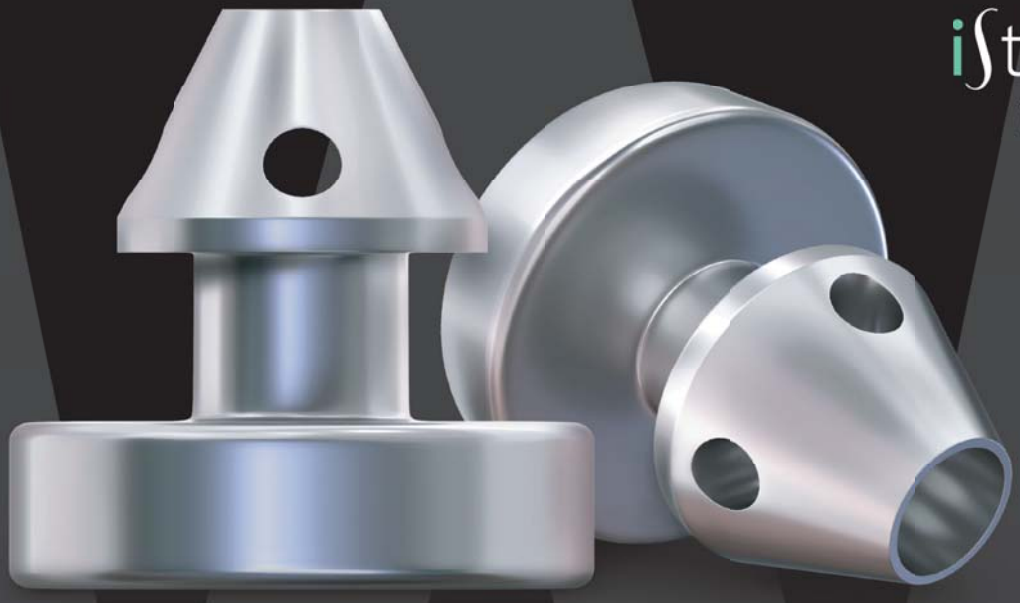
MARCH / APRIL 2022 # 60

# the Ophthalmologist™



iStent *inject*® W



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**Powerful technology** for sustained intraocular pressure and medication reduction. **Predictable outcomes** from a truly tissue-sparing procedure. All on a **proven platform** with the most clinical evidence of any MIGS device.

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**iStent *inject*® W IMPORTANT SAFETY INFORMATION**

**INDICATION FOR USE.** The iStent *inject*® W Trabecular Micro-Bypass System Model G2-W is indicated for use in conjunction with cataract surgery for the reduction of intraocular pressure (IOP) in adult patients with mild to moderate primary open-angle glaucoma. **CONTRAINDICATIONS.** The iStent *inject* W is contraindicated in eyes with angle-closure glaucoma, traumatic, malignant, uveitic, or neovascular glaucoma, discernible congenital anomalies of the anterior chamber (AC) angle, retrobulbar tumor, thyroid eye disease, or Sturge-Weber Syndrome or any other type of condition that may cause elevated episcleral venous pressure. **WARNINGS.** Gonioscopy should be performed prior to surgery to exclude congenital anomalies of the angle, PAS, rubeosis, or conditions that would prohibit adequate visualization of the angle that could lead to improper placement of the stent and pose a hazard. **MRI INFORMATION.** The iStent *inject* W is MR-Conditional, i.e., the device is safe for use in a specified MR environment under specified conditions; please see Directions for Use (DFU) label for details. **PRECAUTIONS.** The surgeon should monitor the patient postoperatively for proper maintenance of IOP. The safety and effectiveness of the iStent *inject* W have not been established as an alternative to the primary treatment of glaucoma with medications, in children, in eyes with significant prior trauma, abnormal anterior segment, chronic inflammation, prior glaucoma surgery (except SLT performed > 90 days preoperative), glaucoma associated with vascular disorders, pseudoexfoliative, pigmentary or other secondary open-angle glaucomas, pseudophakic eyes, phakic eyes without concomitant cataract surgery or with complicated cataract surgery, eyes with medicated IOP > 24 mmHg or unmedicated IOP < 21 mmHg or > 36 mmHg, or for implantation of more or less than two stents. **ADVERSE EVENTS.** Common postoperative adverse events reported in the iStent *inject*® randomized pivotal trial included stent obstruction (6.2%), intraocular inflammation (5.7% for iStent *inject* vs. 4.2% for cataract surgery only), secondary surgical intervention (5.4% vs. 5.0%) and BCVA loss ≥ 2 lines ≥ 3 months (2.6% vs. 4.2%). **CAUTION:** Federal law restricts this device to sale by, or on the order of, a physician. Please see DFU for a complete list of contraindications, warnings, and adverse events.


PM-US-0782

GLAUKOS

# Mirror, Mirror on the Wall

*Prioritizing diversity not only gifts future generations of ophthalmologists with more recognizable role models, but also, crucially, leads to better patient care*



I strongly believe that the biggest challenge we face in ophthalmology is inequality – in gender and diversity. And perhaps our biggest opportunity lies in actively addressing the problem, which exists for historical reasons but nevertheless persists across all aspects of ophthalmology – from the most senior executives to patients of all ages. The representation of women amongst consultant-level staff in the UK is still less than 40 percent (1), and only 1.8 percent of all consultants are of Black ethnicity (2). This lack of diversity negatively impacts on our discovery, advancement of ophthalmology, and – most importantly – the care patients receive.

In previous years, I felt disappointed that the Power List was so male-dominated, with only 17 percent of the 2020 list made up by women, and only one woman featured in the Top 10. And yet, there are brilliant female ophthalmologists working alongside us every day, making great contributions to our field. Why are they not getting the same recognition as their male counterparts? Although there was an entire Power List devoted to women in 2021, I think we need to ensure that there is equal representation in the joint Power List. We have a responsibility to address this imbalance, otherwise we are condoning inequality.

In my own field of genomic ophthalmology, there is a well-recognized dearth of genomic data from Black ethnic populations. And it decreases the interpretation accuracy of genetic tests for patients from those backgrounds; the majority of large databases used to interrogate patient genomes are from European ancestry and that's why we struggle to determine whether a potential variant is common in a population or causes a certain disease.

In academic ophthalmology, there are still few female and ethnic minority senior role models despite greater diversity at junior levels. We see a physical representation of senior leadership, but it is not reflected in the mirror. Our views, approach, contribution, and methodologies need to be integrated at the highest levels to ensure that large strides are taken to tackle diversity and pave the way for clinical and research excellence.

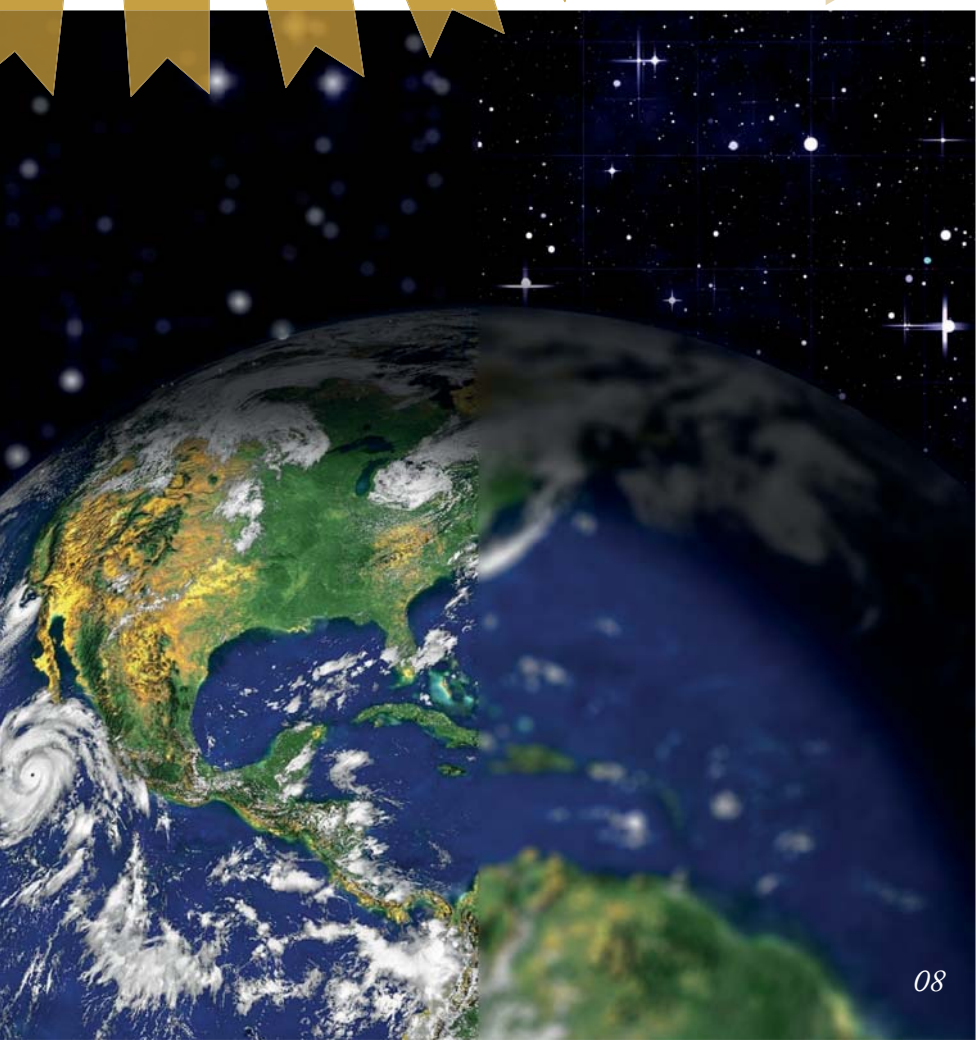
I am proud to lead Women in Vision UK, which has 350 members spanning the country's ophthalmology sector. We have forged strong international networks, but we cannot achieve significant change on our own. We must all work together to dispel the conventional stereotypes and embrace new ways of thinking and acting. We must welcome equality for all – at every level.

**Mariya Moosajee**
*Professor of Molecular Ophthalmology at UCL Institute of Ophthalmology, Group Leader of Ocular Genomics and Therapeutics at the Francis Crick Institute, Consultant Ophthalmologist specializing in Genetic Eye Disease at Moorfields Eye Hospital NHS Foundation Trust, London, UK*

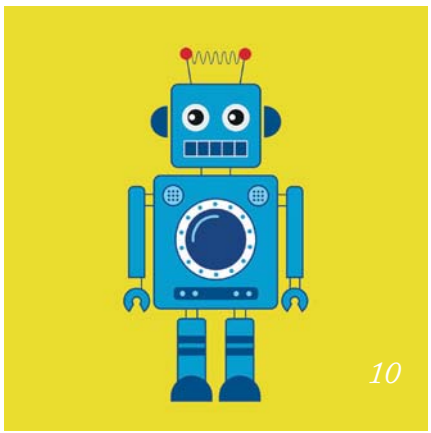
*References*

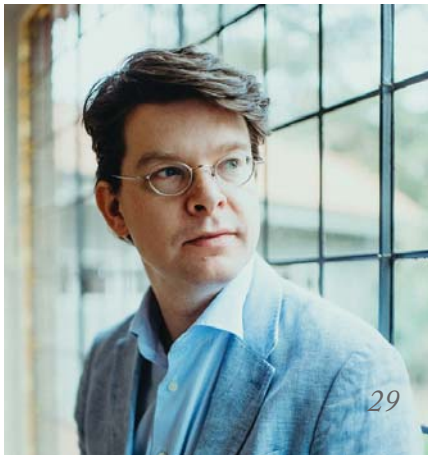
1. *NHS Digital (2018). Available at: https://bit.ly/3qCj4r8.*
2. *NHS Workforce (2021). Available at: https://bit.ly/36mkijD.*

# Contents









## Feature



## Sitting Down With



the Ophthalmologist

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tyrvaya™
(varenicline solution)
nasal spray 0.03 mg

# NOW APPROVED

## *Dry eye starts with tear film disruption.*[1]

## *Treat by activating tear film production.*[2]


### INTRODUCING A WHOLE NEW WAY TO TREAT DRY EYE DISEASE.[2]

Tyrvaya™, the first and only nasal spray approved to treat the signs and symptoms of dry eye, is believed to activate the trigeminal parasympathetic pathway via the nose, resulting in increased tear film production.[2] The exact mechanism of action is unknown at this time.

**Watch Tyrvaya in action at Tyrvaya-pro.com.**

### INDICATION

Tyrvaya™ (varenicline solution) Nasal Spray is indicated for the treatment of the signs and symptoms of dry eye disease.

**Please see Brief Summary of Prescribing Information on the adjacent page and the full Prescribing Information at Tyrvaya-pro.com.**

### IMPORTANT SAFETY INFORMATION

**Adverse Reactions**

The most common adverse reaction reported in 82% of patients was sneezing. Events that were reported in 5-16% of patients were cough, throat irritation, and instillation-site (nose) irritation.

**References: 1.** Craig JP, Nelson JD, Azar DT, et al. *Ocul Surf.* 2017;15(4):802-812. **2.** Tyrvaya. Prescribing Information. Oyster Point Pharma; 2021.

tyrvaya™
(varenicline solution)
nasal spray 0.03 mg

**BRIEF SUMMARY**: Consult the full Prescribing Information for complete product information available at www.tyrvaya-pro.com.

## INDICATIONS AND USAGE

TYRVAYA™ (varenicline solution) nasal spray is a cholinergic agonist indicated for the treatment of the signs and symptoms of dry eye disease.

## ADVERSE REACTIONS

**Clinical Trials Experience:** Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

In three clinical trials of dry eye disease conducted with varenicline solution nasal spray, 349 patients received at least 1 dose of TYRVAYA. The majority of patients had 31 days of treatment exposure, with a maximum exposure of 105 days.

The most common adverse reactions reported in 82% of TYRVAYA treated patients was sneezing. Other common adverse reactions that were reported in >5% of patients include cough (16%), throat irritation (13%), and instillation-site (nose) irritation (8%).

## USE IN SPECIFIC POPULATIONS

**Pregnancy:** Risk Summary: There are no available data on TYRVAYA use in pregnant women to inform any drug associated risks. In animal reproduction studies, varenicline did not produce malformations at clinically relevant doses.

All pregnancies have a risk of birth defect, loss, or other adverse outcomes. In the US general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2% to 4% and 15% to 20%, respectively.

Data: *Animal Data*: Pregnant rats and rabbits received varenicline succinate during organogenesis at oral doses up to 15 and 30 mg/kg/day, respectively. While no fetal structural abnormalities occurred in either species, maternal toxicity, characterized by reduced body weight gain, and reduced fetal weights occurred in rabbits at the highest dose (4864 times the MRHD on a mg/m$^2$ basis).

In a pre- and postnatal development study, pregnant rats received up to 15 mg/kg/day of oral varenicline succinate from organogenesis through lactation. Maternal toxicity, characterized by a decrease in body weight gain, was observed at 15 mg/kg/day (1216 times the MRHD on a mg/m$^2$ basis). Decreased fertility and increased auditory startle response occurred in offspring at the highest maternal dose of 15 mg/kg/day.

