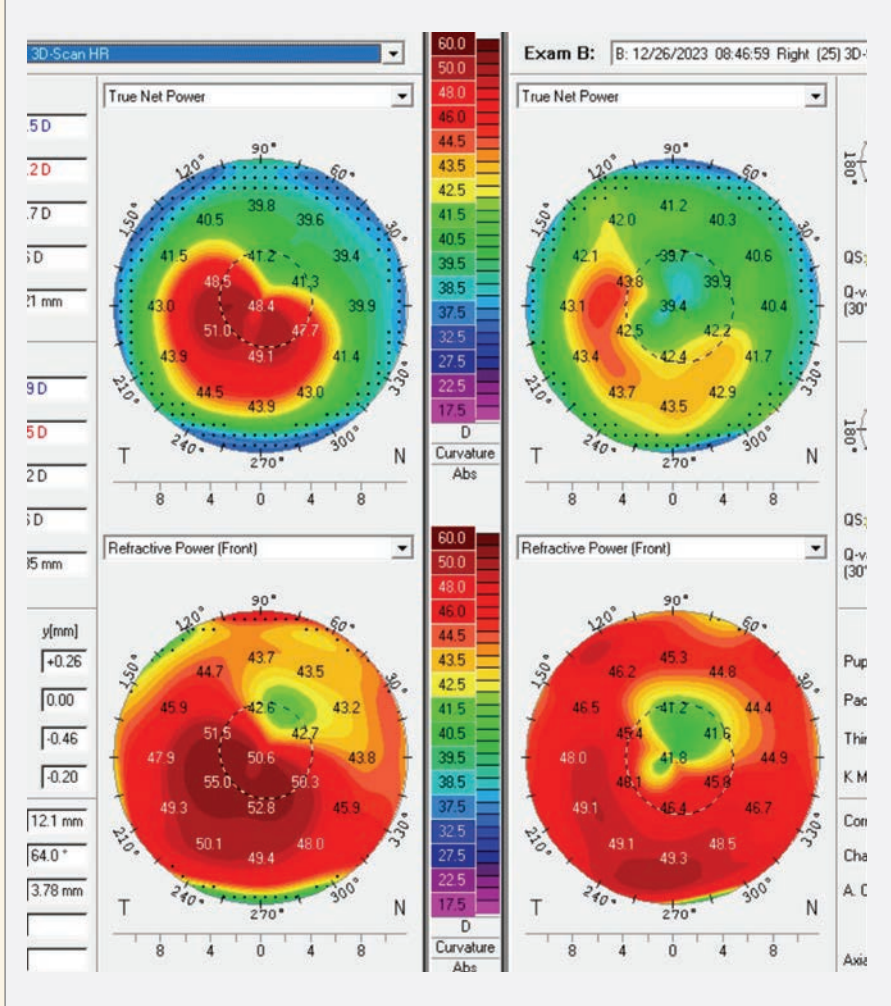
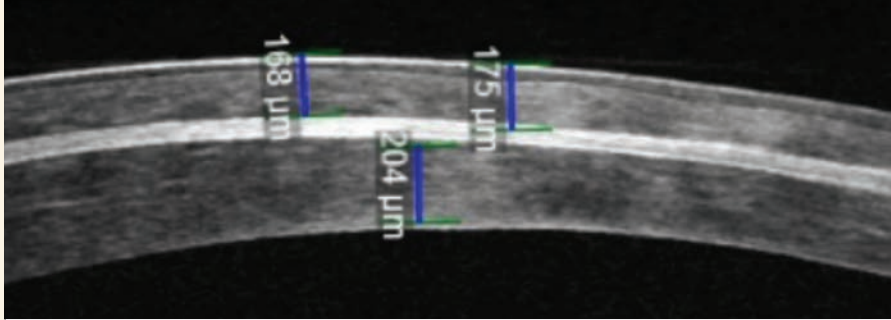
As an ophthalmologist focused on improving outcomes for keratoconic patients, Ghabra has spent many years in developing and refining new techniques. One of these is the Ghabra Technique, which involves the use of a XENIA intracorneal implant to create safely located, deep corneal pockets to address and reduce irregularities in the posterior and anterior corneal surface. “This technique has since become my preferred method for pocket creation and ensures that the pocket is created at the optimal depth for each individual, enhancing the overall effectiveness of the procedure,” he explains.

“You’ve got exactly the structure you want, and you can manipulate the biomechanics to the strength that you want.”

Having treated keratoconus patients with many surgical techniques over 20 years, Ilango praises the XENIA corneal implant for its biological material, easy availability, and cornea flattening properties. With XENIA, “the surgery can be done under topical anaesthesia and takes 15 to 30 minutes,” he explains. “Femtosecond laser pocket creation makes the dissection very predictable and neat, while the XENIA implant, being a biological material, blends into the patient’s corneal stroma.” Ilango adds that no rejection has been reported and, since it “restores near-normal anatomy to the centre of the cornea, the visual improvement can be remarkable.”

Following a XENIA implant, “all my patients have been satisfied to varying degrees and can get on better with their life due to improved best corrected vision,” adds Ilango. “Version X4 of the implant is particularly promising,” he goes on. “One of my recent patients is still ‘over the moon’ with her unaided visual improvement to better-than-driving-standard within 48 hours post-surgery.”

Ghabra also notes that his patients have also shown significant improvements in visual acuity and corneal stability, “reducing the need for more invasive procedures such as corneal transplants.” He adds, “The use of the XENIA implant not only addresses the immediate structural issues but also provides long-term benefits. In conjunction with the Ghabra Technique, it has shown



an average drop in Kmax of 15 dioptres. It represents a practical advancement in our ability to manage keratoconus more effectively and with fewer complications.”

Unlike many other corneal procedures that are subtractive (taking away material from the cornea), XENIA is additive. “The lenticule is placed within the body of the stroma; I call this stromal supplementation surgery,” says John Marshall. “For me this is great, because having produced and patented the Excimer laser for corneal laser refractive surgery I guess I’ve been one of the ‘culprits’ in weakening the cornea for 30 or 40 years. I was looking for something that would strengthen the cornea and indeed these

lenticules have the potential of refractive surgery by addition, not subtraction. In keratoconus surgery, the idea is to put in a “stromal splint” to compensate for the loss of biomechanical properties in the host. With this more sophisticated XENIA technology, we can actually use these implants not only to stop the conic bulge, stop the biomechanical disturbance, but at the same time begin to correct the refractive properties.”

The XENIA implant is reversible and exchangeable. If the patient’s vision or corneal situation changes over time, the implant can be exchanged with another one that is better aligned with the new

corneal or visual situation of the patient. Moreover, the XENIA implant is custom-made. Unlike the vast majority of ophthalmic implants that are mass-manufactured to pre-defined standards, it can be tailored individually to be perfectly aligned for the individual need of the individual patient.

Quality and reproducibility

Tissue of porcine origin has been routinely used in surgery for more than 30 years – for example, in patients needing heart valve replacements. Further, says Marshall, “pig skin is used on burns victims, whole pig organs have been transplanted, and researchers are now looking at porcine pancreatic cells for diabetes.” Where sourcing human donor material is difficult, there is no such problem with pigs, given the hundreds of millions that are routinely farmed in Europe alone. Around the world, “there are millions of individuals that need some kind of corneal transplantation surgery, but can’t access it because of the shortage of human donor material, particularly in low- and middle-income countries,” says Marshall. And in many places, the financial and access challenges associated with human corneal donations are compounded by religious or cultural pressures that stop people donating material.

“With the pig tissue, you’ve got exactly what you want,” says Marshall. “You’ve got exactly the structure you want, and you can manipulate the biomechanics to the strength that you want.” The XENIA implant now has regulatory approval in Europe, the UK, and India, and has been used in almost 200 implants in human eyes with no significant complications or immune responses. “All this is a good measure of the quality and reproducibility of the product.”

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Verifying Your Vision and Values

The importance of a vision statement – and how the concept influenced this year’s inaugural Ophthalmpreneurs meeting

By Bernie Haffey, President and Founder of Haffey&Co.

In April 2024, I had the pleasure of leading a Vision and Values workshop at the Ophthalmpreneurs meeting in beautiful Stresa, Italy. This short article summarizes the session, which was executed in less than one hour – a true sprint!

Vision

The subject of the session was “Why my organization should create a vision statement.” Briefly, a vision statement is a concise, memorable, and aspirational statement describing your organization’s long-term goals. It represents a visible future state, and is often written in future tense. It can present bold claims which, over time, the organization can defend and ultimately own. Vision statements can be audacious – sometimes they are written by organizations who have no present right to the claim their statement makes. But ultimately, they help to guide an organization’s decisions and actions.

We can break a vision statement down into superlative and descriptor components. The Ritz-Carlton hotel chain positions its vision, for example, as “To be the premier worldwide...” (superlative) “provider of luxury travel and hospitality products and services” (descriptor).

Why do you need a vision statement?

Briefly, a well-constructed vision



statement can facilitate:

Organizational alignment. Well-constructed vision statements enhance alignment of functions and individuals to a defined future state or destination.

Employee engagement. Well-constructed vision statements engage and motivate team members and affiliates in a common purpose and direction. Employees who understand the organization’s long-term goals are proven to be more motivated and likely to remain with your organization.