**Lactation:** Risk summary: There are no data on the presence of varenicline in human milk, the effects on the breastfed infant, or the effects on milk production. In animal studies varenicline was present in milk of lactating rats. However, due to species-specific differences in lactation physiology, animal data may not reliably predict drug levels in human milk.

The lack of clinical data during lactation precludes a clear determination of the risk of TYRVAYA to an infant during lactation; however, the developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for TYRVAYA and any potential adverse effects on the breastfed child from TYRVAYA.

**Pediatric Use:** Safety and efficacy of TYRVAYA in pediatric patients have not been established.

**Geriatric Use**: No overall differences in safety or effectiveness have been observed between elderly and younger adult patients.

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Issued: Oct 2021
OP-TYR-000867 10/21

**Upfront**

*Research*
*Innovation*
*Trends*

# Deep Space Blind

## Researchers probe the origin of spaceflight-associated neuro-ocular syndrome

Ever wanted to see the Earth from space? If so, you'd better have your specs handy. According to NASA and the International Space Station, approximately 40–60 percent of astronauts develop spaceflight-associated neuro-ocular syndrome (SANS) during their time away from Earth. Upon their return, these astronauts present with altered visual acuity, retinal injuries, globe flattening, optic disc edema, and mildly elevated intracranial pressure. The symptoms' severity appears to correlate with time spent in space, resulting in recovery that can take years, if it's reached at all (1).

Aiming to identify the causative mechanisms in SANS onset and progression, researchers from the Medical University of South Carolina used magnetic resonance venography to assess differences in the intracranial venous systems of a group of astronauts pre- and post-flight (2). They found that astronauts with SANS displayed significant increases in intracranial dural venous structural volumes upon returning to Earth compared with their non-SANS counterparts.

Unlike most veins, dural sinuses usually resist stretch and change – but venous sinus laxity appears to be a risk factor for SANS. This led the team to hypothesize that SANS occurs when the loss of gravitational hydrostatic pressure causes upward movement of lower body fluids and lack of drainage, leading to venous congestion in the head and neck. This, in turn, increases ICP and causes optic disc edema.

Understandably, these results come from a small group of astronauts and require confirmation in a larger population. The researchers are currently planning further studies, including investigations into gender-related SANS differences and even conducting MRI scans in space. The condition, one of NASA's highest research priorities, presents a major roadblock to large-scale space colonization. After all, if we want to traverse the far corners of the galaxy, we need to be able to see where we're going!

*References*

1. *YM Paez et al., Eye Brain, 12, 105 (2020). PMID: 33117025.*
2. *MJ Rosenberg et al., JAMA Netw Open, 4, e2131465 (2021). PMID: 34705011.*

INFOGRAPHIC

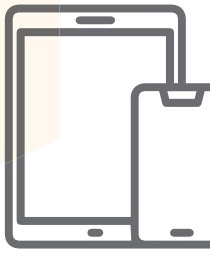
# Pandemic Patients

## How do virtual and in-person visits compare?

Out of **2,943** virtual and **56,174** in-person visits…



Virtual: **64.3** percent female, average age **64.3** years old
In person: **59.5** percent female, average age **65.9** years old



## BUSINESS IN BRIEF

*Discover some of the latest business announcements from the world of ophthalmology*

- Alicia Tozier joined Outlook Therapeutics as its Senior Vice President, Marketing and Marketing Access, to support the company's goal of developing and launching the first FDA-approved ophthalmic formulation of bevacizumab for use in retinal indications.
- The first intraocular pseudophakic contact lens (IOPCL), AccuraSee, aimed to improve near vision in patients with AMD, was implanted by surgeons from Harvard Eye Associates in Laguna Hills, California, USA. The lens implant is designed to magnify images and allow patients to use parts of their retina not affected by the disease.
- HOYA Lens UK partnered with Haag-Streit UK to provide diagnostics and treatment for myopia, addressing the global rise of the condition in children.
- Aerie Pharmaceuticals, which develops and commercializes ophthalmic therapies for conditions such as DED, glaucoma, DME, and wet AMD, has appointed Peter F. Lang as the company's CFO.
- EyeBio, a company working on a portfolio of new-generation therapies for a plethora of ocular disorders, has successfully completed a funding round. The money will be used to assemble and develop a diversified pipeline of product candidates using innovative translational approaches.

Alicia Tozier

# Recharging After Long COVID

**Is non-invasive brain stimulation the solution to long-lasting vision loss after SARS-CoV-2 infection?**

Infection with SARS-CoV-2 is already a mixed bag of symptoms – especially with variants changing the picture – but long COVID results in a scattered array of issues, mostly caused by infiltration of the central nervous system. Along with cognitive deficits, a manifestation of particular note for ophthalmologists is vision impairment.

Symptoms can last for months, with no treatment currently available. But recent research has uncovered that alternating non-invasive brain stimulation (NIBS) significantly improved the vision and cognition of two patients in just three days (1). The effective "recharging" of the vasculature and neurons affected by long COVID partially reversed visual field loss and increased cognition – and the two patients were even able to return to work.

*See references online at: top.txp.to/recharging*

### TOP SPECIALTIES

Virtual: Comprehensive ophthalmology 34.6 PERCENT

In person: Optometry 29.8 PERCENT

### LEAST VISITS

VIRTUAL: STRABISMUS 0%

IN PERSON: STRABISMUS 0.3%

### TOP SPECIALTIES

Virtual: Eyelids, lacrimal system, and orbits group 26.9 PERCENT

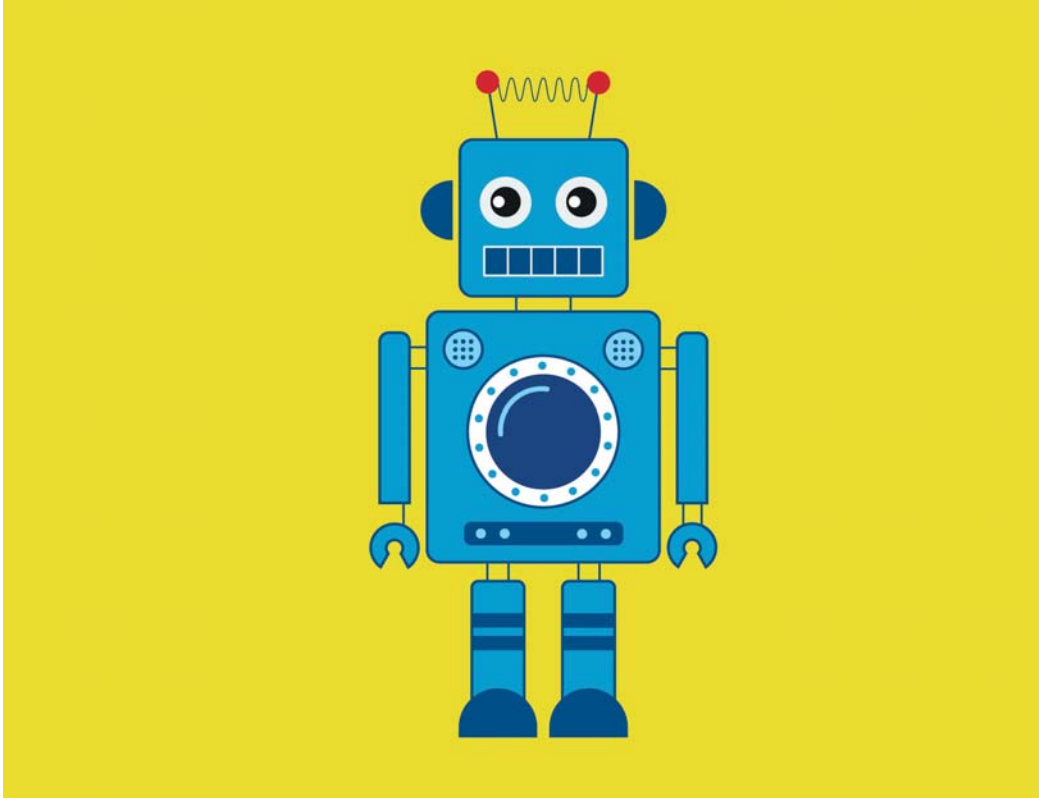
In person: Choroid and retina conditions 19.3 PERCENT

*Reference*

1. *CCS Valentim et al., Eye, 1 (2022). PMID: 35091708.*

# R20-D20 Vision

## Artificial retinas may be the energy-efficient future of robotic vision and security



Artificial retinas developed by researchers at KAUST enable robots to identify handwritten numbers with 72 percent accuracy (1). The artificial retina takes its design from that of the mammalian retina – with a light intensity capacitive photoreceptor (CPR) to replicate the activity of rod cells.

But why should we care about creating retinas for robots, especially given the high quality of modern camera technology? What is the big selling point of an artificial mammalian retina that will convince your average droid to make the switch? It turns out that the imaging used by cameras consumes a lot of energy, even when just in standby mode, whereas this artificial retina is an energy-efficient alternative – a capacitive device that doesn't need static power for its function. Additionally, artificial retina networks have the potential to be smarter and faster than image processing devices.

These neuromorphic sensors pave the way towards energy-efficient and intelligent systems for robotics, and applications that can preserve user privacy. Future retinas made by the KAUST team will aim to build on current work by making larger photoreceptor arrays, adding layers to the neural network, and optimizing the circuit design – all to improve the recognition accuracy of the device.

The photoreceptor, or CPR, is made by sandwiching a nanocomposite material between transparent electrode layers. The nanocomposite material is a hybrid blend of perovskite, which has remarkable photoelectric properties, and a ferroelectric polymer (specifically, PVDF-TrFe-CFE), which is highly effective at insulating and storing electrical energy. Additional advantages to the perovskite include a long lifetime – exemplified by a non-altered performance after 129 weeks in storage in ambient conditions.

Although fancy droids and robots in the movies may enjoy their high-tech cameras for now, the joke is on them; they are better off trading in their energy-guzzling eyesight for the real science fiction future of artificial vision.

*Reference*

1. *MT Vijjapu et al., Light Sci Appl, 11, 3 (2022). PMID: 34974516.*

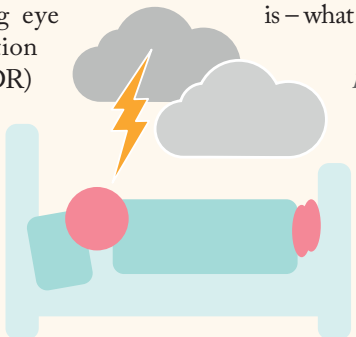
# Behind Closed Eyes

## How our eye movements reveal the emotional context of our dreams

Did you sleep well last night? The answer to that question may rest within your eyes. Researchers have shown that the frequency and pattern of eye movements during sleep reveal the emotions we're experiencing as we dream (1). Slow eye movements are associated with positive emotions, whereas negative emotions are signposted by bursts of rapid eye movements (REMs).

The eye movements observed during negative sleep are reminiscent of those employed during eye movement desensitization and reprocessing (EMDR) therapy, which alleviates the distress patients experience when recalling traumatic events. This may indicate that eye movements during negative sleep are our bodies' way of practicing a form of EMDR, allowing us to subconsciously deal with any negative emotions we're experiencing.

It seems our faces are open books of emotional content. The question now is – what else is there for us to read?



*Reference*

1. *JB Maranci et al., Sci Rep, 12, 1770 (2022). PMID: 35110651.*

## IMAGE OF THE MONTH

*Mishap(tic)*

This month's image shows a dislocated IOL under the slit lamp.

*Credit: Merritt Gammage, Ophthalmic Photographer, Medical Associates Clinic, Dubuque, Iowa, USA.*

Would you like your photo featured in Image of the Month?
Send it to edit@theophthalmologist.com

## QUOTE OF THE MONTH

*"2020 was year of the webinar. We all watched and hosted prolifically. Many of us invested in bigger screens, better webcams, and even teleprompting devices. In contrast, 2021 felt like the year of webinar fatigue and a huge desire for 'real' events to return."*

Dan Lindfield, Consultant Ophthalmologist and Glaucoma Director, Royal Surrey County Hospital, Guildford, UK

# Learning On-the-Line

### When the whole world moves online, can you still teach surgery?

Would you feel confident in your surgical skills if you had been taught through a screen? To find out how well online learning performs, researchers recently delivered a virtual surgical skills practical session to ophthalmology students who, due to COVID-19, faced severely reduced opportunities for in-person teaching (1).

Analyzing student perception and confidence before and after the session, the researchers found that most students felt confident in their new abilities to use the surgical equipment and carry out the techniques demonstrated, disagreeing with the idea that virtual education might have had a negative impact on their learning.

Feedback from instructors indicated that, although some elements required revision to permit the same degree of teaching flexibility and visualization available in person, a virtual teaching session still allowed for individualized learning and was more accessible to students not based in the UK.

*Reference*

1. *C Gupta et al., Eye, [Online ahead of print] (2022). PMID: 35058602.*

THE OPHTHALMOLOGIST'S
**TIME MACHINE:** CHAPTER 2

# Tadeusz Krwawicz: the hero of cataract cryoextraction

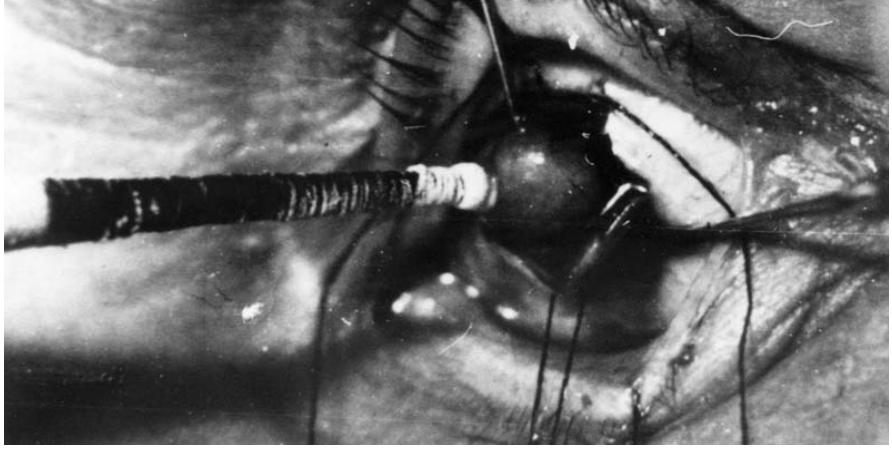


Figure 1. Krwawicz's cryoextractor.

*With Andrzej Grzybowski*

The idea of applying cryosurgery to ophthalmic care first came to Polish ophthalmologist Tadeusz Krwawicz in 1959 as he experimented with lyophilization to store corneas for transplantation. Through exploration, he observed that touching a wire cooled to –70°C to rabbit lenses resulted in firm attachment of the lens capsule and subcapsular material. This finding led him to develop a cryoextractor, which he found particularly helpful for intumescent cataracts and lens subluxation. His idea and primary results were published in the British Journal of Ophthalmology in 1961 (1). However, working in Soviet-controlled Poland, ruined by a communist economy and deprived of modern technology, he was lacking equipment. Noticeably absent was an operating microscope; instead, he improvised with Zeiss loupes able to magnify the image twice. In his own words: "When I described [the technique…], everyone asked me what kind of microscope I used. I did not have a microscope, and I was ashamed to admit it so I equivocated until everybody gave me a break," (2).