Decision making. Good vision statements guide decisions and actions (for example, is scenario A or scenario B more likely to achieve our vision?)

Strategic marketing. An effective vision statement can strengthen your position in the marketplace. Here, you should think in terms of making a bold claim to own a market or segment of a market, which you will defend and, over time, own.

At the Stresa workshop, attendees sought to create a vision statement for Ophthalmpreneurs itself. A pre-meeting survey identified strong words in “global”, “community,” and “entrepreneurship.” From there we fashioned five options, from which this vision statement was chosen:

“Ophthalmpreneurs: The global community driving business innovation and entrepreneurship in private ophthalmology.”

“A vision statement is a concise, memorable, and aspirational statement...”

Values

With the vision statement accomplished, an organization should agree on a set of shared values. Having shared values will help a company to:

- set expectations for behaviors necessary to achieve your vision
- shape your culture, which can become a competitive advantage
- align teams around a common language that improves speed and efficiency
- provide higher quality products and services at lower cost
- simplify the process of hiring, firing, and awarding promotions

The session in Stresa was rewarding and enjoyable as a very rapid introduction and application of these critical elements. I am sure that Ophthalmpreneurs – as it absorbs and refines the lessons above – will continue to go from strength to strength!

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How Biomarker Detection is Personalizing Treatment Decisions in Diabetic Macular Edema

Enabling early intervention with technological advances, healthcare professionals can improve outcomes for people with DME

Managing diabetic macular edema (DME), the main cause of vision loss in people living with diabetes, is a complex challenge due to late detection and treatment response variability (1, 2). With deepening understanding of ocular biomarkers and advances in artificial intelligence (AI), healthcare professionals are gaining the tools to swiftly identify DME and deliver timely interventions to help improve patient care (3, 4).

DME is characterized by inflammation, retinal thickening, and macular swelling (2). Some studies suggest that almost one in three people with diabetes are affected by DME (5). When improperly managed or left untreated, progressive retinal damage from DME may severely impair vision (6). “If patients do not respond to treatment, they lose visual acuity,” adds Dr. Mathias Schifflers, International Medical Affairs Head of Eye Care at AbbVie.

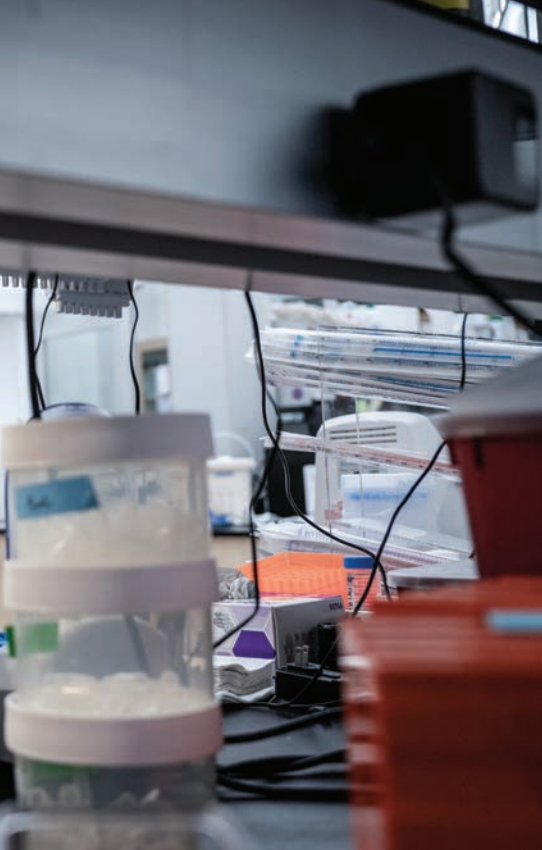
How can we use biomarkers to predict how patients will respond to treatment? Inflammation has a key role in the pathophysiology of DME, driven by several biochemical processes triggered through hyperglycemia (7), says



Schifflers. “Unlike other retinal diseases such as neovascular age-related macular degeneration, we see the expression of multiple inflammatory cytokines, broadening possible treatment targets. There are multiple pathways that could be driving the edema; for example, if there is a greater inflammatory component, the edema may be less likely to resolve quickly with anti-vascular endothelial growth factor (VEGF) agents. The presence of various inflammatory cytokines is associated with different DME phenotypes and can be used to

help determine prognosis and response to treatment.”

Imaging innovations have changed the landscape of DME through increasingly advanced ocular biomarker detection (8). Dr. Jie Shen, Vice President of Translational Sciences at AbbVie, explains: “Right now, we use optical coherence tomography (OCT) to look at structural features of the disease: at which layer of the retina is the edema? How thick is it – how much fluid has accumulated, especially around the macula?” Shen has decades of experience



“As understanding of ocular biomarkers increases and AI devices are validated, treatment decisions will continue to become more personalized, elevating the standard of care.”

in ophthalmology and says these retinal thickness measurements can be used to detect severity and location of the edema. Monitoring for changes in these factors is one aspect of measuring DME treatment efficacy (9).

Research shows that certain OCT

biomarkers indicate how an eye with DME may respond to different treatment classes, allowing personalized decision-making in patient care (10). “Many groups, including leading retinal experts, have published on the role of OCT biomarkers in predicting response to treatment with intravitreal therapies,” Schiffers observes. “We are conducting studies to understand which patients potentially respond well to specific treatments by analyzing optical biomarkers.” OCT biomarkers such as hyper-reflective foci, outer retinal layer disruption, and intraretinal cysts may help to predict treatment response (10).

How is research and clinical practice evolving now that we better understand the pathophysiology of DME?

“This is where AI comes in,” says Shen. “Even with the most advanced OCT machine, it’s not necessarily at a point that you can delineate exactly which retinal cell layer has edema and readily quantify the edema volume.”

Schiffers adds, “AbbVie is working at the forefront of what science can provide by partnering with AI technology and academic researchers to investigate treatment responses. This will help us to guide treatment using OCT to identify predictive features, really changing the standard of care.”

“AI could predict disease progression based on an individual retina’s structural features, even maybe getting to a point at which it can determine what kind of therapy a person would be most responsive to,” says Shen.

By utilizing technological advances in clinical practice to enable early intervention, healthcare professionals can improve outcomes for people with DME (3). Schiffers adds: “Some key groups have recognized the value of using biomarkers to tailor treatment to patient phenotype, helping ensure patients are initiated on the treatment most likely to provide an optimal response. As understanding of ocular biomarkers increases and AI devices are validated, treatment decisions will

continue to become more personalized, elevating the standard of care.”

References

1. S Sharma et al., “Innovations in Diabetic Macular Edema Management: A Comprehensive Review of Automated Quantification and Anti-vascular Endothelial Growth Factor Intervention,” *Cureus*, 16 (2), e54752 (2024).
2. B Bahrami et al., “Diabetic macular oedema: pathophysiology, management challenges and treatment resistance,” *Diabetologia*, 59 (8), 1594–608 (2016).
3. SS Lwin et al., “Utilizing AI to Detect Diabetic Macular Edema in OCT Scans: Performance and Dataset Insights,” *IOVS*, 65, 2350 (2024).
4. L Li et al., “Application of Artificial Intelligence in Precision Medicine for Diabetic Macular Edema,” *APJO*, 12 (5), 486–94 (2023).
5. C Duphare et al., “Diabetic Macular Edema,” in *StatPearls [Internet]*, USA, StatPearls Publishing (2021).
6. MA Rose et al., “Adherence of patients with diabetic macular oedema to intravitreal injections: A systematic review,” *Clin Exp Ophthalmol*, 48 (9), p. 1286–98 (2020).
7. EA Urias et al., “Novel therapeutic targets in diabetic macular edema: Beyond VEGF,” *Vision Research*, 139, 221–7 (2017).
8. A Markan et al., “Novel imaging biomarkers in diabetic retinopathy and diabetic macular edema,” *Ther Adv Ophthalmol*, 12, 2515841420950513 (2020).
9. G Trichonas, PK Kaiser, “Optical coherence tomography imaging of macular oedema,” *Br J Ophthalmol*, 98, no. Suppl 2, p. ii24–ii29 (2014).
10. MR Munk et al., “The Role of Intravitreal Corticosteroids in the Treatment of DME: Predictive OCT Biomarkers,” *Int J Mol Sci*, 23 (14), 7585 (2022).