As his cryoextractor was not protected by international patent rights, Krwawicz's publication led to its uninhibited worldwide production. One famous pioneer of the technique in the US was Charles Kelman, inventor of phacoemulsification. Kelman developed his own cryoprobe a few years after Krwawicz, publicly acknowledging him as the technology's originator. Another adopter was Selig Percy Amoils – a South African ophthalmologist and biomedical engineering inventor, who introduced a modern cryoprobe in 1965.

However, not everyone was so readily convinced. After seeing Krwawicz in Lublin, Poland, William Riddell, a well-renowned Scottish ophthalmologist, said, "I was there for a long time, I looked and saw a lot, I came to believe that he is either a madman or a genius. It is better we wait," (3). The UK listened, delaying the introduction of cryosurgery by five years. Despite this, as cataract cryoextraction reduced complications, its use became routine in cataract removal for two decades, resulting in substantial progress in ophthalmology.

On the importance of Krwawicz's discoveries, Fritz Hollwich, President of Academia Ophthalmologica Internationalis in 1980 stated, "The last hundred years witnessed a great progress in the treatment of glaucoma and the closure of the retinal detachment using the Gonin method. I am inclined to recognize Professor Krwawicz's cryoextraction as the third achievement equally important as the two aforementioned," (3). Sir Stewart Duke-Elder wrote in his System of Ophthalmology, "He will be always remembered for the introduction of cryosurgical techniques in 1959, especially cataract cryoextraction and cryotherapy of such diseases as viral infections of the cornea. These achievements made him well known all over the world."

Later, Zbigniew Zagórski, Professor of Ophthalmology and one of Krwawicz's pupils, established the Tadeusz Krwawicz Chair of Ophthalmology in Lublin Medical University. Additionally, the International Council of Ophthalmology awards Tadeusz Krwawicz's Gold Medal every four years during the World Ophthalmology Congress, recognizing significant contributions to ophthalmology, especially in anterior segment diseases, the introduction of new technologies, and the advancement of international relationships among ophthalmologists. Previous recipients are Douglas R. Anderson, USA (2008), Alan C. Bird, UK (2012), Marie-Jose Tassignon, Belgium (2016), and David F. Chang, USA (2020). Krwawicz was inducted into the American Society of Cataract and Refractive Surgery Hall of Fame in 2021.

Though Krwawicz may be difficult for some to pronounce, his name – and his achievements – need not be difficult to remember. Speaking during the 1972 ophthalmology congress, G. Peter Halberg, Director of Glaucoma Service at the New York Eye and Ear Infirmary, suggested Krwawicz change his name to "Cryo-Krwawicz," (3), which, though clearly a joke, aptly links the man with his creation.

*Andrzej Grzybowski is a Professor of Ophthalmology and Chair of Department of Ophthalmology, University of Warmia and Mazury, Olsztyn, Poland, and Head of Institute for Research in Ophthalmology, Foundation for Ophthalmology Development, Poznań, Poland.*
*He is also an expert in the history of ophthalmology, with over 100 peer-reviewed articles published in this area. He is a member of AAO Museum of Vision's Program Committee, curator of ESCRS Archive, founder of history section at EVER. He is the president of the Polish Society for History and Philosophy of Medicine; Editor-in-Chief of Archives of History and Philosophy of Medicine, and Historia Ophthalmologica Internationalis, the only journal devoted solely to the history of ophthalmology.*

*See references online.*

INFOGRAPHIC

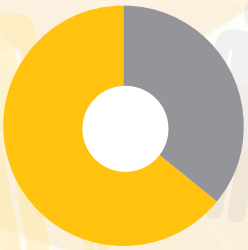
# The Power List 2022 in Numbers

**The what, where, who, and how many times of 2022 List**

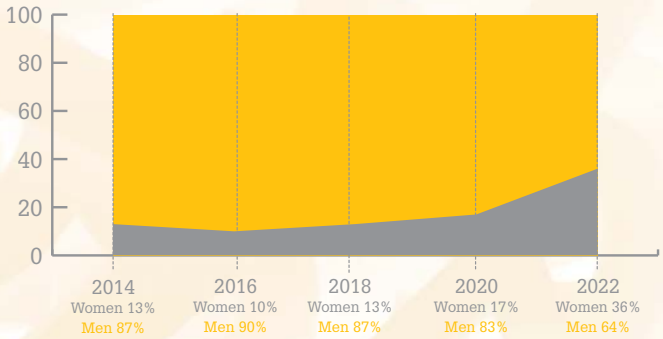
## Where do the Power Listers practice? Countries represented:

| | | | | | |
|---|---|---|---|---|---|
| USA | 47 | Japan | 3 | Nepal | 1 |
| UK | 11 | The Netherlands | 3 | New Zealand | 1 |
| Singapore | 6 | Canada | 2 | Poland | 1 |
| Australia | 4 | Belgium | 1 | Russia | 1 |
| Germany | 4 | France | 1 | Spain | 1 |
| China | 3 | Ireland | 1 | Switzerland | 1 |
| India | 3 | Israel | 1 | Thailand | 1 |
| Italy | 3 | | | | |

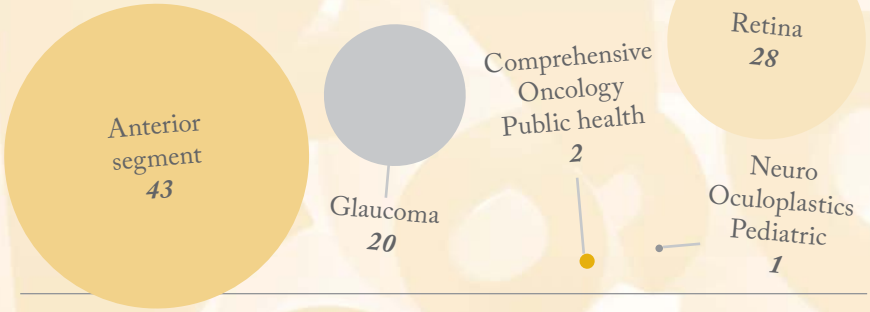
## What is the ratio of women versus men?



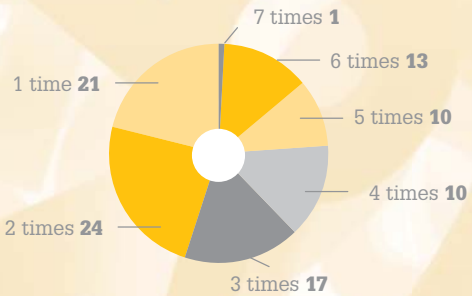

Previous Top 100 lists:




## What fields do Power Listers represent?




## How many times have the frontrunners appeared on the list, including this year's edition?




*We are really happy to see **21** newcomers on this year's list!*

## These names have been on the list **six times** so far...

Amar Agarwal
Anat Loewenstein
Carol L. Shields
David (Ted) Garway-Heath
Elizabeth Yeu
Iqbal Ike K. Ahmed
John Berdahl
Malik Y. Kahook
Pearse Keane
Peng Tee Khaw
Philip Rosenfeld
Richard Lindstrom
Robert Osher

*... and the record of seven appearances goes to Emily Chew.*

**In My View**

*Experts from across the world share a single strongly held opinion or key idea.*

# Seeing the Value of Nano

## How challenges in ophthalmic drug delivery could be overcome by nanotechnology

*By Christian Jones, Chief Commercial Officer at Nanoform*

The global population is aging and increasing numbers of patients are suffering from chronic eye conditions such as dry eye disease and allergic conjunctivitis. These conditions are typically treated with topical medications, which offer a number of advantages over systemic therapies; topical ophthalmic delivery is a relatively noninvasive route and side effects can be minimized. Systemic therapy, in contrast, requires a relatively high circulating drug concentration to achieve a therapeutically effective dose in the eye (1).

To meet the needs of patients and allow more ophthalmic therapies to reach the market, it is vital that the industry overcome several key obstacles. One is the low bioavailability of topical ophthalmic therapies. First, high tear-fluid turnover rate and nasolacrimal drainage rapidly removes fluid from the eye – along with any topically applied drug particles. Second, the eye possesses a number of specialized physiological barriers, such as the corneal epithelia, which are designed to effectively prevent toxic chemicals from penetrating the eye. Unfortunately, this also hinders therapeutic agents (2). A trend toward more complex – and, consequently, more hydrophobic – drug molecules further exacerbates the issue (3). Drug molecules with higher molecular weights often suffer from poor solubility, leading to poor bioavailability and absorption in the body.

Put simply, ophthalmic formulations require a higher precorneal residence time and enhanced drug penetration to enhance drug bioavailability. To this end, novel drug delivery technologies based on cyclodextrins, prodrugs, colloidal systems (such as nanoparticles, liposomes, and nanomicelles) and nanocrystals have been the subject of extensive research.

For example, solubility enhancer cyclodextrin derivatives – which have a hydrophilic surface and a hollow hydrophobic core – have proven an effective means of improving the permeability of active ingredients in certain cases, increasing retention time on the ocular surface. The poorly soluble API is entrapped within the β-cyclodextrins to allow them to be carried across biological membranes. In addition to enhancing efficacy and bioavailability, this approach also reduces inflammation – a significant patient benefit (1). Cyclodextrins' chief drawbacks, however, are their complexity and high cost. Because the API is loaded

*"Compared with other nanocarriers, nanocrystals have high drug loading, which helps efficiently transport drugs into cells; they can also show increased adhesion to cell membranes, which can increase residence time in the ocular sac."*

into the cavities of cyclodextrin molecules, it can also be difficult to achieve very high drug loads (4).

The prodrug approach, meanwhile, involves modifying the physicochemical properties of the drug to achieve one or more objectives, which can include increasing solubility. The drug is then converted into its therapeutically active, less soluble form by cellular enzymes once it reaches the corneal tissue (1). This can successfully improve the bioavailability of poorly soluble APIs. However, formulation of ocular prodrugs is a challenging task, because they should exhibit optimum chemical stability as well as the ability to be converted by enzymes into the parent drug after administration at the desired pace. As a result, this approach can only be applied in some cases (5).

Colloidal nanocarriers have achieved some success in facilitating sustained and controlled drug release, protecting drugs from ocular enzymes and overcoming ocular barriers for poorly soluble drugs. As such, they can help reduce the frequency of dosing, increase precorneal residence time, and improve tissue concentrations for better pharmacological action (1).

Another exciting approach is the use of API nanocrystals. This involves reducing the size of API particles to between 10 and 1,000 nm to increase their surface area and interaction with solvent particles, thereby dramatically enhancing solubility. Nanocrystal-based formulations have been explored for ocular drug delivery and found successful in achieving increased retention time, bioavailability, and permeability of drugs in the eye. Compared with other nanocarriers, nanocrystals have high drug loading, which helps efficiently transport drugs into cells; they can also show increased adhesion to cell membranes, which can increase residence time in the ocular sac. Nanocrystal production requires fewer processing steps and generates fewer physical and chemical stability concerns than other nanocarriers. Because of the simplicity in formulating nanocrystals and their applicability to a wide variety of drugs, there are already products on the market leveraging nanocrystals for oral and injectable drugs, such as Triglide (fenofibrate) and Ritalin (methylphenidate) (6).

*"The latest innovations in technology further spotlight the use of nanocrystals for ophthalmic drugs. For instance, using scalable nanoparticle engineering approaches, such as controlled expansion of supercritical solutions, drug particle size can be reduced uniformly without damaging their inherent chemical properties."*

The latest innovations in technology further spotlight the use of nanocrystals for ophthalmic drugs. For instance, using scalable nanoparticle engineering approaches such as controlled expansion of supercritical solutions, drug particle size can be reduced uniformly without damaging their inherent chemical properties. The subsequent upsurge in surface area can enable poorly soluble particles to be dissolved, held in suspension, or formulated for a variety of other form factors depending on the desired route of administration. In my view, this approach is well suited to very poorly soluble APIs, offering the potential to enhance penetration into tissues – including the eye.

Overall, by directly reducing the size of API particles, advances in nanoparticle engineering open up exciting possibilities across the board, from ophthalmic to oral and beyond.

*References*

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4. *IP Kaur et al., "Role of cyclodextrins in ophthalmics," Curr Drug Deliv, 1, 351 (2004). DOI: 10.2174/1567201043334623.*
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# My Pick for Patients with Presbyopia

## Are hybrid IOLs – the combination of EDoF and diffractive multifocal optics – the right choice for presbyopes?

*By Ivan Gabrić, refractive surgeon at Svjetlost Eye Clinic in Zagreb, Croatia*

The presbyopic patients who come to Eye Clinic Svjetlost (a large private-pay refractive surgery practice in Zagreb, Croatia) tell us they want to enjoy good vision for work and leisure activities – without the need for glasses. They want to continue to feel young and get the most from life. It has always been challenging to meet these high expectations, but, for me, new IOLs that combine extended depth of focus (EDoF) with diffractive multifocal optics in a hybrid design are making it easier than ever.

My colleagues and I recently published a paper (1), presenting results on a study conducted on the largest cohort (206 eyes of 103 patients) implanted with one such lens. We found that refractive predictability was excellent, there were statistically significant reductions in sphere and SE from preop to three months, and patient-reported outcome measures (PROMs) were also great.

However, in addition to the objective results – as those reported in our paper – I also like to ensure that patients don't have to "hunt" for the best focal points. In my experience, most patients are able to see well from about 30 cm to infinity – with no gaps or blurred zones. And this has reduced the amount of time we need to spend preoperatively asking patients for specific details on how they use their vision or how far away they like to position their mobile phone or computer monitor. Being able to simplify patient education, implant the same lens in both eyes, and still meet all the patient's visual needs is a big advantage.

In fact, the outcomes have been so impressive that two of the most experienced refractive cataract surgeons in our clinics have already chosen to have the hybrid lenses implanted in their own eyes, including my father, cataract and refractive specialist professor Nikita Gabrić. In 2020, after seeing his patients' results and their level of satisfaction with the new lenses, he opted to have one implanted in his left eye.

As with any other premium IOL, careful patient selection and counseling is still required to ensure that patients have realistic expectations. In our practice, we believe that a strong motivation for spectacle independence is essential to success with these lenses. Patients may experience glare, halo, or some loss of distance acuity, especially in low-contrast settings, and may require a little time for neuroadaptation. To accept these risks, they need to see the gain in near vision as a major reward. When patients who still have residual accommodation seek refractive lens exchange, we encourage them to wait a few more years until they are fully presbyopic.