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The Art of Eyes 2024

*Showcasing a selection of art from across
the spectrum of ophthalmology*

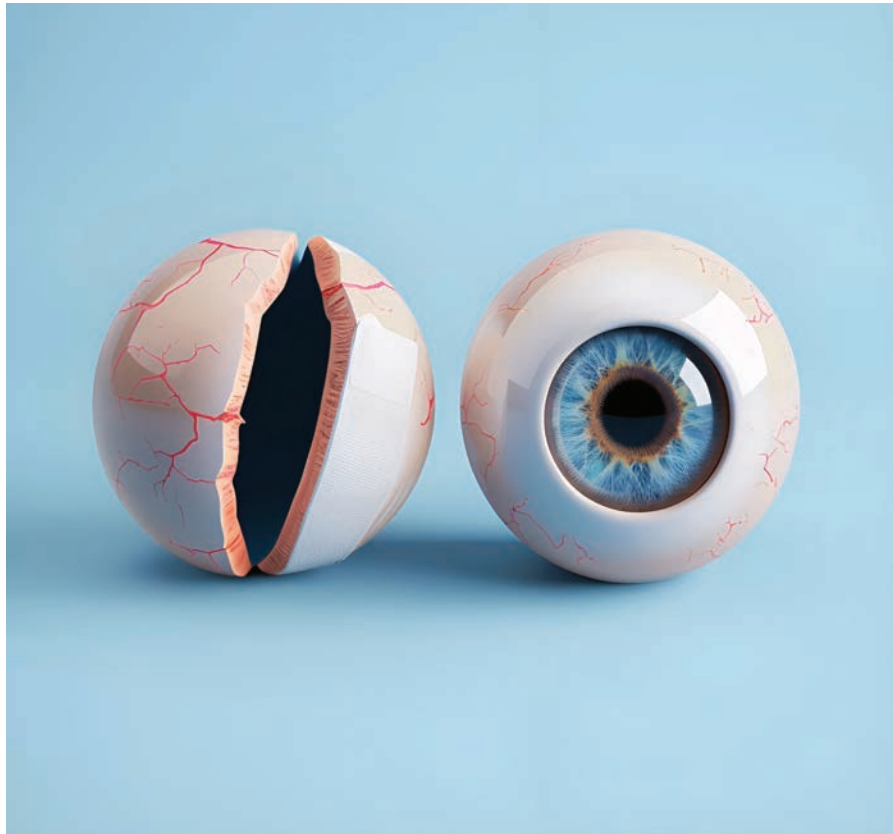
This year marks the 10-year anniversary of The Ophthalmologist's Art of Eyes feature. Once again we are proud to present the finest images, illustrations, and paintings produced by practitioners working in the field.

INTANGIBLE *to* TANGIBLE

Nima Ghadiri is a consultant ophthalmic physician. "This holistic, integrative speciality exists at the interface between the eye and systemic medicine," he says.

Ghadiri recently co-hosted the Uveitis North-West training day, "A Palette of Possibilities," at the Whitworth Art Gallery in Manchester, UK. He believes that art can be invaluable in giving form to the subjective experiences of patients, transforming the intangible into tangible visual representations. In ocular inflammation (which can be invisible to the naked eye), art can capture the complexities of the condition, and even create a visual narrative.

Title: Reflections on the Eye



EYES of CONFLICT

Fares Antaki was born and raised in Aleppo, Syria. Currently a vitreoretinal surgery fellow at the Cleveland Clinic Cole Eye Institute, he has had a long-standing passion for art and technology. The rise of generative artificial intelligence models has enabled him to combine these interests, easing the technical skills required for art creation.

Of this image, he says: “The rise of worldwide armed conflicts has brought immense suffering. For survivors, the aftermath can involve life-altering wounds – including ocular injuries. Losing vision means more than just the loss of sight; it often signifies the loss of livelihood for entire families, perpetuating a cycle of misery.”

www.faresantaki.com

The TEAL INVASION

Rushmia Karim completed her medical degree at the University of New South Wales, Australia, and earned a Masters’ degrees in Ophthalmology and Clinical Epidemiology from the University of Sydney. She also holds a Genomics degree from Imperial College London. She later trained in the London ophthalmology vocational program, including Moorfields Eye Hospital, where she completed a fellowship in Strabismus and Paediatric Ophthalmology and has subspecialty training in neuro-ophthalmology.

She is a Fellow of the Royal Australian and New Zealand College of Ophthalmologists and the Royal College of Ophthalmologists, UK, and is affiliated with the Save Sight Institute at the University of Sydney.

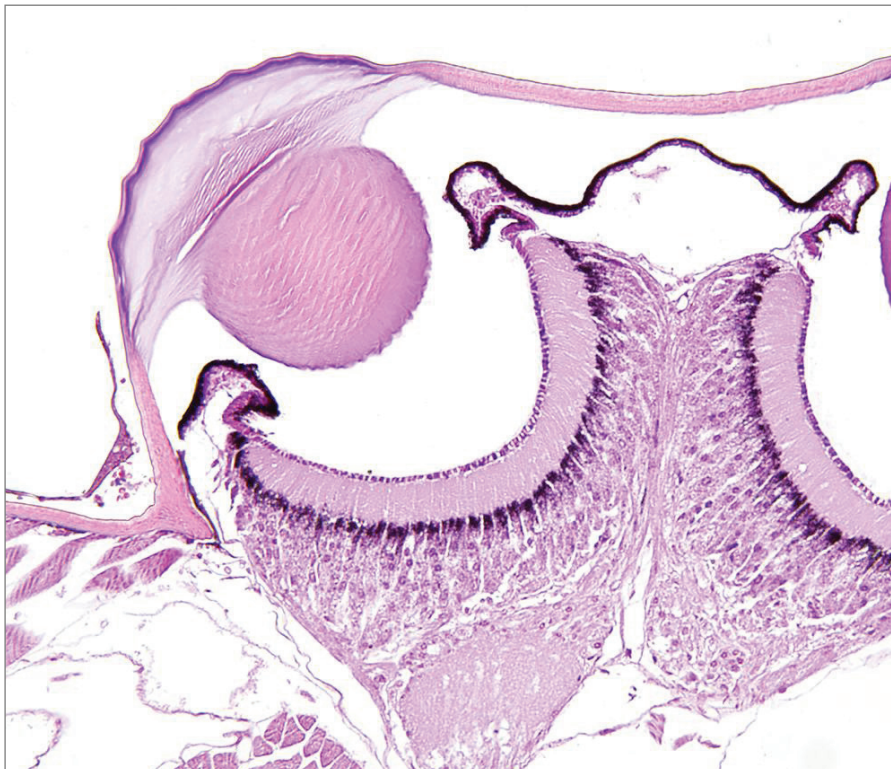
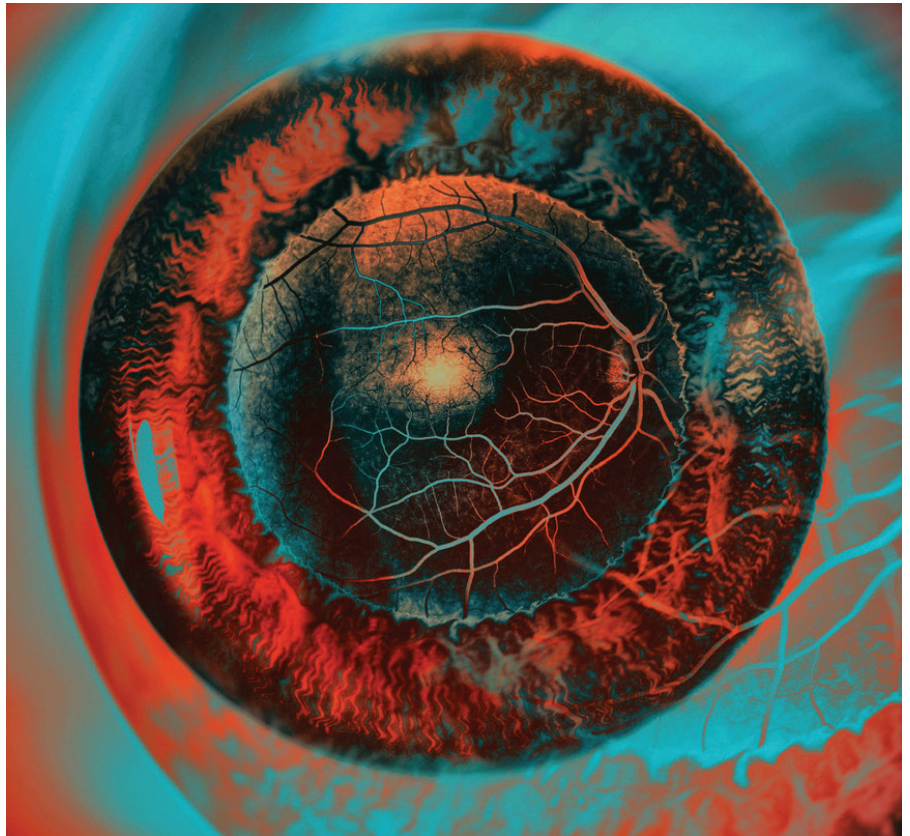


“During the Australian federal election I painted the political landscape that would end up shaping Australia.”

PATTERNS *of the IRIS*

Monika Majchrowicz has been practicing ophthalmology for over 20 years in Bielsko-Biala, Poland. In her view, “the iris is one of the most fascinating and beautiful tissues in the human body. Each iris has unique and intricate patterns – not even identical twins have iris patterns that are the same.”

Majchrowicz occasionally isolates the iris from its surroundings in her photography, presenting it in a simple, minimalist style. At other times, she combines iris photos with those taken by a fundus camera for a less realistic effect. These close-up photos reveal details such as color gradients, textures, patterns, and even tiny blood vessels, making the eyes appear like alien landscapes.



The COMPARATIVE OCULAR PATHOLOGY LABORATORY *of* WISCONSIN

The Comparative Ocular Pathology Laboratory of Wisconsin (COPLOW) was founded in 1983 when Dick Dubielzig was hired to provide pathology services at the University of Wisconsin Veterinary School. COPLOW provides diagnostic services for veterinary ophthalmologists, educational services, and clinical research of ocular pathology and anatomy.

www.vetmed.wisc.edu/lab/coplow/

DEEP into the EYE

Mirna Ehab is an Egyptian doctor, self-taught artist, and medical illustrator, who has a strong belief in the ability of art to express ideas, teach, and learn.