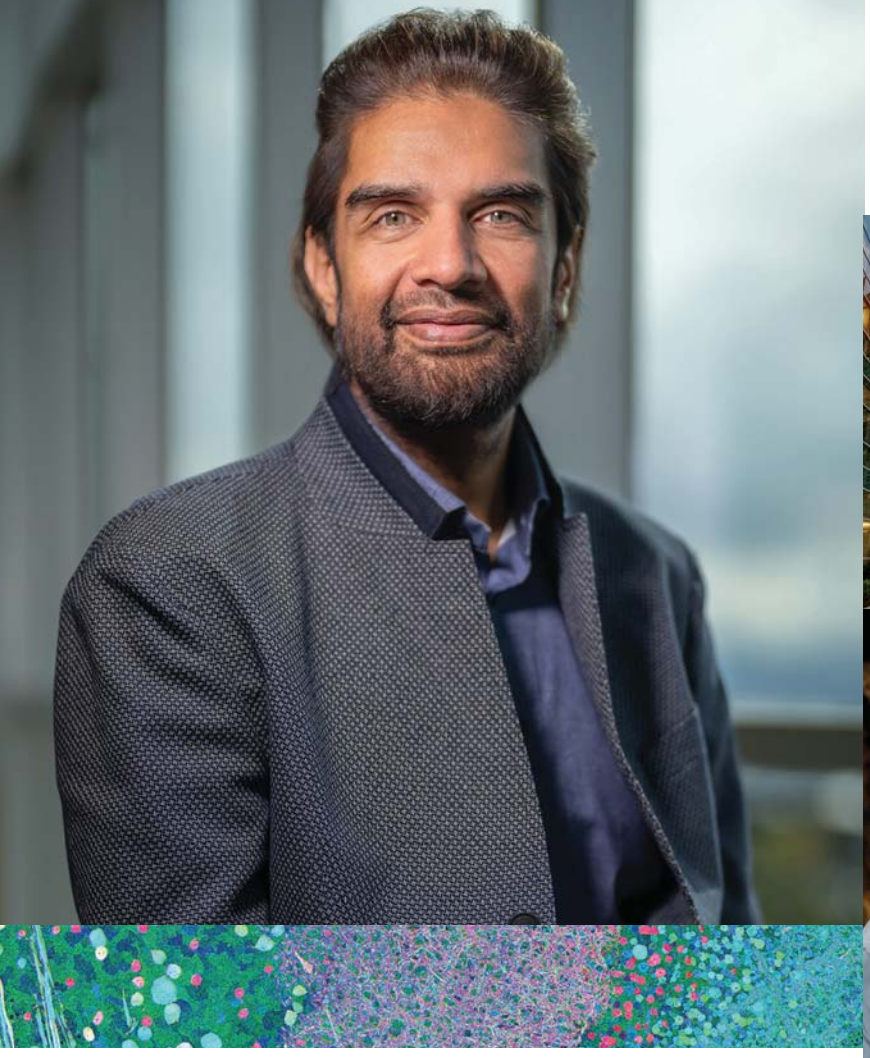
It is important to avoid implanting presbyopia-correcting IOLs in patients with dry eye disease. These advanced optics demand a stable, healthy tear film for the best visual quality. A patient who is dry before surgery will, even in the best-case scenario, remain so, and may get considerably worse. If the ocular surface problems cannot be treated and improved, it's best to choose a monofocal IOL.

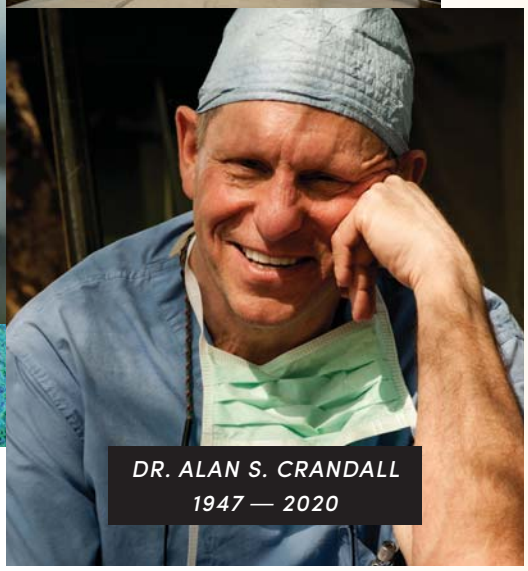
*"The outcomes have been so impressive that two of the most experienced refractive cataract surgeons in our clinics have already chosen to have the hybrid lenses implanted in their own eyes."*

It is also important to choose candidates without significant (≥0.5 D) astigmatism, or use incisional surgery or the toric version of the lens to correct it. Due to its complex optics, the hybrid IOL is sensitive to any residual astigmatism, and particularly to astigmatism in against-the-rule or oblique axes. In our study, four eyes had residual astigmatism at 3 months; this refractive error had a significant negative impact on their UDVA and near vision under low light or low contrast conditions.

Despite these caveats, we are finding that we don't need to screen as carefully for this type of lens as we have for other presbyopia-correcting IOLs. We will consider it for low myopes, detail-oriented perfectionists, and even for those who drive at night or work in variable light conditions.

Just remember that any complications, including residual postoperative error, new or worsening dry eye, or posterior capsular opacification, should be addressed in a timely fashion. After all, we must all be driven to deliver the best results and the absolute highest standard of care.





*DR. ALAN S. CRANDALL*
*1947 — 2020*

WE POWER

# INNOVATION.

The John A. Moran Eye Center at the University of Utah congratulates Iqbal "Ike" K. Ahmed, MD, FRCSC, director of the new Alan S. Crandall Center for Glaucoma Innovation, on his 2022 Power List recognition.

Founded as a tribute to Dr. Ahmed's mentor and friend, the Crandall Center will advance their shared mission to improve glaucoma care through revolutionary surgical approaches and devices.

Dr. Ahmed also has expanded his practice to include the Moran Eye Center. To schedule patient referrals and consultation requests at his Utah location, call 801-585-3071.

HEALTH
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# High-Volume Dependability

**What is the pragmatic impact of top-class, reliable devices and equipment in a busy ophthalmic practice? We asked Jonathan Myers, Chief of Glaucoma Service, and Douglas Wisner, Director of Cataract and Primary Eye Care Service, at Wills Eye Hospital, Philadelphia, PA, USA to share their experience with Haag-Streit's "gold-standard" ophthalmic devices.**

What Haag-Streit devices and equipment do you use?

*Myers:* I've been using Haag-Streit slit lamps from the very beginning of my training, and was using one of the first visual field devices in the US, the Octopus 201. In addition, I presently also use Reliance chairs and Lenstar biometry devices. In our glaucoma practice, all the perimetry devices, slit lamps, microscope stands, and chairs are from Haag-Streit.

*Wisner:* I use Haag-Streit slit lamps daily however, I rely on other Haag-Streit devices throughout my practice, such as microscopes in the operating room, and medical simulators and surgical stools in the training laboratory.

And how do these devices affect patient care?

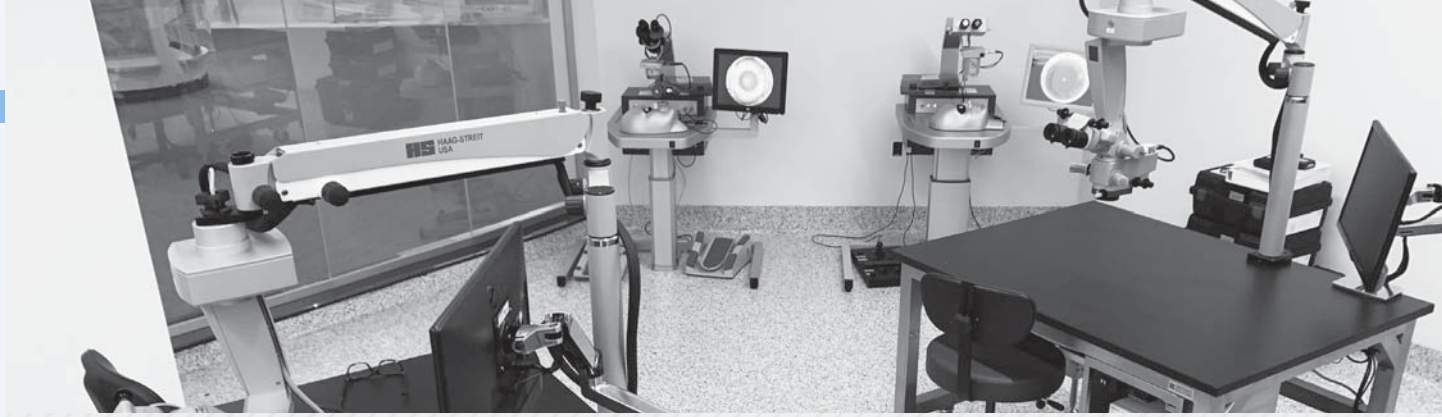
*Myers:* Haag-Streit products are really solid. Their optics are among the best in the business; they're dependable, offer excellent visibility, and they are remarkably low in maintenance. We've been using our Octopus perimeter with the EyeSuite software since 2009, and there has hardly been any downtime. Another example are their Reliance chairs. I don't need to think about the chair, and the patient doesn't complain about it. And a chair that suits all is quite an achievement – after all, patients come in all shapes, sizes, and ages!

Haag-Streit devices just work – and when devices work really well, you hardly notice them because they don't interfere with patient care.

We're especially delighted with the performance of the Octopus perimeters – it's made a big difference to what we do in our practice. Octopus' networking system is robust, its easy-to-use progression algorithm eliminates data variability and allows me to assess a patient in mere seconds. Its cluster trend analysis feature helps highlight visual field concerns. In brief, Octopus gives my team a deeper understanding of patient data, and it plays a central role in our practice.

*"Haag-Streit devices work so smoothly, you almost forget they're working."*
*– Jonathan Myers*

The Lenstar is another great addition to the practice; this plug-and-play biometry device has my favorite formula, the Barrett IOL, directly built in and automatically collects all measurements, thereby reducing error. It is a tried and proven technology that gives reliable results quickly, so patients and technicians alike are completely satisfied.



## Haag-Streit technology for teaching: how to build an ophthalmic surgical training laboratory

*Wills Eye Institute designed an entire surgical skill center around the portfolio of Haag-Streit devices – and Douglas Wisner explains the hospital's decision.*

Ophthalmic surgery is increasingly complicated – and subject to constantly rising high standards of excellence and patient safety. Consequently, educators must squeeze a higher number of more demanding skills into the training period – gone are the days when residents could train on a few pig eyes, and then move on to humans! How should we meet this challenge? At Wills, we decided the answer was to develop a training lab that was compatible with both animal and artificial tissue, and with advanced capabilities, such as virtual reality (VR) medical simulators.

We chose Haag-Streit to help construct this training lab for two main reasons – the quality of the microscopes and the company's collaborative approach. The latter was critical; the Haag-Streit team ensured they understood our space restraints and worked with us to develop an entire lab system, including everything from floor planning to selection of microscopes, audio-visual resources, and other surgical equipment. Throughout, Haag-Streit paid attention to the important details – they even developed an adjustable table that mimics the OR stretcher, and is height adjustable to promote best-in-class ergonomics for surgeons of different physical builds. This attribute is very useful in the training lab – people must be comfortable when they are learning. In addition, making the stations mobile – to retain flexibility of use and assist maintenance – was very helpful during the pandemic, with the need to practice social distancing. Our access to a well-designed lab, at this difficult time, allowed our training program to continue without significant disruption – it all worked well!

We've found the Haag-Streit Eyesi Surgical medical simulators within a VR environment to be an especially valuable resource. They allow residents to practice a range of techniques – from basic to very complex surgery – in a standardized environment, supporting objective performance measurement. In brief, they fill an important gap in early training. And that's why our residents love the lab; they are more confident going into the OR with the high level of virtual training they've received. Even our fellows find the medical simulators useful – whenever I look in the lab, someone is always in there practicing!

Furthermore, we now host industry-led programs to train surgeons in the use of innovative ophthalmic devices. Our new lab is ideal for these purposes, because many people can participate simultaneously. We are open to all companies for such collaborations; as an educational institution, we continually want to expose our faculty to the best available technology and help develop and expand it further.

In conclusion, the training lab is a great success, and we've been extremely fortunate to have Haag-Streit partner with us on this project.

*"Haag-Streit optics are excellent; I can always see what I need to see."*
*– Doug Wisner*

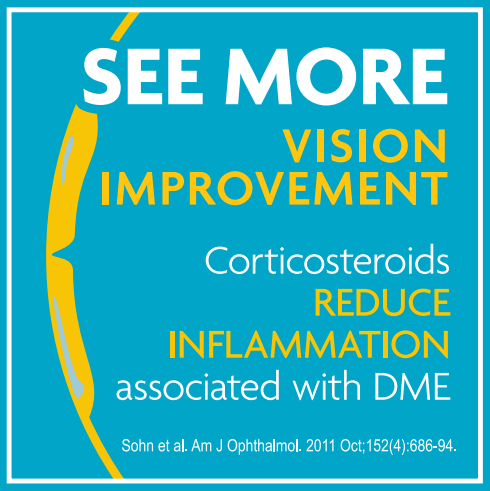
*Wisner:* Haag-Streit optics are excellent; I can always see what I need to see. Simplicity is also a key advantage of the Haag-Streit range; device operation quickly becomes second nature.

### The importance of ergonomics

Ergonomics is a hot topic among physicians; what details can you share about the profile of Haag-Streit devices?

*Myers:* This is an important point – many ophthalmologists have required neck surgery, or even become disabled, because of work-related postural issues. Fortunately, Haag-Streit instruments allow us to work hard without harming our own health.

*Wisner:* Haag-Streit continually works with physicians to identify the best ergonomic practices, modify the equipment we use. The equipment and devices have been very useful to our trainees – they have to be comfortable while learning so that they can develop good ergonomic habits for when they are operating on their patients.


ILUVIEN®
(fluocinolone acetonide intravitreal implant) 0.19mg

**Improved** and stable **vision** increases PATIENT SATISFACTION

Singer et al. OSLI Retina. 2020 Nov 1;51(11):658-667.

ILUVIEN with CONTINUOUS MICRODOSING™ can reduce the recurrence of edema by treating the underlying inflammation that drives DME.[1,2]

**Learn More at hcp.ILUVIEN.com**

## INDICATION

ILUVIEN® (fluocinolone acetonide intravitreal implant) 0.19 mg is indicated for the treatment of diabetic macular edema (DME) in patients who have been previously treated with a course of corticosteroids and did not have a clinically significant rise in intraocular pressure.

## Important Safety Information

### CONTRAINDICATIONS

- ILUVIEN is contraindicated in patients with active or suspected ocular or periocular infections including most viral disease of the cornea and conjunctiva including active epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, varicella, mycobacterial infections and fungal diseases.
- ILUVIEN is contraindicated in patients with glaucoma who have cup to disc ratios of greater than 0.8.
- ILUVIEN is contraindicated in patients with known hypersensitivity to any components of this product.

### WARNINGS AND PRECAUTIONS

- Intravitreal injections, including those with ILUVIEN, have been associated with endophthalmitis, eye inflammation, increased intraocular pressure, and retinal detachments. Patients should be monitored following the intravitreal injection.
- Use of corticosteroids including ILUVIEN may produce posterior subcapsular cataracts, increased intraocular pressure and glaucoma. Use of corticosteroids may enhance the establishment of secondary ocular infections due to bacteria, fungi, or viruses. Corticosteroids are not recommended to be used in patients with a history of ocular herpes simplex because of the potential for reactivation of the viral infection.
- Patients in whom the posterior capsule of the lens is absent or has a tear are at risk of implant migration into the anterior chamber.

### ADVERSE REACTIONS

- In controlled studies, the most common adverse reactions reported were cataract development (ILUVIEN 82%; sham 50%) and intraocular pressure elevation of ≥ 10 mm Hg (ILUVIEN 34%; sham 10%).

Please see brief summary of Prescribing Information on the following page. You are encouraged to report negative side effects of prescription drugs to the FDA. Visit www.fda.gov/medwatch or call 1-800-FDA-1088.

[1]Deuchler SK, et al., Arch Clin Exp Ophthalmol. 2022 Mar 3. doi: 10.1007/s00417-022-05564-2. Epub ahead of print.

[2]Singer M, et al. Ophthalmology. 2022. doi: 10.1016/j.ophtha.2022.01.015. Online ahead of print.

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1-844-445-8843. US-ILV-MMM-1019-01 03/2022

## BRIEF SUMMARY OF FULL PRESCRIBING INFORMATION

**ILUVIEN®** (fluocinolone acetonide intravitreal implant) 0.19 mg
For Intravitreal Injection

### INDICATIONS AND USAGE

**ILUVIEN®** (fluocinolone acetonide intravitreal implant) 0.19 mg is indicated for the treatment of diabetic macular edema in patients who have been previously treated with a course of corticosteroids and did not have a clinically significant rise in intraocular pressure.

### CONTRAINDICATIONS

**Ocular or Periocular Infections: ILUVIEN** is contraindicated in patients with active or suspected ocular or periocular infections including most viral disease of the cornea and conjunctiva including active epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, varicella, mycobacterial infections and fungal diseases.

**Glaucoma: ILUVIEN** is contraindicated in patients with glaucoma who have cup to disc ratios of greater than 0.8.

**Hypersensitivity: ILUVIEN** is contraindicated in patients with known hypersensitivity to any components of this product.

### WARNINGS AND PRECAUTIONS

**Intravitreal Injection-related Effects:** Intravitreal injections, including those with **ILUVIEN**, have been associated with endophthalmitis, eye inflammation, increased intraocular pressure, and retinal detachments. Patients should be monitored following the intravitreal injection.

**Steroid-related Effects:** Use of corticosteroids including **ILUVIEN** may produce posterior subcapsular cataracts, increased intraocular pressure and glaucoma. Use of corticosteroids may enhance the establishment of secondary ocular infections due to bacteria, fungi, or viruses.

Corticosteroids are not recommended to be used in patients with a history of ocular herpes simplex because of the potential for reactivation of the viral infection.

**Risk of Implant Migration:** Patients in whom the posterior capsule of the lens is absent or has a tear are at risk of implant migration into the anterior chamber.

### ADVERSE REACTIONS

**Clinical Studies Experience:** Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

Adverse reactions associated with ophthalmic steroids including **ILUVIEN** include cataract formation and subsequent cataract surgery, elevated intraocular pressure, which may be associated with optic nerve damage, visual acuity and field defects, secondary ocular infection from pathogens including herpes simplex, and perforation of the globe where there is thinning of the cornea or sclera.

**ILUVIEN** was studied in two multicenter, randomized, sham-controlled, masked trials in which patients with diabetic macular edema were treated with either **ILUVIEN** (n=375) or sham (n=185). Table 1 summarizes safety data available when the last subject completed the last 36-month follow-up visit for the two primary **ILUVIEN** trials. In these trials, subjects were eligible for retreatment no earlier than 12 months after study entry. Over the three-year follow-up period, approximately 75% of the **ILUVIEN** treated subjects received only one **ILUVIEN** implant.

Table 1: Ocular Adverse Reactions Reported by ≥1% of Patients and Non-ocular Adverse Reactions Reported by ≥5% of Patients

| Adverse Reactions | ILUVIEN (N=375) n (%) | Sham (N=185) n (%) |
|---|---|---|
| **Ocular** | | |
| Cataract[1] | 192/235[2] (82%) | 61/121[2] (50%) |
| Myodesopsia | 80 (21%) | 17 (9%) |
| Eye pain | 57 (15%) | 25 (14%) |
| Conjunctival haemorrhage | 50 (13%) | 21 (11%) |
| Posterior capsule opacification | 35 (9%) | 6 (3%) |
| Eye irritation | 30 (8%) | 11 (6%) |
| Vitreous detachment | 26 (7%) | 12 (7%) |
| Conjunctivitis | 14 (4%) | 5 (3%) |
| Corneal oedema | 13 (4%) | 3 (2%) |
| Foreign body sensation in eyes | 12 (3%) | 4 (2%) |
| Eye pruritus | 10 (3%) | 3 (2%) |
| Ocular hyperaemia | 10 (3%) | 3 (2%) |
| Optic atrophy | 9 (2%) | 2 (1%) |
| Ocular discomfort | 8 (2%) | 1 (1%) |
| Photophobia | 7 (2%) | 2 (1%) |
| Retinal exudates | 7 (2%) | 0 (0%) |
| Anterior chamber cell | 6 (2%) | 1 (1%) |
| Eye discharge | 6 (2%) | 1 (1%) |

Table 1 (continued)

| Adverse Reactions | ILUVIEN (N=375) n (%) | Sham (N=185) n (%) |
|---|---|---|
| **Non-ocular** | | |
| Anemia | 40 (11%) | 10 (5%) |
| Headache | 33 (9%) | 11 (6%) |
| Renal failure | 32 (9%) | 10 (5%) |
| Pneumonia | 28 (7%) | 8 (4%) |

[1] Includes cataract, cataract nuclear, cataract subcapsular, cataract cortical and cataract diabetic in patients who were phakic at baseline. Among these patients, 80% of **ILUVIEN** subjects vs. 27% of sham-controlled subjects underwent cataract surgery.

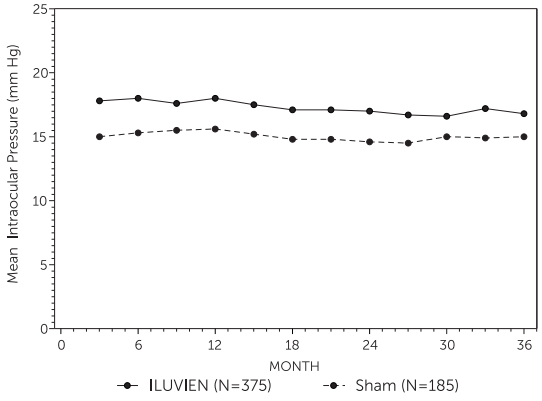
[2] 235 of the 375 **ILUVIEN** subjects were phakic at baseline; 121 of 185 sham-controlled subjects were phakic at baseline.

*Increased Intraocular Pressure*

Table 2: Summary of Elevated IOP-Related Adverse Reactions

| Event | ILUVIEN (N=375) n (%) | Sham (N=185) n (%) |
|---|---|---|
| **Non-ocular** | | |
| IOP elevation ≥ 10 mm Hg from baseline | 127 (34%) | 18 (10%) |
| IOP elevation ≥ 30 mm Hg | 75 (20%) | 8 (4%) |
| Any IOP-lowering medication | 144 (38%) | 26 (14%) |
| Any surgical intervention for elevated intraocular pressure | 18 (5%) | 1 (1%) |

Figure 1: Mean IOP during the study




*Cataracts and Cataract Surgery*

At baseline, 235 of the 375 **ILUVIEN** subjects were phakic; 121 of 185 sham-controlled subjects were phakic. The incidence of cataract development in patients who had a phakic study eye was higher in the **ILUVIEN** group (82%) compared with sham (50%). The median time of cataract being reported as an adverse event was approximately 12 months in the **ILUVIEN** group and 19 months in the sham group. Among these patients, 80% of **ILUVIEN** subjects vs. 27% of sham-controlled subjects underwent cataract surgery, generally within the first 18 months (Median Month 15 for both **ILUVIEN** group and for sham) of the studies.

**Post-marketing Experience:** The following reactions have been identified during post-marketing use of **ILUVIEN** in clinical practice. Because they are reported voluntarily, estimates of frequency cannot be made. The reactions, which have been chosen for inclusion due to either their seriousness, frequency of reporting, possible causal connection to **ILUVIEN**, or a combination of these factors, include reports of drug administration error and reports of the drug being ineffective.

### USE IN SPECIFIC POPULATIONS

**Pregnancy:** Pregnancy Category C.
There are no adequate and well-controlled studies of **ILUVIEN** in pregnant women. Animal reproduction studies have not been conducted with fluocinolone acetonide. Corticosteroids have been shown to be teratogenic in laboratory animals when administered systemically at relatively low dosage levels. **ILUVIEN** should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

**Nursing Mothers:** Systemically administered corticosteroids are present in human milk and could suppress growth and interfere with endogenous corticosteroid production. The systemic concentration of fluocinolone acetonide following intravitreal treatment with **ILUVIEN** is low. It is not known whether intravitreal treatment with **ILUVIEN** could result in sufficient systemic absorption to produce detectable quantities in human milk. Exercise caution when **ILUVIEN** is administered to a nursing woman.

**Pediatric Use:** Safety and effectiveness of **ILUVIEN** in pediatric patients have not been established.

**Geriatric Use:** No overall differences in safety or effectiveness have been observed between elderly and younger patients.

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Alimera


Can you believe this is the ninth iteration of our Power List – or the fifth time we're featuring the Top 100 most influential people in the world of ophthalmology? The 2022 List includes genuine giants of clinical practice and vision research – and each one was first nominated by you and then plucked from the long list of 450 names by our international panel of 20 judges.

Do we believe our List is definitive? As ever, no! But we hope you find this year's selection not only inspirational but also reflective of the brilliance found in so many corners of this wonderful field.

Over the past few years, we have seen some changing trends among the final 100 names. For example, you had to look hard to find a woman on 2016 List – just 10 women among 90 men. This year, we are delighted that the number of women has risen to 36. Can we credit last year's all-female Power List with the upward swing? Well, showcasing just 100 of the many highly talented women in the field certainly didn't hurt…

The Power List 2022 greets 21 newcomers – congratulations! Please, make yourselves at home. But the passage of time doesn't change everything; we also welcome back 79 previous frontrunners – 14 of whom have appeared on the link six or more times!

*Welcome to The Power List!*

IF YOU WANT TO READ THE FULL VERSION OR SHARE THE POWER LIST WITH A COLLEAGUE, IT CAN BE ACCESSED ONLINE (FOR FREE): THEOPHTHALMOLOGIST.COM/POWER-LIST

## #1 JANEY L. WIGGS

Paul Austin Chandler Professor of Ophthalmology, Vice Chair for Clinical Research, Harvard Medical School/ Massachusetts Eye and Ear, Cambridge, Massachusetts, USA

*If you weren't an ophthalmologist…*
I think I would be either a geologist or an archaeologist. I enjoyed digging and finding unusual rocks as a child (and still do!). As for other fields in medicine, as a student I enjoyed pathology, infectious disease and hematology/oncology.

## #2 IQBAL "IKE" K. AHMED

Director, Alan S. Crandall Center for Glaucoma Innovation, University of Utah, Salt Lake City, USA; Director, Glaucoma & Advanced Anterior Segment Surgery Fellowship, University of Toronto, Ontario, Canada

*A little-known or interesting thing about you...*
I am a very romantic person! It's true, despite my "bad boy" image.

*If you weren't an ophthalmologist…*
I would be a human rights lawyer, protecting and advocating for those treated unfairly.

## #3 MICHAEL F. CHIANG

Director, National Eye Institute, National Institutes of Health, Bethesda, Maryland, USA

*A little-known or interesting thing about you...*
As a medical student, I initially thought about becoming a neurosurgeon because I was interested in computational neuroscience and neural networks. I worked for several years in the lab of Richard Masland in the Division of Neurosurgery Research at Massachusetts General Hospital. He was studying neural information processing – using the rabbit retina as a model system. This is how I became fascinated by the visual system and is what made me become an ophthalmologist.

## #4 KEITH R. MARTIN

Ringland Anderson Professor and Head of Ophthalmology, University of Melbourne, Director, Centre for Eye Research Australia, Honorary Professor of Ophthalmology, University of Sydney, Honorary Senior Research Fellow, University of Cambridge

*A little-known or interesting thing about you...*
I have a Black Belt in Shotokan Karate.

*An instrument you would not have been able to live without over the past 10 years…*
My piano.

*If you weren't an ophthalmologist…*
I'm not sure, but it probably wouldn't be another job in clinical medicine. I have always loved technology, and I am increasingly interested in finding ways to support innovation in vision and eye health that has real world impact – one of the key things we are trying to do at the Centre for Eye Research Australia and the University of Melbourne.

## #5 CAROL L. SHIELDS

Ocular Oncology Service, Director, Wills Eye Hospital, Thomas Jefferson University, Philadelphia, Pennsylvania, USA

*A little-known or interesting thing about you...*

I attended the University of Notre Dame for my collegiate education, with the intention of studying hard to become a scientist. And that I did, but I could not resist trying out for the newly founded women's basketball team, a sport I loved. In the end, I played on the team for four years, served as its captain for three years, and this experience propelled me into my future, convincing me to believe in myself and my ultimate potential.

*If you weren't an ophthalmologist...*

I would probably specialize in dermatology. I really enjoyed both fields in medical school. My career in ophthalmic tumors is a blend of ophthalmology and dermatology, with an emphasis on related tumors.

*One practical tip for a fellow expert...*

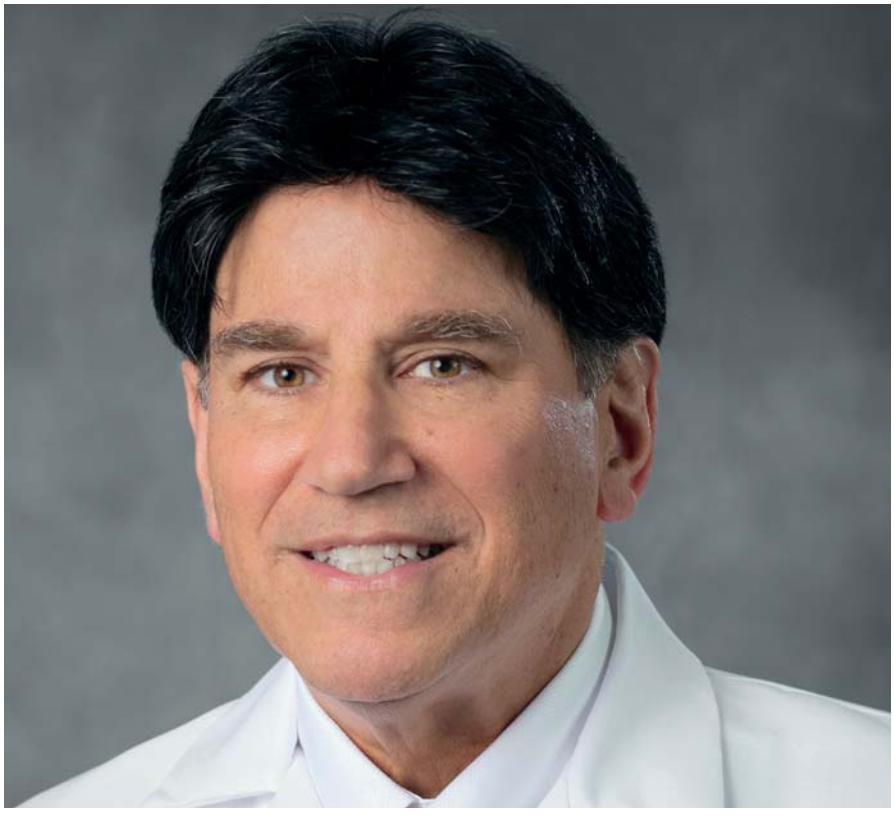
A practical tip for patient management in ocular oncology is to stay positive and relay this to the family. I always start my counseling session with a positive comment, to give the patient and their family hope.