The eye, the inspiration for modern day cameras.



Dr. Lizard: "Ma'am, those are some truly exquisite polar bear tracks."

Ms. Polar Bear: "You're too kind, doctor."



Dr. Lizard and the polar bear tracks

The RETURN of DR. LIZARD

Dorothea Laurence is a second-year resident at the university clinic in Göttingen, Germany (Universitätsmedizin Göttingen). Between graduating from medical school and her current residency, she spent a few years in the US with her husband and daughters. That's where her love for English-speaking cartoon animals and mixed-media illustrations was born. Her favorite tools are dip-pens and ink, pencils and watercolors.

During the first year of her residency, the pun-leaning terminology in ophthalmology inspired her to create the enigmatic character "Dr. Lizard," who was featured in the summer art issue of *The Ophthalmologist* in 2021. Since Dr. Lizard's first appearance, his impeccable diagnoses have become a regular contribution in the magazine of one of the two main German ophthalmology associations, "Der Augenarzt" (BVA, Berufsverband der Augenärzte Deutschlands)."

www.dorothealaurence.com.

www.instagram.com/dorotheaslaurence/?hl=en

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EYE on UKRAINE

Ariana Allen is a Ukrainian-American ophthalmology resident at Duke University, where she also completed her medical school training. Allen's piece, *Eye on Ukraine*, was first featured at the Ukrainian Art Festival in Durham, NC in 2023. As the war in Ukraine continues, Allen hopes this painting will not only highlight the beauty of sight, but also encourage individuals not to be blind to world issues that may seem distant but have far-reaching consequences.

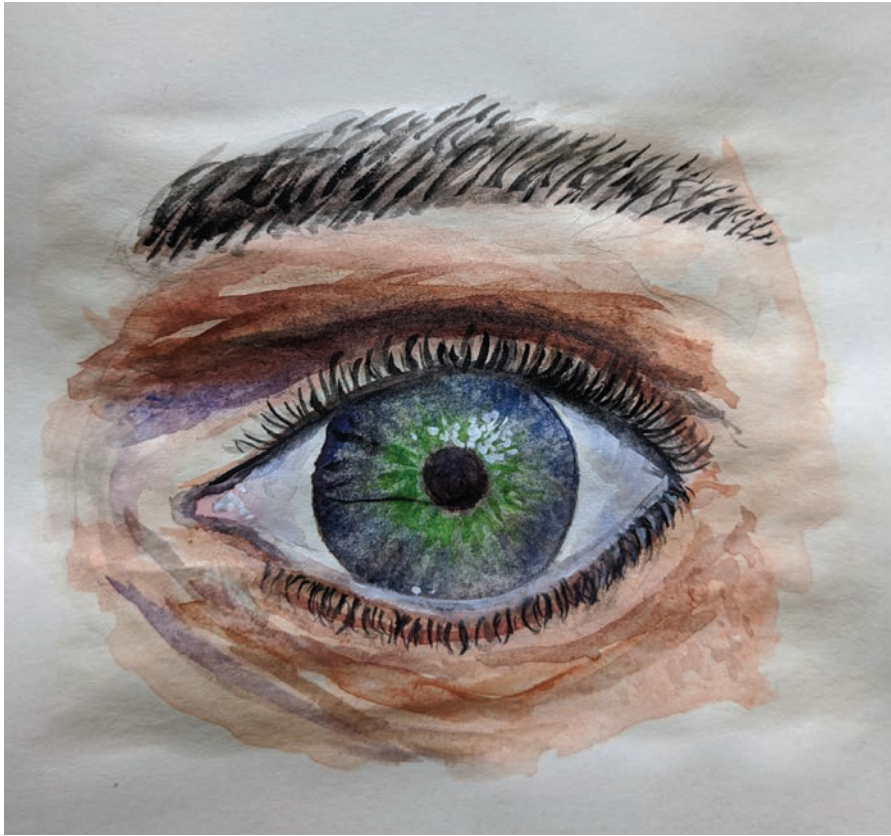
www.vetmed.wisc.edu/lab/coplowl/
"Eye on Ukraine" is a acrylic on canvas painting depicting an eye with a vivid iris of blue and yellow set within a multicolored eyelid that stands out against a stark black background.



EYE SEE STARS

Antonio Yaghy is an intern at UMass Memorial Medical Center in Worcester, MA, USA. In addition to his passion for ophthalmic research, he enjoys creating digital art, playing music, and writing poetry. His artistic works have been selected for publication in medical journals including the *AMA Journal of Ethics*, *JAMA Oncology*, the *Canadian Medical Education Journal*, and *Palliative & Supportive Care*.

Highlighting the profound connection between our eyes and the universe, reminding us of the wonders that sight allows us to perceive.



PROGRESS OVER PERFECTION

Tanya Trinh is a triple fellowship qualified Australian ophthalmologist with extensive expertise in the areas of refractive, cornea, cataract and pterygium surgery. She is a staff specialist at the Sydney Eye Hospital, Principal Surgeon at Mosman Eye Centre and is also the co-director of Australia's Keratoprosthesis Program. She currently trains fellows, registrars, and residents in the public and private system in Sydney, Australia.

<https://www.instagram.com/drtanyatrinb/>
The constant evolution of watercolors remind me of the importance of enjoying the journey and not solely focusing on the destination.

Worth a closer look

Precision solutions for laser eye surgery



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FLOURISHING FURNITURE ART

Reem Osama is a lecturer of ophthalmology at Ain Shams University in Cairo and a Fellow of the Royal College of Surgeons of Glasgow. As a practicing vitreoretinal surgeon, Osama combines medical expertise with a deep passion for art.

Osama comments: "I have had this vision since my teenage years that I would not earn money from my practice in medicine but always from my art... I make hand-painted furniture pieces. Each of them is unique and has a strong inspirational story."

<https://www.facebook.com/reemosamaart>

When the pandemic hit, I began running outdoors rather than on treadmills at the gym. The newfound time I spent every day watching the clouds drifting against an infinite blue sky, leaves dancing softly in the breeze, and hummingbirds flitting from flower to flower inspired an enduring sense of awe.



FOUR FACES

Luigi Marino has been an eye surgeon since 1983. He is currently President of IDEA International Dry Eye Academy, Director of European Dry Eye Institute, member of American Academy of Ophthalmology (AAO) and European Society of Cataract & Refractive Surgeons (ESCRS).

<https://www.instagram.com/profluigimarino/?hl=en>

VISUAL PERCEPTION

Ninglu Weng is a medical student from Canada with a keen interest in both ophthalmology and the visual arts.

<https://www.ninglurweng.com/>



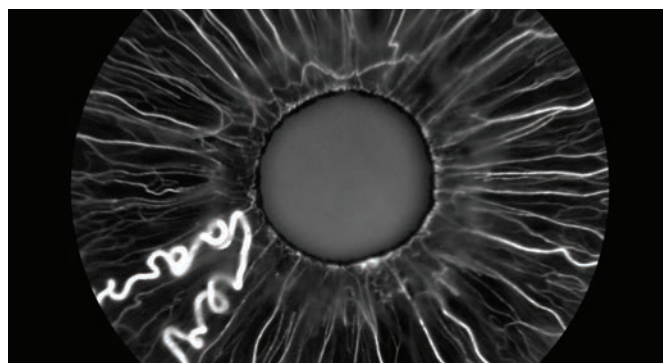
The **COLORS** of *RETINAL*
PATHOLOGY

Feyene Art is the pseudonym of an optometrist who began painting and drawing before starting optometry school. Reflecting on this period, they said “I started making art to closely study fundus photography and capture retinal pathology colors and shapes I might otherwise miss. Posting the paintings on Instagram received positive feedback from other ophthalmologists and optometrists, encouraging me to sell them and their prints to help pay off student loans. Fundus photos looked surreal to me initially, and I believe anyone unfamiliar with them would see them as abstract paintings.”

www.instagram.com/feyeneart/
Chorioretinitis sclopetaria


ANOMALOUS IRIS VESSEL


Michael P. Kelly, FOPS is Director of Remote Diagnostic Imaging at Duke University Eye Center in Durham, North Carolina. He is a Fellow – and the immediate past president – of the Ophthalmic Photographers’ Society. He has written fifty peer-reviewed publications and five book chapters, and has given over one hundred lectures. His image is an anterior segment fluorescein angiogram of a patient referred for the presence of a suspicious vessel coursing over the iris.