## #6 DAVID S. FRIEDMAN

Albert and Diane Kaneb Chair Massachusetts Eye and Ear, Director of Glaucoma and Medical Director for Clinical Research, Co-Director of the Glaucoma Center of Excellence, Professor, Harvard Medical School, Boston, Massachusetts, USA

*A person in your field you look up to...*

I especially admire Alfred Sommer for having applied public health approaches to eye care, resulting in a much deeper understanding of who gets glaucoma and how it progresses. I have learned a tremendous amount from him over the years.



## #7 ROBERT N. WEINREB

Distinguished Professor and Chair, Ophthalmology, Director, Shiley Eye Institute, Distinguished Professor, Bioengineering, Director, Hamilton Glaucoma Center, Morris Gleich, MD Chair of Glaucoma, University of California, San Diego, California, USA

*A practical tip for a fellow expert...*

One should never stop learning as there are many more questions about glaucoma than answers. In my office, I have a plaque with a quote by Michelangelo that reads, "I am still learning". Every day, I am reminded how fortunate I am to be able to do this.

## #8 DONALD TAN

Eye & Retina Surgeons, Singapore

*A little-known or interesting thing about you...*
During the COVID-19 pandemic, I started a whisky infusion company called The Whimsky Bar, making bespoke whisky blended with Asian herbs, fruits and spices.

*If you weren't an ophthalmologist…*
I would be a minor grade cellist, playing in local chamber groups and a local orchestra.

*A person in your field you look up to…*
Shigeru Kinoshita from Kyoto Prefectural University; he has influenced so many aspects of basic science and clinical medicine in the corneal field, and continues to make tremendous contributions to ocular surface and endothelial cell biology, and therapeutics.

## #9 GUS GAZZARD

Director, Glaucoma Service, Moorfields Eye Hospital, Consultant Ophthalmic Surgeon, UCL Professor of Ophthalmology (Glaucoma Studies), Institute of Ophthalmology UCL & NIHR Biomedical Research Centre, London, UK

*A little-known or interesting thing about you...*
I love opera.

*Your prediction for the field…*
Genetic predictions of risk will become routine.

*The biggest breakthrough of the past decades…*
OCT imaging of retinal ganglion cells; it's hard to imagine clinical decisions were made on changes to cup-disc ratios!

*The challenge for 2022 – and beyond…*
Making sure that the evidence for treatments (especially MIGS) keeps up with the innovation and we don't get carried away and inadvertently – but enthusiastically – cause harm.

## #10 PEARSE A. KEANE

Consultant Ophthalmologist, Moorfields Eye Hospital NHS Foundation , Professor of Artificial Medical Intelligence, University College London (UCL) Institute of Ophthalmology, London, UK

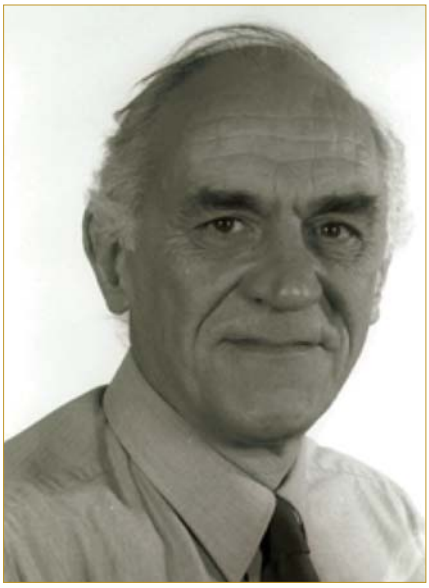
*A person in your field you look up to…*
I am privileged to work with so many amazing up and coming researchers. Some that come to mind include: Siegfried Wagner, who leads the AlzEye study with me… this should transform the use of the eye as a window to the rest of the body! Xiaoxuan Liu, who led recent AI extensions of CONSORT and SPIRIT clinical trial guidelines. With Alastair Denniston, she co-leads the recent Standing Together grant funding from NHSx, which will focus on making sure that AI works well across genders and ethnicities.

## ADNAN TUFAIL

Consultant Ophthalmologist Moorfields Eye Hospital & Professor of Ophthalmology, Institute of Ophthalmology, UCL, London, UK

*Here is what his nominator said about him:*

"He was one of the earliest movers in Big Data application for retinal disease, and has continued to leverage this to accelerate application of AI and deep learning to improve our understanding of retinal disorders, and develop validation and monitoring systems."



## ALAN BIRD

Emeritus Professor and Consultant at Institute of Ophthalmology, University College London, UK

*A nominator commented:*

"Alan Bird has been involved in designing and implementing numerous clinical trials. He has trained a huge number of fellows and has published numerous papers. He is an internationally recognized figure."

## AMAR AGARWAL

Chairman, Dr. Agarwal's Group of Eye Hospitals, Chennai, India

*Here is what his nominator said about him:*

"A true force in ocular surgery, including anterior segment and vitreoretinal procedures. PDEK and glued IOL are among his many vital contributions to the field. He has had many 'firsts' in the surgical field, and is universally admired."

## ALLEN C. HO

Wills Eye Hospital Attending Surgeon and Director of Retina Research and Professor of Ophthalmology, Thomas Jefferson University, USA

*If you weren't an ophthalmologist…*

I would be at the NFL, running and throwing with the likes of Joe Burrow and Saquon Barkley. Which is exactly why I'm not in the NFL, and thus relegated to the most rewarding, meaningful and impactful subspecialty in all of medicine!

## ANAT GALOR

Staff Physician, Miami Veterans Affairs Medical Center and Professor of Ophthalmology, Bascom Palmer Eye Institute, University of Miami, Florida, USA

*A person in your field you look up to…*

Carol Karp, a leader in the field of ocular surface tumors. Not only is she a wonderful researcher, clinician, and surgeon, she also takes dozens of medical students, residents, and fellows under her wing each year and provides a "full service" operation that includes instructions in the realms of clinical practice, surgical techniques, and research, in addition to personal advice, matchmaking, and home cooked meals. On top of that, she is a terrific mom.

## ANDRZEJ GRZYBOWSKI

Professor of Ophthalmology, Chair of Ophthalmology at the University of Warmia and Mazury, Olsztyn, Poland

*If you weren't an ophthalmologist…*

I love reading, with a particular interest in Polish as well as North and South American literature, but also 19th-century Russian literature. When I was in secondary school, I planned to study literature, and I would be happy to have become a writer.

## ANNE L. COLEMAN

The Fran and Ray Stark Foundation, Professor of Ophthalmology, David Geffen, School of Medicine at UCLA, Professor of Epidemiology, Jonathan and Karin Fielding School of Public Health at UCLA, Past President, American Academy of Ophthalmology, based in Los Angeles, California, USA

*Outside of work, what makes you happy?*

Now that my daughter is no longer home and is away at medical school, I get my happiness outside of work through my morning "me-time" routine. Every morning before I get my day started, I sit in my hot tub for 10 minutes watching birds fly overhead, along with the beauty of an ever-changing sky.

## ANTHONY KHAWAJA

Associate Professor & Honorary Consultant Ophthalmic Surgeon, UCL Institute of Ophthalmology & Moorfields Eye Hospital, London, UK

*Do you have a controversial opinion?*

I think I'm in the minority of people that do not think myopia contributes to the risk of glaucoma. I think the cross-sectional evidence is flawed and there is lacking evidence in progression studies. It is high pressure that causes myopia rather than vice versa!

## ANAT LOEWENSTEIN

Director, Ophthalmology Division, Sackler and Sidney Fox Chair incumbent in Ophthalmology, Associate Dean, Faculty of Medicine, President of the Ophthalmological Israeli Society, Tel Aviv, Israel

*Practical tips for a fellow expert…*

I have a few critical tips for the young physician in the beginning of their career: choose an interesting niche which speaks to you, and concentrate all of your efforts to facilitate its advancement. Simultaneously, find a good mentor, who will help with goal setting, networking, negotiation skills, career advancement and provide guidance regarding research and publications.

## ANTONIA M. JOUSSEN

Professor and Chair, Department of Ophthalmology, Campus Benjamin Franklin and Campus Virchow Klinikum, Charité Universitätsmedizin Berlin, Germany

*If you weren't an ophthalmologist…*
I would have loved to stay in basic science. Or become a musician…

*A person in your field you look up to…*
Steve Ryan, Alan Bird, Judah Folkman: three leaders in the field with the ability to raise, support and counsel younger colleagues.

*One practical tip for a fellow expert...*
Stay curious.

## BORIS MALYUGIN

Professor of Ophthalmology, Deputy Director General (R&D, Edu), S. Fyodorov Eye Microsurgery Complex, Russia

*What is the single biggest challenge facing your field in 2022 – and beyond?*
The number of patients needing eye care is outgrowing the number of practising ophthalmologists, ultimately leading to a limited access to eye care in many regions of the world and a further rise in unnecessary blindness.

## BURKHARD DICK

Professor and Chairman, Director, Ruhr University Eye Hospital, Germany

*One practical tip for a fellow expert...*
Get all the information – about a technique, about a patient, about anything relevant – ahead of time. It can be a terrible mess when you, proverbially speaking, do something at the twelfth hour.

*If you weren't an ophthalmologist…*
In the field of medicine, I would probably have chosen to become a neurosurgeon. Outside of medicine? I would have likely attended an art academy and worked as an artist, which comes close to being an eye surgeon, doesn't it?

*A little-know fact about you...*
Being born in relative proximity to the North Sea, I always had a fondness for the sea, for the wide open spaces of our planet's oceans. Sailing in a yacht or steering a motorboat, particularly on the Mediterranean, is time and again an invigorating experience.

## ARTHUR B. CUMMINGS

Consultant Ophthalmologist and Medical Director at Wellington Eye Clinic, Dublin, Ireland

*The biggest challenge facing your field in 2022 – and beyond?*
We do not have enough refractive surgeons globally. The burden of vision impairment lies squarely at the feet of cataract and refractive surgeons with most reports stating that 75 to 80 percent of the treatable visual impairment burden is due to uncorrected refractive error and cataract.

*Do you have any controevrsial opinions?*
I do – backed by Nobel-Prize winning behavioural economist, Daniel Kahneman. His "loss aversion" theory states that we prefer to avoid loss to acquire equivalent gains. Ophthalmology is about avoiding loss, but vision correction surgery is about the pursuit of gain. It is so fundamentally different to general ophthalmology that refractive surgery should be its own speciality.

## CAMIEL J. F. BOON

Professor of Ophthalmology and Consultant Ophthalmologist, Amsterdam University Medical Centers and Leiden University Medical Center, the Netherlands

*The biggest breakthrough in the field over the last two decades...*

When I started my PhD in 2005, anti-VEGF injections were just introduced. No one could believe what they saw in terms of efficacy. I feel fortunate to have experienced this true revolution in the field of retina. Anti-VEGF treatment has saved eyesight for countless patients.

*What is the single biggest challenge facing your field in 2022 – and beyond?*

There are many challenges ahead, but a major one for me would be the development of an effective and versatile - and affordable - tool box of genetic therapies for the spectrum of dramatic hereditary retinal dystrophies. The development and commercial use of voretigene neparvovec AAV-based subretinal gene therapy for RPE65-associated early-onset retinal dystrophy is a major first breakthrough, which hopefully heralds many more effective treatments to come.

*If you weren't an ophthalmologist, what would you be doing?*

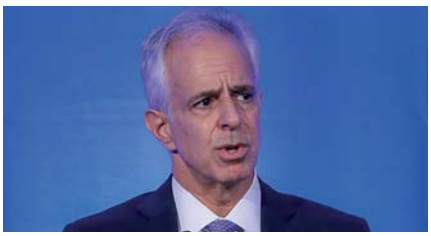
If I had enough talent for it, I would have loved to be a concert pianist, doesn't matter if it is classical music or jazz (no wait - both!)

## CARL D. REGILLO

Director, Retina Service, Wills Eye Hospital, Professor of Ophthalmology at Thomas Jefferson University, Philadelphia, Pennsylvania, USA

*The biggest breakthrough in retina…*

It has to be anti-VEGF therapy, and small incision vitrectomy. The former has revolutionized the outcomes of the most common, blinding retinal disease, whereas the latter has made vitreoretinal surgery safer and more efficient.



## CAROLINE KLAVER

Professor of Ophthalmology and Epidemiology, Erasmus Medical Center, Rotterdam, Netherlands, Radboud University Medical Center, Nijmegen, The Netherlands, and the Institute for Molecular and Clinical Ophthalmology, Basel, Switzerland

*A little-known or interesting thing about you...*

I used to be a race rower.

*If you weren't an ophthalmologist…*

I'd be working in environmental biology.

## CATHLEEN M. MCCABE

Chief Medical Officer, Eye Health America, Medical Director, The Eye Associates, Chair, Refractive Surgery Clinical Committee ASCRS, Co-Chief Medical Editor, Cataract Refractive Surgery Today, Co-Chief Medical Editor: Ophthalmic ASC Magazine, President: Outpatient Ophthalmic Surgery Society, Bradenton, Florida, USA

*Practical tips for a fellow expert...*

For doctors early in their careers, I would advise that they strive to stay inquisitive and nimble, with a passion for learning and thinking outside the box. Try not to become too comfortable with the status quo; instead, look for large and small ways to improve the delivery of eyecare. Challenge yourself to take one new skills transfer course, teach a technique or attend a small meeting once a year to keep learning, contributing, and evolving.

## CHARLES N. J. MCGHEE

Maurice Paykel Professor and Chair of Ophthalmology, Director, New Zealand National Eye Centre, University of Auckland, New Zealand

*A little-known or interesting thing about you...*

I left medical school to play guitar in a rock band and travel, but also pursued eye pathology research with Bill Lee in Glasgow and Dan Albert in Harvard, ultimately leading me back to medical school and a career in ophthalmology!

## CHELVIN SNG

Medical Director, Chelvin Sng Eye Centre, Adjunct Associate Professor, National University of Singapore, Adjunct Clinician Investigator, Singapore Eye Research Institute, Convenor, Asia Pacific Glaucoma Society MIGS Interest Group, Singapore

*A little-known or interesting thing about you...*

Few people know that I used to be an avid Chinese Chess player, and I represented my school in the Singaporean National Chinese Chess competitions when I was in school. I was never crowned the champion, but I did come close and was ranked 2nd and 3rd in some competitions! Sadly, I hardly play Chinese Chess these days, and I hope to get back into the game when I have more time one day.