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RS-1 Glauvas NEW

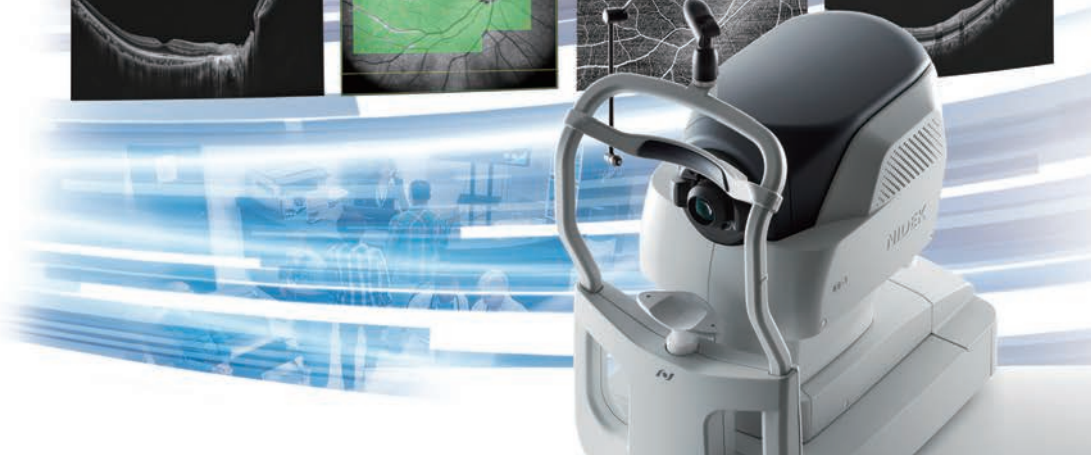
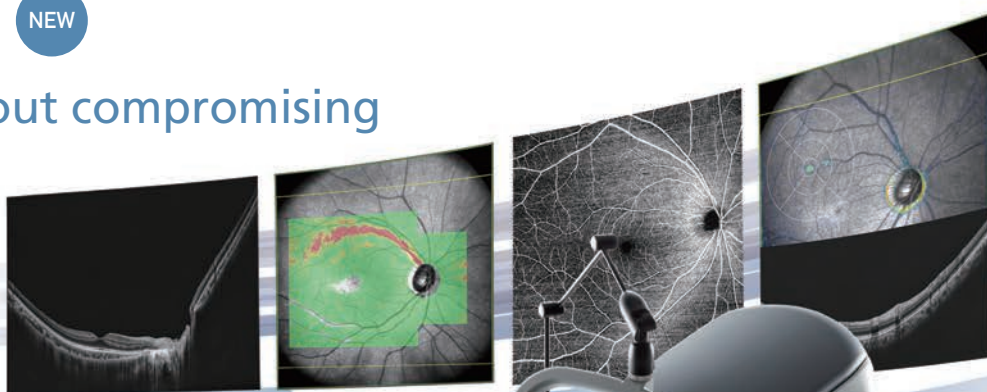
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The Ultimate Glaucoma Workflow Solution

Streamlining glaucoma patient care with Heidelberg Engineering technologies

Advances in OCT technology – and a multidisciplinary approach to glaucoma management – enable better outcomes regarding confident diagnosis, right treatment at the right time, and patient engagement. “Early glaucoma has no symptoms,” explains Christian Mardin, Consultant Ophthalmologist at Friedrich-Alexander-Universität, Erlangen, Germany. “Every person over 40 should go to their optometrist or ophthalmologist to get their optic nerve head checked.”

Glaucoma management requires a thorough patient history, functional testing, structural imaging, and analysis of the eye for accurate diagnosis. Identifying change over time is an important step in confirming a diagnosis, detecting how the disease has evolved, and monitoring treatment efficacy. Thus, a glaucoma clinic needs a comprehensive array of diagnostic, imaging, treatment, and monitoring technologies to provide effective and holistic care.

The Heidelberg Engineering Glaucoma Workflow Solution integrates imaging technologies and healthcare data solutions for holistic management of glaucoma. The solution delivers services from the anterior to posterior segment, combining image management, artificial intelligence, and third-party device integration to facilitate efficient review of all relevant data and images, as well as secure data exchange for timely referrals.

Dynamic visualization of all parameters

A proper workflow cannot begin without the electronic medical record (EMR), which enables management of all ophthalmic data. The Heidelberg Eye Explorer HEYEX EMR helps to manage and present all ophthalmic patient records in a flexible, intuitive interface. It captures high-quality, structured patient data for reporting and auditing, while effectively managing the clinic's resources.

The intelligent integration of HEYEX EMR and HEYEX 2 image management platform into the existing clinic workflow allows for improved efficiency. All patient information is centrally recorded so that it can be accessed from anywhere in the clinic, and shared with other hospital systems to avoid duplication and minimize manual data entry. Images and data are immediately available on the desired device, viewing station, and in the patient record to view disease progression and treatment efficacy over time.

Visualization of all relevant data and images throughout the

glaucoma pathway makes for an optimum diagnostic workflow. HEYEX 2 picture archiving and communication system (PACS)

integrates third-party ophthalmic devices and patient information systems into the Heidelberg Engineering ecosystem. Any type of image (DICOM or non-DICOM) can be imported to consolidate all data and enhance efficiency.

The HEYEX 2 Multimodality Viewer (MMV) also allows for the review of images and reports from any device, side-by-side from both eyes simultaneously, for a complete overview of all relevant diagnostic information, including visual fields and fundus photography. This information can be tailored to the user's preferred method of conducting data reviews, as well as supporting different use cases for various workflows.

Early detection and confident diagnostic decisions

SPECTRALIS Glaucoma Module Premium Edition (GMPE) delivers a comprehensive selection of imaging and analytics to support confident diagnostic decision-making in glaucoma management—from routine to difficult cases.

SPECTRALIS GMPE provides a personalized analysis of the optic nerve head, retinal nerve fiber layer (RNFL), and macular ganglion cell layer by precisely matching unique scan patterns to the fine anatomic structures, ensuring that the exact area is compared at every follow-up visit. Practitioners can benefit from three high resolution circumpapillary RNFL (cpRNFL) scans of increasing size, especially useful in patients who also have myopia. The Hood Glaucoma Report, combining OCT data from the RNFL and macula, relates this information to visual field data in an intuitive, clinically effective way. Simultaneous infrared and OCT imaging can help visualize RNFL changes characteristic of glaucoma damage. Bruch's Membrane Opening – Minimum Rim Width (BMO-MRW) provides the objective anatomic disc margin and a geometrically accurate measure of the neuro-retinal rim, making early detection of glaucoma possible.

Asymmetry is a critical consideration in optic neuropathies, and the way in which it presents aids in identifying potential glaucomatous damage. Posterior Pole Asymmetry Analysis (PPAA) provides a thickness map of the macula, highlighting



The Heidelberg Engineering Glaucoma Workflow Solution integrates imaging technologies and healthcare data solutions for holistic management of glaucoma.

the amount of asymmetry observed in the inferior and superior macula, and suggesting characteristic tissue damage patterns.

There is increasing awareness of the impact of primary angle closure glaucoma (PACG), and that it has been shown to visually impair a disproportionately high number of patients. The ANTERION Metrics App can be an invaluable tool for the non-contact assessment of iridocorneal angles and anterior segment anatomy. The precise measurements and visualization of all relevant angle parameters in a 360° graph supplement the gonioscopic examination. Automatic identification of the scleral spur, an important anatomical landmark in the anterior segment, enables the automatic calculation of the most relevant biometric parameters, leading to more efficient, objective, and consistent clinical evaluation.

Referrals and data sharing

Referrals are a big part of glaucoma management. For practitioners who provide eye care in the community, participate in screening programs, and are connected with a referral network, HEYEX 2 Cloud Exchange provides simple and safe exchange of images over the internet. It's as easy as dragging and dropping complete data sets with one click, providing the option for automatic anonymization. HEYEX 2 Cloud Exchange provides a simple end-to-end encrypted, peer-to-peer data transfer.

HEYEX 2 MMV supports data sharing and follow-up in different locations, allowing the clinician to easily access previous images and reports and organize new scans from multiple visits in a desirable order, in a single view.

Monitoring and follow-up

Regular follow-ups are crucial to monitor progression and to ensure effective patient management. Measuring change as small

as 1 micron empowers a clinician to detect glaucoma early and monitor minute changes as the condition advances. Components of SPECTRALIS DNA, such as TruTrack Active Eye Tracking and AutoRescan, make measuring this change in the same anatomic location with accuracy possible, even in challenging patients who find it difficult to fixate. TruTrack effectively “freezes” the retina, facilitating the acquisition of the precise OCT image needed, even if the patient blinks or moves. AutoRescan enables follow-up scans in precisely the same anatomic location as previous exams to detect and monitor progression.

Treatment at the right time

When it comes to surgical intervention, SEELUMA™, the world's first fully digital microscope, is setting new standards in precision with its innovative digital 3D visualization technology. SEELUMA offers advantages specifically for Glaucoma surgeons, including improved ergonomics to prevent musculoskeletal diseases, excellent image quality with an enhanced depth of field, and educational features like the AssistMode, which enables live annotation of the surgical image.

The glaucoma care pathway is essentially a patient's journey, starting with early detection and screening, followed by thorough diagnosis, referral, continuous monitoring, tailored treatment options, and support to manage the disease and maintain quality of life. The Heidelberg Engineering Glaucoma Workflow Solution is designed with the patient journey in mind, delivering unparalleled efficiency and diagnostic confidence for physicians, improving patient engagement and, ultimately, patient outcomes.

ANTERIOR SEGMENT

Pushing Back on BAK

Miriam Kolko explains how she and her research group EyeTRU helped to change the law in Denmark on generic eye drop ingredients

Why did you bring the issue of generics and benzalkonium chloride (BAK) in eye drops to public attention in Denmark?