## CHRISTINA Y. WENG

Associate Professor of Ophthalmology, Fellowship Program Director, Vitreoretinal Diseases & Surgery, Director, Medical Student Clinical Elective-Ben Taub General Hospital, Baylor College of Medicine, Cullen Eye Institute, Houston, Texas, USA

*A little-known or interesting thing about you...*

I'm the quintessential night owl so the early rising surgeon lifestyle has taken (and continues to take) intentional adjustment on my part. I relish the peaceful solitude that night brings and typically do my best work then. In turn, sleeping in when my schedule allows is a real treat!

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## CHRISTOPHER E. STARR

Associate Professor of Ophthalmology, Director of Refractive Surgery, Director of Ophthalmic Education, Weill Cornell Medicine, New York-Presbyterian Hospital, New York City, New York, USA

*If you weren't an ophthalmologist...*

I'd be on stage at Madison Square Garden fronting a wildly successful prog-rock, jazz-fusion, doom-metal, improvisational jam band… This of course is a fantasy on many levels.

*What is the most interesting or little-known fact about you?*

I am fanatical about all things music! … playing, recording and producing improvisational music with friends, listening to music on vinyl and hi-res streaming (yes, I'm a nerdy audiophile), and of course seeing as much live music as possible in my hometown New York City.

## CLEMENT C.Y. THAM

Chairman, Department of Ophthalmology & Visual Sciences, The Chinese University of Hong Kong (CUHK), S.H. Ho Professor of Ophthalmology & Visual Sciences, The Chinese University of Hong Kong (CUHK), Director, CUHK Eye Centre, Director, Lam Kin Chung. Jet King-Shing Ho Glaucoma Treatment and Research Centre, Faculty of Medicine, The Chinese University of Hong Kong

*If you weren't an ophthalmologist…*

Towards the end of my general surgical training rotation, I was choosing between ophthalmology and urology. I guess there are similarities between these two specialties – both are surgical specialties, with relatively more dramatic and appreciable surgical outcomes, and they both bring forth great satisfaction for both the patient and the surgeon. Eventually, I chose ophthalmology, partly because ophthalmology is even more technologically driven!

## CONSTANCE OKEKE

Glaucoma & Cataract Specialist, CVP Physicians/Virginia Eye Consultants, Author, The Building Blocks of Trabectome Surgery: Patient Selection, Assistant Professor of Ophthalmology, Eastern Virginia Medical School, Norfolk, Virginia, USA

*A little-known or interesting thing about you…*

When I was a football cheerleader in high school, my favorite part of the sport were the dance competitions. So, when I got to Yale college, I decided to try out for a dance group called Rhythmic Blue. I was fortunate to dance with the group for all four years and learned to choreograph hip-hop, modern, and jazz. I never realized how valuable those skills would become years later in all my annual Wilmer Resident Skits, which were always a hit!

*If you could offer one practical tip to a fellow expert in your sub-specialty, what would it be?*

Take time to watch your own surgical videos. There's so much that you can learn from watching your techniques and seeing how you can refine them. Sometimes you can get into a rut and not realize why it's happening. It may be due to a slight change in your technique that has been slightly modified, now resulting in you running into some challenges. Watching prior videos can allow you to remember something you once did, as well as show you where you can make improvements. Coupling this with periodically watching surgical video techniques of others can help you hone your surgical craft.

## COURTNEY E. BOVEE

Glaucoma and Cataract Surgeon, Tampa Bay, Florida, USA

*The biggest breakthrough in the field over the last two decades...*

Sustained release drug delivery platforms have transformed how I approach control of glaucoma. Technology is rapidly evolving to introduce life-changing devices and molecules that offer sustained pressure lowering therapy. I have been fortunate to witness the profound effect that these technologies have on slowing disease progression as a result of consistent and durable pressure control whilst also enhancing a patient's quality of life.

## DAMIEN GATINEL

Head of the Anterior Segment and Refractive Surgery Department, Rothschild Foundation Hospital, Paris, France.

*The single biggest challenge facing your field in 2022 – and beyond?*

I think the increase in the prevalence of myopia is of particular concern. Of course, it assures refractive surgery a bright future, but the management of myopia co-morbidities is a public health challenge for all concerned countries.

## DANIEL TING

Associate Professor, Duke-NUS Medical School, Consultant Vitreo-Retinal Surgeon, Singapore National Eye Center, Head, AI and Digital Innovation, Singapore Eye Research Institute, Singapore

*A little-known or interesting thing about you...*

I can play the piano well.

*If you weren't an ophthalmologist…*

I would probably be involved in a financial technology start-up, or a multinational company.

## DAVID (TED) GARWAY-HEATH

Glaucoma UK Professor of Ophthalmology, UCL, and Hon. Consultant Ophthalmologist, Moorfields Eye Hospital, London, UK

*A little-known or interesting thing about you...*

As a medical student, I chaired a community organization in London aiming to promote cooperation between local residents, businesses, and developers to achieve inner city regeneration – which was sympathetic to the needs of local residents and businesses.

*If you weren't an ophthalmologist…*

I'd probably be an architect.


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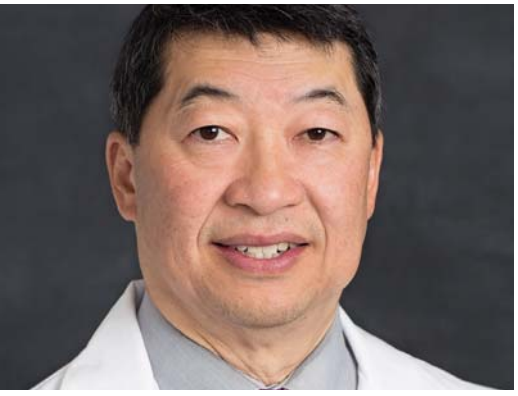


## DAVID F. CHANG

Private practice, Altos Eye Physicians, Los Altos, California; Clinical professor, University of California, San Francisco, USA

*The biggest breakthrough in your field over the last couple of decades…*

The single biggest breakthrough was the appropriate delineation of our Medicare and private insurance system in 2005, and the separation of medical and refractive aspects to cataract surgery. This paradigm shift allowed patients to pay separate premiums for refractive IOLs while still receiving coverage for the medical procedure, providing fair compensation to industry and ophthalmologists for their products and services. It also gave patients access to improved refractive technologies and outcomes, while elevating the refractive skills of cataract surgeons.

## DEEPINDER K. DHALIWAL

Professor of Ophthalmology, University of Pittsburgh School of Medicine, Chief, Divisions of Cornea and Refractive Surgery, UPMC Eye Center, Director and Founder, Center for Integrative Ophthalmology, Clinical Co-Director, Corneal Regeneration Laboratory, Associate Director, Charles T. Campbell Ocular Microbiology Laboratory, Medical Director, UPMC Laser Vision Center, Pittsburgh, Pennsylvania, USA

*The biggest breakthrough in your field over the last two decades…*

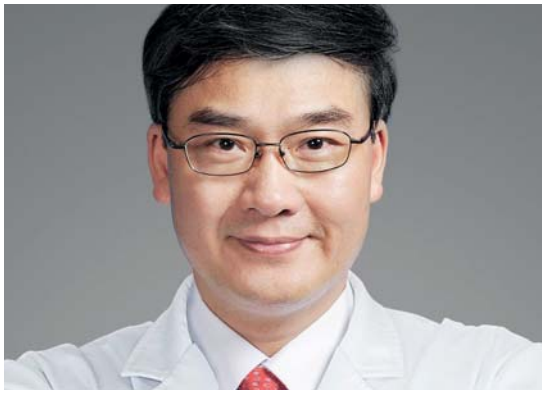
Endothelial keratoplasty, without a doubt. Gerrit Melles is an absolute genius! He revolutionized corneal transplantation.

## DENNIS S.C. LAM

Chairman & CEO, Hong Kong C-MER International Eye Care Group Ltd, Editor-in-Chief, Asia-Pacific Journal of Ophthalmology (APJO), Secretary General, Academy of Asia-Pacific Professors of Ophthalmology (AAPPO) & Asia-Pacific Myopia Society (APMS), Past President, Asia-Pacific Academy of Ophthalmology (APAO) & Asia-Pacific Vitreo-retina Society (APVRS), Hong Kong

*If you weren't an ophthalmologist, what would you be doing?*

I would most likely be a politician. As Plato said, "One of the penalties of refusing to participate in politics is that you end up being governed by your inferiors." A visionary politician makes a real difference to the future of the community or society that they lead.



## DOUGLAS KOCH

Professor and Allen, Mosbacher, and Law Chair in Ophthalmology, Cullen Eye Institute, Baylor College of Medicine, Houston, Texas, USA

*If you weren't an ophthalmologist…*

In college, I toyed with the idea of becoming a professional French horn player, but I saw the challenges that this career entailed. I have many friends who are musicians and love their careers, but I certainly have no regrets about my decision. Music remains an important part of my life: I help to run Bach Society Houston and play the piano (at a very amateur level).

*When did you first think of becoming a physician?*

My father, a radiologist, talked of how he loved patient care and the intellectual stimulation of practicing medicine. So it appealed to me from a young age.

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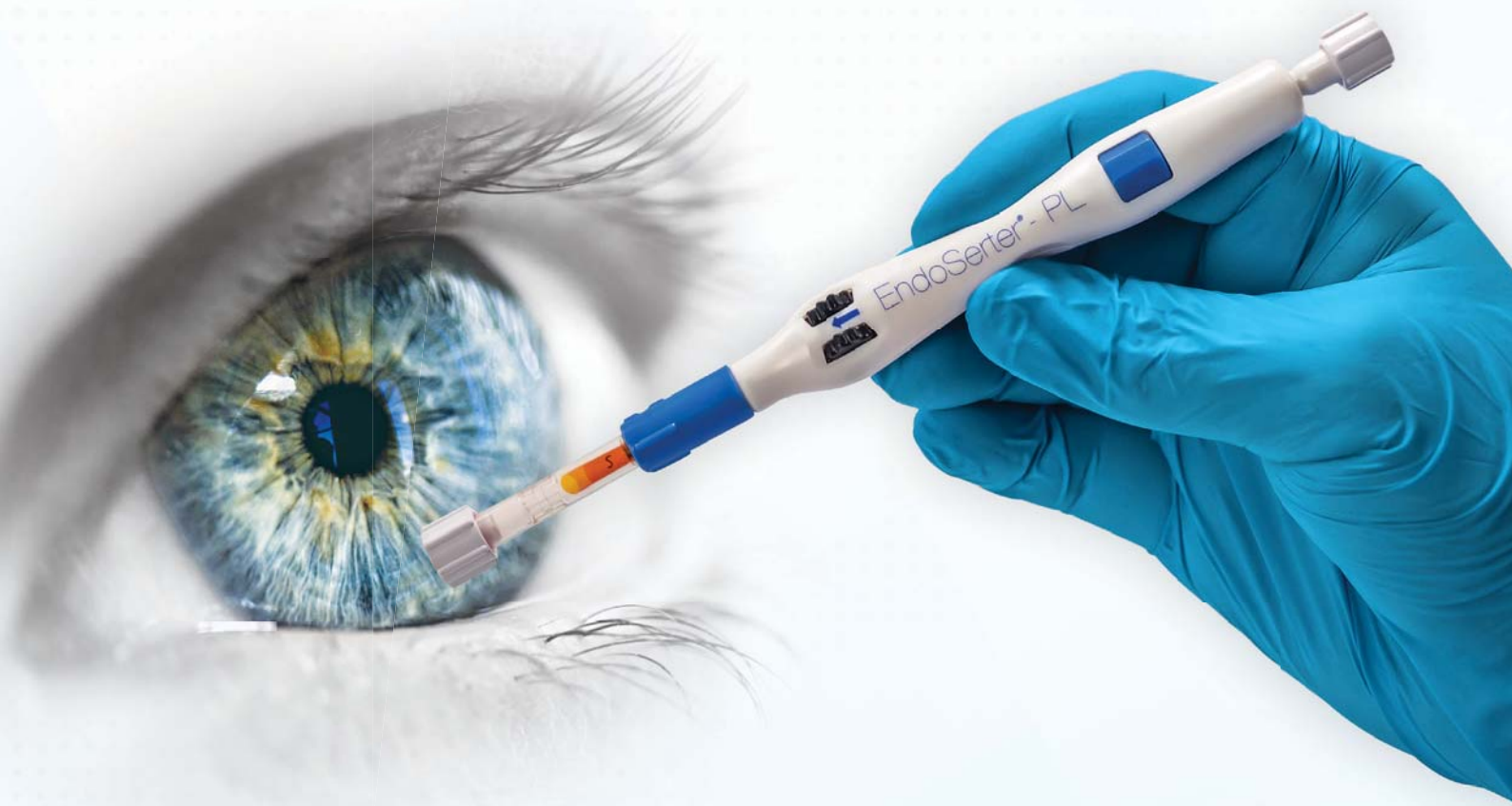


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## EDUARDO C. ALFONSO

Chairman and Director, Bascom Palmer Eye Institute Miami, Florida, USA

*A person in your field you look up to…*

The person I most admire in the field is Edward W.D. Norton, the insightful ophthalmologist who founded Bascom Palmer Eye Institute sixty years ago and guided its growth for more than three decades. Norton – a remarkable physician, professor, and administrator – inspired openness and trust. That transparency and integrity created the foundation that, to this day, allows Bascom Palmer to grow and flourish. All of us at Bascom Palmer, including alumni around the world, are proud to continue his legacy of providing compassionate patient care and advancing our understanding of ophthalmology.

## EDWARD J. HOLLAND

Director of Cornea, Cincinnati Eye Institute, Professor of Ophthalmology, University of Cincinnati, Cincinnati, Ohio, USA

*If you weren't an ophthalmologist...*

During my freshman year in college, I was a history/political science major. I have always loved history and contemplated teaching history as a career.

## ELIZABETH YEU

Assistant Professor of Ophthalmology, Eastern Virginia Medical School, Cornea, Cataract, External Disease, Refractive Surgery, Virginia Eye Consultants, Medical Director, CVP Mid-Atlantic, Norfolk, Virginia, USA

*If you weren't an ophthalmologist…*

I'd be a hair and make-up artist.

*A little-known or interesting thing about you...*

Although I was born outside of Philadelphia, I did not learn how to speak any English until entering elementary school as my maternal grandmother was my primary caregiver. I love that I'm still able to semi-conversationally speak Korean.

## EMILY CHEW

Director of the Division of Epidemiology and Clinical Applications (DECA), at the National Eye Institute, the National Institutes of Health in Bethesda, Maryland, USA

*In the words of her nominator:*

"Chew has provided mentorship to numerous medical students who take a year off medical school to gain research experience at the NEI/NIH and to the medical retina fellows at NIH."

*Outside of work, what makes you happy?*

I am very happy to create culinary occasions because that often means the gathering of friends and family to share in joy and laughter. Such events will also facilitate the camaraderie among our colleagues and to better understand each other for more fruitful collaborations.

*What have been your career highlights?*

The opportunities to participate and to lead clinical trials that make a difference in medical practice to help reduce the burden of disease in patients with visual impairment.