Around 10 years ago, my patients were asking me about generics. They would show me different bottles of latanoprost and ask, “Are these all the same?” And I had to reply, “I don’t actually know.” They were supposed to be the same treatment, but the bottle designs were different, the boxes were different. Together with a colleague, I began to purchase all the different generics of latanoprost and measured their physical and chemical properties. And we found significant differences in all of them, not so much with the active component, but with the inactive components.

With topical medications such as eye drops, one of the inactive

components is preservatives, in particular benzalkonium chloride (BAK).

Our following studies showed that there was a difference between BAK-containing generics and brand-name latanoprost in terms of the effect on human conjunctival goblet cell survival. The generic variant with BAK was very toxic, but the original brand name drops – with polyquad preservative – were much less toxic.

We found that in Denmark there are very few regulations to follow when you introduce a generic, certainly compared with all the phases you need to go through with a new branded medicine. As a result of our collaboration with Fight for Sight Denmark and the Danish Glaucoma Society, we instigated a change in the law. Now in Denmark, it is no longer legal to substitute BAK into a generic variant where the original brand name does not have it.

“I think it’s our duty to do what we think is the best for patients.”

What do patients need to know about BAK?

There are other negative ingredients, but BAK is the “bad guy.” It’s one of the more toxic preservatives, and the one most commonly used in eye drops. We’re working to make patients aware of the existence of BAK in their eye drops and asking the question, “Why would you put a toxin into an eye drop for chronic use?” It’s not about efficacy; it’s been shown that there is no efficacy

difference between BAK-free and BAK-containing eye drops.

In my opinion, the only case where BAK could perhaps be useful is in short-term antibiotics treatments as it kills bacteria. But generally, the more BAK comes into contact with the eye, the more toxic it becomes to the ocular surface. And the more side effects the patients suffer, the less adherent they become.

If patients are getting side effects from a generic, they should communicate this to their physician or eye doctor because it might not be the most appropriate treatment for them. Physicians should also be aware that if we use more eye drops, it’s better to use a combination where only one contains BAK, as opposed to all three. The less BAK, the better!

Do you have a taste for activism now?

I think it’s our duty to do what we think is the best for patients. We should engage them because, in the end, it’s patients that actually have the power. But they need to understand what opportunities they have, understand their disease and their choices, and know what is harmful. When something does not make sense or is causing harm, we should speak up, talk to the authorities, join forces with patient organizations and societies, and approach politicians because it is possible to actually make a difference.

We still need to do more research to convince the authorities to phase out BAK and work towards optimizing the requirements for generics much more than we do. I’m not against generics, of course, but it’s important that we are certain that generics are as efficient – and have no more side effects – than the original medication.

Miriam Kolko is senior consultant and glaucoma specialist at the Copenhagen University Hospital and Professor in Translational Eye Research at the Department of Drug Design and Pharmacology at the University of Copenhagen, Denmark.



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An anatomical diagram of the eye in cross-section, showing the supraciliary MIGS device. The device is a white tube with a green band, positioned between the iris and the sclera. Blue arrows indicate the flow of aqueous humor from the anterior chamber, through the device, and into the sub-Tenon's space. A white mesh filter is visible in the sub-Tenon's space, and a blue arrow points upwards from the filter towards the sclera, indicating the drainage path.

**Booth
#7.G67**

1. Presented by Prof. Keith Barton at the European Glaucoma Society (EGS) congress (Dublin, June 2024).

GLAUCOMA

Neuroprotection: The Future of Glaucoma Treatment?

Assessing the power of neurorepair, early detection, and combination therapy in glaucoma management

By Ghazi O. Bou Ghanem, MD, and David J. Calkins, PhD, Vanderbilt Eye Institute, Department of Ophthalmology and Visual Sciences, Vanderbilt University Medical Center, Nashville, TN, USA.

Current glaucoma treatments focus on lowering intraocular pressure (IOP), which is akin to fighting a raging fire with a bucket of water – the intervention slows the inferno, but it cannot extinguish it. For many patients, there simply are not enough “buckets.” And, like many other researchers, we share the realization that more must be done.

The truth is this: our single-minded pursuit of managing IOP is failing a significant portion of patients. Glaucoma progressed in 20 percent of participants in a UK-based glaucoma treatment study (UKGTS) by 24 months (1), and an earlier study revealed that 46 percent of patients receiving IOP-lowering surgery progressed to blindness within a decade even when IOP was “controlled” (2). Patients need a paradigm shift – a multi-pronged strategy that not only targets IOP management but also actively supports, protects, and even repairs RGCs and the optic nerve.

We want to create glaucoma treatments that do more than lower pressure; we want to empower RGCs to fight back. This goal demands a greater understanding of the relationship between the mechanical stress, vascular and metabolic dysfunction,



and inflammatory cascades that contribute to glaucomatous damage to the optic projection. Think of it as equipping the system and its constitutive elements (RGCs, axons, glia, vessels, extracellular matrix, and so on) with a comprehensive toolkit to manage oxidative stress, optimize energy production, and mitigate inflammation. The good news is that neurons are inherently resilient fighters, with adaptive responses in their arsenal (3). It is important to note though that these responses are limited by resource constraints and require external support for long-term survival and recovery.

One field that could have a positive impact in this regard is neuroprotection or neurorepair. This approach has the capability to combine diverse strategies, each targeting a specific aspect of the disease during a specific point in progression, to create a personalized treatment regimen for each patient or for each type of glaucoma. But it hinges on early detection. The sooner we intervene, before irreversible damage sets in, the greater the chance of success. New biomarkers – molecular, electrophysiological, and imaging – are of particular interest, as they offer earlier and more accurate detection. Other testing methods, like clustered testing, are an additional way we can quickly identify eyes with rapidly progressing glaucoma; thus, improving the

feasibility of glaucoma clinical trials (4).

The road to a combination neuroprotective future is not without its bumps, however. Combination therapy trials are notoriously difficult and expensive. They will require adaptive trial designs that adjust based on interim data analysis, as well as robust collaborations between researchers, industry, and regulatory bodies. The validity of preclinical models is also crucial. No single model can perfectly capture the intricate complexities of glaucoma. Therefore, evaluating treatment regimens in a battery of diverse experimental models, including non-human primates with their close resemblance to human ocular anatomy, is paramount. Only through this multifaceted approach can we establish robust evidence for the effectiveness of combination therapies, setting a foundation for evaluation in clinical trials (5).

The future of glaucoma treatment is not about a single magic bullet but rather a well-equipped and diverse arsenal. Through the power of neuroprotection, early detection, and combination therapy, we can rewrite the narrative against this condition – one that moves beyond the limitations of IOP-centric approaches.

*See references online at:
[top.txp.to/Neuroprotection/
Future/Glaucoma/Treatment](http://top.txp.to/Neuroprotection/Future/Glaucoma/Treatment)*

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RETINA

Surgical Tips for Retina

Ferenc Kubn and Andrzej Grzybowski discuss what the ophthalmologist needs to address during eye surgery

Retinal surgery has gradually become vitreoretinal (VR) surgery; it's extremely rare today that a posterior segment surgeon performs scleral buckling only. This article, therefore, discusses a handful of highly selected surgical tips related to vitreoretinal procedures.

No procedure, especially VR surgery, should be performed without the surgeon first designing a plan. The plan is akin to a map – how to get from place A to place B. The surgeon should have a rough idea of the eye's condition prior to surgery, and the anatomy to arrive at as the surgery is completed. This strategy mostly concerns preparing for what is in the “road” that connects the two endpoints. Naturally, the plan is always modified based on how the actual surgery evolves and how tissues react to the surgeon's manipulations.

Here, we review several tips that are useful during surgery.

1. Placement of the (intrascleral) cannulas

The role of the three cannulas is mainly to provide access to the vitreous cavity for the infusion line and for the instruments to be used. The trocar at the time of scleral penetration should have a ~15-degree angle to the surface; its distance from the limbus in an emmetropic eye is 3–3.5 mm, and they are ideally positioned in the right eye at 7 o'clock (infusion line; 5 o'clock in the left) and at 2:30 and 9:30 for the “working” cannulas. A fourth cannula is inserted, typically superiorly, if truly bimanual vitrectomy is performed.

2. Anterior segment: the lens

When the strategy has been formulated, the surgeon must take into consideration that every VR surgery leads to cataract development (not only “if the patient is over 50 years old,” as the literature used to claim). In other words, cataract development is not a complication but a side effect of vitrectomy. In patients compromised by age, concomitant cataract surgery should be offered, especially if silicone oil is to be used. The old counter-argument that cataract surgery increases the severity of the postoperative inflammation is no longer valid with today's phacoemulsification technology.

3. The vitreous: the sequence and completeness of the removal

If there is no severe vitreoretinal traction, and especially if the vitreous is transparent (for example, no vitreous hemorrhage is present), a posterior-anterior approach is recommended. The vitreous removal is started centrally and posteriorly, and is gradually extended towards the mid-vitreous cavity and then towards the periphery and the retrolenticular space. For this latter area, vitreous removal is highly advantageous if there is severe VR traction (proliferative vitreoretinopathy [PVR], proliferative diabetic retinopathy [PDR]) and in eyes with retinal detachment or trauma. In a phakic eye, small air bubbles should be injected behind the lens; if they remain there, vitreous is still present behind the lens. This is first detached by gentle aspiration and then removed by holding



the vitrectomy probe's port sideways, minimizing the risk of lens touch/cut.

4. Posterior vitreous detachment (PVD)

One of the most misleading concepts in the literature has been the myth of spontaneous PVD developing in conditions such as vitreous hemorrhage, retinal detachment, PVR, PDR, and trauma involving the posterior segment. However, if the surgeon actively tries to verify the presence of vitreous on the posterior retina – and triamcinolone is an almost mandatory vehicle for this – they will discover more often than not that what appears to be PVD is in fact vitreoschisis (a thin layer of vitreous is still undetached from the retinal surface). If this is not detached and removed, a host of complications (from macular

pucker to retinal detachment) may arise.

The most common method of surgical PVD-creation involves using high flow/aspiration but no cutting, as the vitrectomy probe is dragged along the disc margin on the temporal side, barely touching or just above the retinal plane. It is triamcinolone that helps the surgeon visualize the vitreous, both when it is still attached and when it finally pops up. Once separation has been achieved, the cutting action is to be activated so that no VR traction is transmitted towards the periphery where separation of the two tissues is impossible.

If aspiration is insufficient to lift the posterior vitreous, a barbed needle/blade can be used to engage the vitreous; this is ideally done under a contact lens to increase the resolution and avoid retinal damage.

5. Macular pucker

A forceps or a barbed needle/blade can be used to lift the scar tissue from the retinal surface – almost all eyes with a pucker have a true PVD. Care must be taken if there is an area in the scar that seems to be very prominently elevated, especially if it is whitish colored – this may be a retinal fold. The entire membrane should be detached within the vascular arcade, and serious consideration should be given to also remove the internal limiting membrane (ILM). The ILM may already be partially broken, and, more importantly, its removal prevents recurrence of the pucker (otherwise occurring in up to 10 percent of the eyes).

6. Surgery on an injured eye

Surgery on an injured eye is always a challenge because of the many unknowns and the relatively small number of rules related to management. Moreover, this surgery might require different experience or training based on different cases. Below we touch upon two very basic issues of the tissue in the tactics category.

- **Anterior segment: hyphema**
If liquid, the blood can be removed through a single paracentesis created

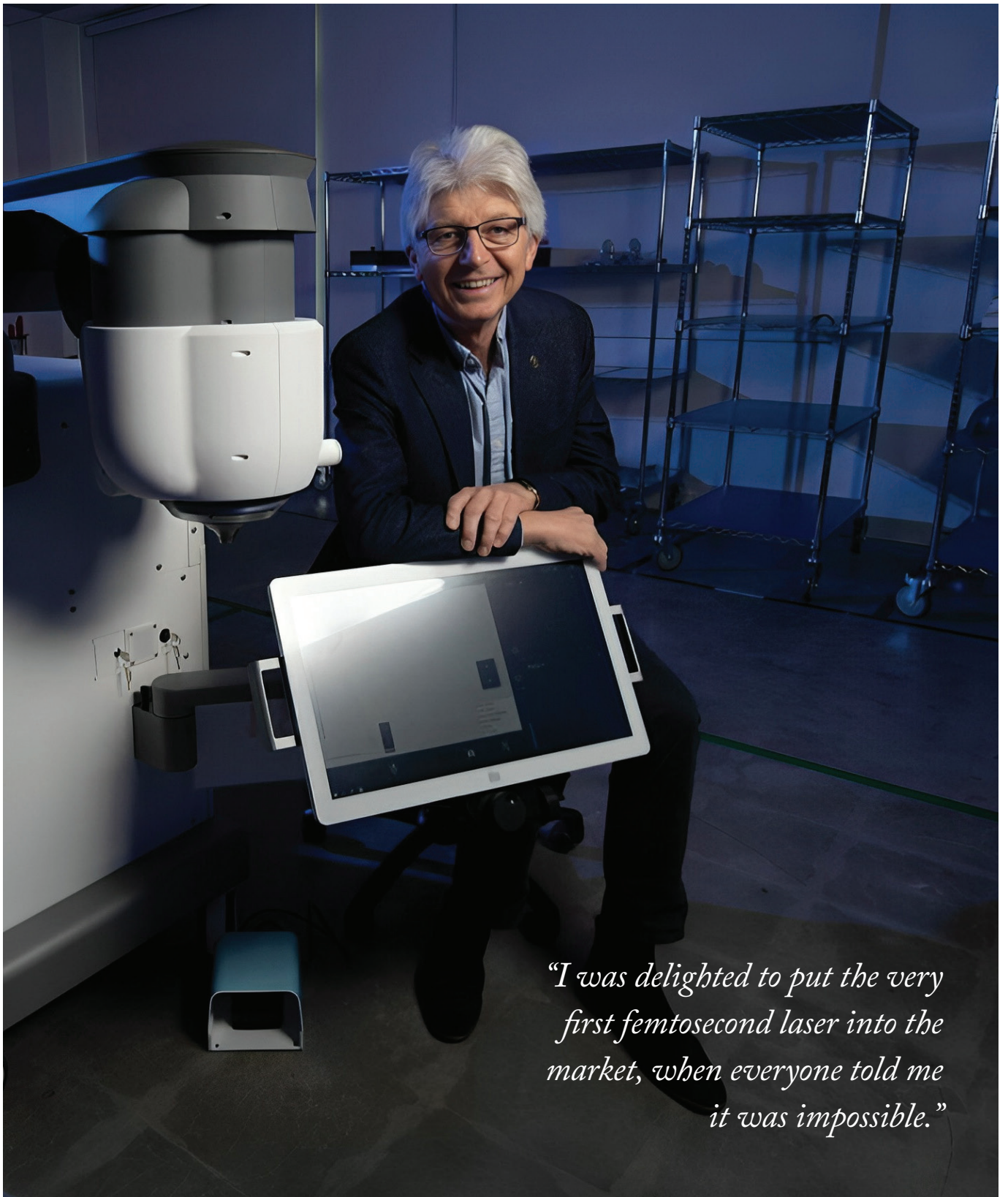
“No procedure, especially VR surgery, should be performed without the surgeon first designing a plan. The plan is akin to a map – how to get from place A to place B.”

on the temporal side. The cannula is used both to push down the opening's inferior lip and to irrigate the anterior chamber (AC). If the blood is clotted, an AC maintainer must be positioned first, ideally inferotemporally and with its tip slightly downwards over the iris (to prevent damaging the endothelium and the lens). The vitrectomy probe is used to engage and remove the clot; the port should be kept sideways and always occluded by the clot.

- **Anterior segment: the iris**
This diaphragm must always be reconstituted if damaged; should posterior segment surgery be required, the reconstruction of the iris is the last step, only when the VR situation is deemed final. If during the initial examination/surgery a wide pupil is found, the iris may be missing (rupture) or simply retracted by fibrin (contusion). In the latter case the iris must urgently be pulled using serrated vitrectomy forceps so that the fibrin “glue” is broken and a normal-sized pupil created.



Credit: shutterstock.com



“I was delighted to put the very first femtosecond laser into the market, when everyone told me it was impossible.”

Laser Focus

Sitting Down With...
Tibor Juhasz, femtosecond laser
pioneer and CEO of ViaLase

Having obtained a PhD in physics, what drew you to ophthalmology?

It really started by accident. After completing my PhD in Hungary, I was lucky enough to be offered a research position at the University of Rochester, New York, with Gérard Mourou – the world leader in ultrashort pulse laser technology at the time. (Important sidenote: for this work, Mourou and Donna Strickland would go on to be awarded the 2018 Nobel Prize in Physics). After a short time in Rochester, I spent several years in Southern California, doing postdoctoral research and continuing to work in laser technology, including consulting for a company that was evaluating laser applications in ophthalmology. That effort was unsuccessful because we needed much shorter laser pulses to achieve the desired effects.

Eventually I rejoined Mourou in his new lab at the University of Michigan, where he was focusing solely on femtosecond lasers. One day, one of Mourou's graduate students inadvertently lifted his safety goggles and caught a stray laser beam, causing a retinal injury. However, the damage to the retina was extremely small and confined, without any collateral damage. Suddenly, we were all much more excited about ophthalmic applications for femtosecond lasers! Our work together demonstrating the femtosecond laser's capacity to create ocular tissue incisions with micron-level precision without damaging adjacent tissue would ultimately revolutionize laser refractive surgery, cataract surgery, and corneal transplantation.

What were the challenges of bringing femtosecond laser technology to the world's attention?

One problem was that the lasers were very

big – filling an entire lab! Plus, you needed at least a couple of graduate students to run around them all day making adjustments to keep them operating. So, the first challenge was to engineer a femtosecond laser that could sit in a small, confined area. The second challenge was to make the laser more stable and less expensive to operate. Although we recognized that there were many potential applications for the femtosecond laser in ophthalmology, we began with flap creation for refractive surgery. At the time, lamellar flaps were made with a microkeratome, but it was difficult to achieve a consistent thickness and the bladed flaps were prone to complications. The femtosecond laser significantly reduced both the uncertainty and the complications, making LASIK safer and more predictable for patients. Bladeless, femtosecond laser LASIK has for years been considered the standard in the field, and more than 24 million patients have benefited from it.

What are you currently focused on in the laser space?

Today, I am focused on glaucoma because I feel there is a real unmet medical need in this area. There are many treatment options for glaucoma patients, but they all have shortcomings of some kind. The femtosecond laser can be used to create drainage channels through the trabecular meshwork. The channels increase the outflow of aqueous humor, thereby decreasing intraocular pressure (IOP) without damage to the adjacent tissues. And, because the femtosecond laser beam can be delivered through the cornea, the procedure can be performed completely non-invasively, without opening the eye. This minimizes or eliminates surgical trauma, speeding up recovery.

How does this process improve on current micro-invasive glaucoma surgery (MIGS)?

MIGS is similar in that it creates an opening in the trabecular meshwork (TM), but in most cases it also involves implantation of a stenting device into the TM. It can be hard

to visualize and correctly place the stent and, of course, the patient has undergone corneal incisions to achieve this goal. With an incision-free, precise, femtosecond approach, creating the TM opening can be done noninvasively in a way that is more reproducible and easier to visualize, thereby making it more accessible to a wider range of ophthalmologists and their patients.

How far away are we from seeing femtosecond lasers in glaucoma surgery?

We're now three years out from a pilot study to evaluate the safety and efficacy of the procedure we call FLigHT (femtosecond laser, image-guided, high-precision trabeculotomy). In the cohort studied we have seen no serious adverse events and a mean IOP reduction of approximately 34 percent at the two-year timepoint. I think the study indicates that FLigHT is going to be a potentially safe and effective procedure. For example, it creates a single channel – measuring only 500- μ m wide by 200- μ m high – through the TM and into Schlemm's canal. I can see this working very well as a first-line treatment; it can also be used in patients who are either phakic or pseudophakic who are unhappy or uncontrolled on IOP-lowering medical therapy.

What stands out for you as a particularly proud moment in your career?

As R&D team leader at IntraLase, I was delighted to put the very first femtosecond laser into the market, when everyone told me it was impossible. The safety and efficacy of FLigHT appears to be favorable based on our first-in-human study, so I believe we will defy the odds again by successfully bringing to market the first device capable of performing a noninvasive, non-incisional trabecular bypass procedure in glaucoma.

Read the full version of
 this interview at
top.txp.to/laser/focus



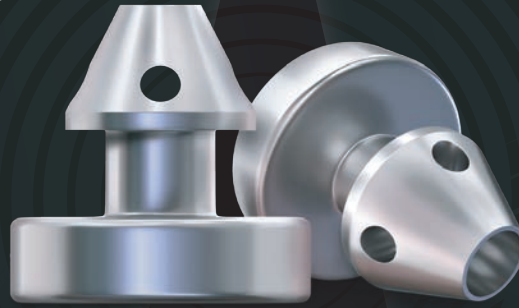
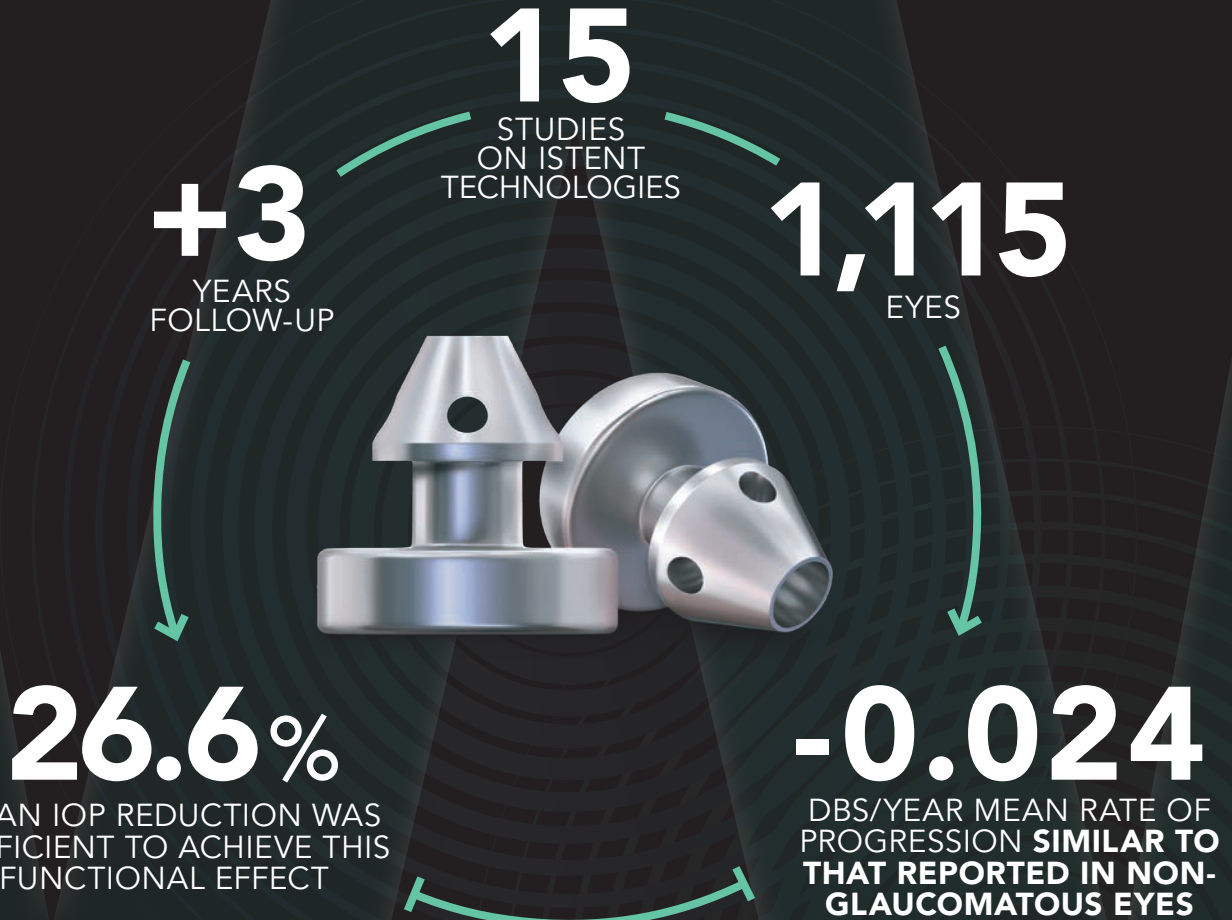


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inject® W

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Glaucoma Disease Progression

iStent® technologies have been proven to **stabilize visual fields loss and glaucoma disease progression** with a favourable risk-benefit ratio¹



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TO PRESERVE PATIENTS' FUNCTIONAL VISION AND QUALITY OF LIFE**



1. Gillmann K, Hombek DM. *BMJ Open Ophthalmol* 2024;9:e001575. doi:10.1136/bmjophth-2023-001575.

iStent inject® W IMPORTANT SAFETY INFORMATION

INDICATION FOR USE: The iStent inject® W is intended to reduce intraocular pressure safely and effectively in patients diagnosed with primary open-angle glaucoma, pseudo-exfoliative glaucoma or pigmentary glaucoma. The iStent inject® W can deliver two (2) stents on a single pass, through a single incision. The implant is designed to stent open a passage through the trabecular meshwork to allow for an increase in the facility of outflow and a subsequent reduction in intraocular pressure. The device is safe and effective when implanted in combination with cataract surgery in those subjects who require intraocular pressure reduction and/or would benefit from glaucoma medication reduction. The device may also be implanted in patients who continue to have elevated intraocular pressure despite prior treatment with glaucoma medications and conventional glaucoma surgery. **CONTRAINDICATIONS:** The iStent inject® W System is contraindicated under the following circumstances or conditions: • In eyes with primary angle closure glaucoma, or secondary angle closure glaucoma, including neovascular glaucoma, because the device would not be expected to work in such situations. • In patients with retrolbulbar tumor, thyroid eye disease, Sturge-Weber Syndrome or any other type of condition that may cause elevated episcleral venous pressure. **WARNINGS/PRECAUTIONS:** • For prescription use only. • This device has not been studied in patients with uveitic glaucoma. • Do not use the device if the Tyvek® lid has been opened or the packaging appears damaged. In such cases, the sterility of the device may be compromised. • Due to the sharpness of certain injector components (i.e. the insertion sleeve and trocar), care should be exercised to grasp the injector body. Dispose of device in a sharps container. • iStent inject® W is MR Conditional; see MRI Information below. • Physician training is required prior to use of the iStent inject® W System. • Do not re-use the stent(s) or injector, as this may result in infection and/or intraocular inflammation, as well as occurrence of potential postoperative adverse events as shown below under "Potential Complications." • There are no known compatibility issues with the iStent inject® W and other intraoperative devices. (e.g., viscoelastics) or glaucoma medications. • Unused product & packaging may be disposed of in accordance with facility procedures. Implanted medical devices and contaminated products must be disposed of as medical waste. • The surgeon should monitor the patient postoperatively for proper maintenance of intraocular pressure. If intraocular pressure is not adequately maintained after surgery, the surgeon should consider an appropriate treatment regimen to reduce intraocular pressure. • Patients should be informed that placement of the stents, without concomitant cataract surgery in phakic patients, can enhance the formation or progression of cataract. **ADVERSE EVENTS:** Please refer to Directions For Use for additional adverse event information. **CAUTION:** Please reference the Directions For Use labelling for a complete list of contraindications, warnings and adverse events.

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