For Chronic Eye Conditions

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## ERIC DONNENFELD

Clinical Professor of Ophthalmology NYU, Founding Partner Ophthalmic Consultants of Long Island.

*A little-known or interesting thing about you...*

I was born in the Philippines on a United States Naval Base.

*A person in your field you look up to…*

My senior partner, Henry Perry, has been a mentor to me for 35 years. He is deeply committed to the field of cornea and continues to innovate and teach for almost 50 years.

*If you weren't an ophthalmologist...*

I cannot imagine being anything other than an ophthalmologist. This has been my dream since I was in elementary school.

## EUGENE DE JUAN

H.S. Clinical Professor of Ophthalmology at the University of California San Francisco, Founder and Member of Forsightlabs, California, USA

*A person in your field you look up to…*

"Our group" of maybe 15-20 retina physicians, all within 10 years of my age, has led the field of retina and ophthalmology for years. Many of us will transition to retirement within the next decade. These are the retina "founding fathers and mothers," so to speak. I am so proud to have been a part of the field's growth with this group.

## FRANCESCO BANDELLO

Professor and Chairman of the Department of Ophthalmology at the University VitaSalute, Milan, Italy

*In the words of his nominator:*

"Bandello has been the principal investigator in several clinical trials concerning diabetic retinopathy and AMD. He is co-author of nine books and has published 651 articles in journals listed on PubMed relating to retinal diseases, diabetic retinopathy, AMD, and fluorescein and indocyanine green angiographies of different retinal vascular disorders."

## GARY WÖRTZ

Associate Professor of Ophthalmology, University of Kentucky, Cataract and Refractive Surgeon, Commonwealth Eye Surgery, Founder/Chief Medical Advisor, Omega Ophthalmics, Lexington, Kentucky, USA

*If you weren't an ophthalmologist...*

I'd be a barista/coffee shop owner. I have been obsessed with coffee for most of my life. I have purchased almost every style of coffee maker, from drip coffee, to cold brew apparatus, to my latest investment in a commercial grade espresso grinder and machine. What I love about making coffee are the multitude of variables from bean, to roast and freshness, to grind size, pressure, and temperature. We are performing a complex chemical extraction, and the results can be fantastic with proper equipment and technique. Some days, I dream of opening a coffee shop by the beach upon retirement decades from now, where the worst thing that happens is that I have to remake a cup of coffee for someone.

## GEMMY CHEUNG

Professor, Duke-NUS Medical School, National University of Singapore, Head and Senior Consultant, Medical Retina Department, Singapore National Eye Center, Head, Retina Research Group, Singapore Eye Research Institute, Singapore

*What techniques are likely to come into prominence in the next five years in your field?*

AI-assisted clinical decision making, remote monitoring, gene therapy. There has been so much active research into these 3 areas, and many groups have made important advances over the past few years. I believe over the next five years, we will see further maturation of these techniques and some will become ready to be incorporated into mainstream practice.

## GEORGE L. SPAETH

Louis Esposito Research Professor at Wills Eye Hospital, Sydney Kimmel Medical College, Thomas Jefferson University, Philadelphia, Pennsylvania, USA

*If you weren't an ophthalmologist…*

I am not an ophthalmologist. I am a person trying to do better.

*What is the biggest challenge in your field?*

The biggest challenge is to acknowledge that we are all biased and that we actually know little.

*Do you have any controversial opinions?*

Medical care will not effectively and affordably help people be healthy until people know how to care well for themselves. People actually have access to what is necessary for them to become well, and the major objectives of the medical profession are to help people both learn to take care of themselves and to create an environment where that is possible.

the Ophthalmologist®

# MYOPIA FUNDAMENTALS

## *Live Roundtable*

Our star-studded myopia roundtable brings the leading experts together to discuss the growing prevalence of myopia, its impact on other ocular disorders, prevention, and treatment.

Sean Ianchulev nicely outlines the impending impact of myopia in a pandemic world: "The curve of myopia is only going to get steeper, because two of the factors that are most impactful include the time kids spend outdoors and time spent in front of screens, and both of those are really negatively impacted by the pandemic. That's why I have been calling myopia an epidemic behind the pandemic."

For this, and more, check out the discussion!


**WATCH OUR FREE ROUNDTABLE TODAY:**
*top.txp.to/myopia/rtable*

# Leading the Way

*The 2022 Ophthalmologist Power List celebrates the outstanding individuals who have been recognized by their peers as leaders in the field of ophthalmology. Here, our industry sponsors tell us about their commitment to R&D in eye care, and how they are leading the way in the field to make a difference to ophthalmologists and patients.*

## Xiao-Yu Song, MD, PhD

*Global Head of Research and Development, Johnson & Johnson Vision*

What in the ophthalmic field is your team most excited about right now?

At Johnson & Johnson Vision, our purpose is to deliver healthy sight for life. Everything we do within our strong portfolio and robust pipeline focuses on innovating against unmet eye health needs across one's lifetime. The potential to serve the ophthalmic community by identifying unmet medical needs and developing unique ways to address them is what excites us the most.

Starting with the developing eyes of pediatric patients, we believe it is part of our responsibility as one of the leading healthcare companies in the world to help slow down and stop the progression of myopia, a pandemic in the eye health space. We are advancing the next generation of science, generating new evidence based on innovative research, and bringing new products and services to the market – under our ACUVUE® Abiliti™ brand portfolio – to address this fast-growing threat that is disproportionately affecting children.

In young adults and aging adults, we are focused on developing solutions for refractive/vision correction, allergy relief, dry eye, and beauty. We have a long legacy of innovation across vision correction and recognize that there remains a high level of unmet need across the globe as approximately a quarter of the population experiences some sort of visual impairment. We are making investments in corneal refractive surgery – both excimer and femtosecond laser technology platforms – as well as with contact lenses, that we expect to introduce soon. Additionally, and notably, we recently announced the FDA approval of ACUVUE® Theravision™ with Ketotifen - the world's first and only drug-eluting contact lens for prevention of ocular itch associated with allergic conjunctivitis that also provides vision correction. Approximately 40 percent of contact lens wearers suffer from itchy eyes due to ocular allergies. Together, our scientists, engineers and cross-functional colleagues were the first to tackle this challenge.

As consumers/patients continue to age, we are focused on providing enhanced solutions to address presbyopia and cataracts with products ranging from our new next-generation presbyopia correcting intraocular lenses (PCIOLs), TECNIS Synergy™ IOL and TECNIS Synergy™ Toric II IOL, that go beyond trifocal technology, delivering the widest range of continuous vision, to rolling out the first monofocal innovation in 20 years for cataract patients, TECNIS Eyhance™ IOL and TECNIS Eyhance™ Toric II IOL, to a next-generation phacoemulsification system, VERITAS Vision System.

We believe the future of eye care is bright with tremendous opportunities for ongoing innovation in technology, products, pharmaceuticals, and care delivery methods across every stage of life.

Johnson & Johnson VISION

*www.jjvision.com*

Georgea Pasedis
*Senior Vice President, Global Biotech Head of Medical and Clinical Affairs*
*Dompé*

What role does Research & Development (R&D) play in Dompé's success?

At Dompé, we take a science-first approach and invest heavily in R&D to bring innovative therapies to patients in need. The R&D team at Dompé was responsible for developing and executing the clinical trials, as well as working closely with the FDA to get the first approval label for rhNGF, a topical biologic to treat neurotrophic keratitis. Due to these R&D efforts, the company has now been able to treat thousands of patients who suffer from this vision threatening disease.

Our investment in R&D extends beyond ophthalmics to include exploration into several areas of profound unmet medical need. This includes increasing the number of active clinical trials from nine in 2020 to 17 in 2022, in such areas as Type 1 Diabetes, Cancer Related Fatigue, COVID-19 and ARDS. Dompé remains deeply committed to ophthalmics and as such has initiated two parallel phase III trials in patients with severe Sjögren's dry eye disease, in addition to our ongoing study in patients with Stage I Neurotrophic Keratitis, which is now fully enrolled. Dompé has also provided independent grants to support several investigator-initiated clinical trials to further scientific advancement in multiple therapeutic areas.

What are the biggest challenges in running a successful R&D program?

In the pharmaceutical industry today, only 13 percent of new molecules that enter Phase I of clinical trials go on to commercialization (1) – and the journey from the start of the R&D program to market can take, on average, 5-15 years. Some of the more recent challenges stemming from the pandemic have shifted the way in which clinical trial programs can recruit patients, and the qualified research staffing at healthcare facilities. In the last two years, we have seen lower than normal enrolment, with fewer patients interested in enrolling in clinical trials. Additionally, it has become even harder to recruit diverse patient populations.

Pandemic-related staffing complications have also impacted the clinics, private practices, and institutions that play such a critical role in the seamless execution of clinical research. Dompé remains committed to overcoming these barriers so that innovation can make it to market through the R&D process. Initiatives that Dompé has kicked off include a patient-centric study website with digital tools on social media to allow patients to learn more about their condition and submit their medical information to a site nearby, investing in several resources to find sites that serve underserved communities, and providing additional staff to subsidize the staffing limitations.

*References*

1. *DB Fogel, Contemp Clin Trials Commun, 11, 156 (2018). PMID: 30112460.*
2. *Dompé at a Glance. Available at: https://bit.ly/35FeAc3.*
3. *OXERVATE™ [package insert]. Boston, MA: Dompé U.S. Inc.; 2019.*

Dompé

*www.dompe.com*

Dr. Tilman Otto,
*Head of Technology Management for Ophthalmic Devices*
*Heidelberg Engineering*

What is your team most excited about right now?

Optical coherence tomography (OCT) has revolutionized diagnostics in ophthalmology over the last 15 years, becoming an integral part of almost any patient examination, but it is still far from reaching its limits. There is still tremendous potential in axial and lateral resolution, as well as increased sensitivity and higher speeds. Being part of this process has been hugely inspiring for the Heidelberg Engineering team. In addition to OCT, our team is involved in molecular imaging, such as time-resolved fluorescence, which is also a highly promising technology.

What role does R&D play in Heidelberg Engineering's success and what are the main challenges in this area?

Heidelberg Engineering is widely known for exceptional image quality and innovative technologies. The expertise and many years of experience in selecting the most appropriate technologies and components, as well as the implementation of innovative concepts, play a key role in our company culture and are crucial to our success.

Transforming highly complex technical concepts that border on the limits of what is technically possible into robust and reliable devices suitable for everyday clinical use is a major challenge, which we constantly strive to overcome. We work hard to anticipate the kinds of problems that can potentially arise. Our R&D team has an innovative mindset and the determination to master challenges for the sake of better patient care.

What role does the end user play in your R&D process?

Our mission is to optimize our imaging and healthcare IT technologies to empower clinicians to improve patient care. The user is at the heart of everything we do. Heidelberg image quality, the dynamic visualization of information, and the integrity of data over time are examples of our commitment to clinical excellence. We have always collaborated with researchers and clinicians to find innovative solutions to challenging problems. More recently, we have focused our attention on the performance and usability of our platforms to streamline workflow and increase efficiency.

Who are the unsung heroes within your R&D team?

Experienced and talented developers form an essential core part of R&D, but that alone is not sufficient. There are many other vital team members whose contributions are key: test engineers who verify development results, technical writers who create manuals and service and manufacturing documentation, and the project managers, who motivate everyone to aim higher. It is a team effort!

HEIDELBERG ENGINEERING

*www.heidelbergengineering.com*

AnnMarie Hipsley
*Founder and CEO,*
*Ace Vision Group (AVG), Inc.*

What role does R&D play in the success of Ace Vision?

The science behind Ace Vision's technology is extremely deep and R&D is at the crux of the dynamic innovation we are creating at AVG. During the COVID-19 pandemic, AVG took advantage of the engineering resource surplus that were disengaged from other projects which required physical lab presence, and acquired those resources virtually to build up its Artificial Intelligence (AI )and Virtual Reality (VR) platforms on the Next Gen VisioLite® laser. AVG hopes to be a leader in the ophthalmic laser industry in these areas.

What are the biggest challenges in running a successful R&D program?

Innovating in a remote ecosystem was a huge challenge. AVG spent a great deal of time building and managing remote teams during and after the COVID-19 crisis. Evolving projects within an industry of decreased human and tangible resources is also a challenge. While supply chains continue to shrink, we continually have to innovate around these challenges, which places a critical burden on the R&D deliverables.

What role does the end user play in your R&D process?

The end user essentially drives the R&D process. Beginning with the end user in mind is done systematically as part of our R&D process. It is extremely important to use this as a guideline while still using a "lifecycle mentality" to allow innovation to strive alongside today's usability environment. As a start-up, we have to envision the end user over 10 years and how those user requirements are quickly changing and impacted by the technology springboard.

Who are the unsung heroes within your R&D team?

The unsung heroes are the pioneers who forged the ophthalmic laser industry to begin with and who were willing to become mentors to me and to AVG during the course of its evolution; those that have offered their advice, criticism, feedback, and encouragement to our R&D team for the simple exchange of paying it forward to the benefit of the ophthalmology industry. For AVG, those people would be Professor John Marshall's for his tireless guidance over the years, Prof. Ioannis Pallikaris for his innovative inspiration and coaching, Dr. George O. Waring III for being the amazing mentor and teacher he was to this adopted student in the concept of improving "lifetime vision," and finally Prof Danièle Aron Rosa for her endorsement of the science as well as her inspiration to support this vision from the very beginning of its genesis.

What is your team most excited about right now?

Ace Vision is extremely excited about nearing the completion of its Gen I prototype pilot studies and clinical read out to inform the company's FDA pathway planned for Q4 2022. AVG expects to complete a series of final milestones to reach the design freeze of our Next Generation VisioLite® Ophthalmic laser system by the last quarter of 2022.

AceVision
See Life Naturally™

*www.acevisiongroup.com*

Franck Leveiller
*Senior Vice President, Head of Global Research & Development*
*Alcon*

What role does R&D play in Alcon's success?

R&D is the DNA of Alcon; it's how we aspire to bring life-changing vision and eye care products to millions of people. It is what has helped shape our brilliant history and will shape our brilliant future.

We've dedicated a significant amount of our resources and funding to R&D. We continue to be among the market leaders in ophthalmic R&D investment, creating a robust pipeline that truly makes an impact for eye care professionals and patients.

We've made one of the largest R&D commitments of any surgical and vision care companies. I could not be prouder of leading a team of more than 1,400 associates worldwide researching and developing treatments and solutions for unmet patient needs.

In 2021, we invested $682 million in R&D, and I'm thrilled to say we currently have a rich pipeline of more than 100 products in development, including novel IOL technologies and equipment platforms, to continue to fuel our growth as a leader in eye care. Our passion is to develop the best products possible – so we pursue both internal and external innovation opportunities at all stages.

And what's the role of the end user in your R&D process?

Effective R&D is never linear – it's cyclical. It requires a constant feedback loop from healthcare professionals, surgeons, patients, and physicians to ensure that the solutions and technology that we bring to market actually – demonstrably – help improve people's lives.

At Alcon, we adhere to an outcomes-based R&D philosophy. We ask ourselves: What unmet need is this solution meant to fulfill? What problem – for an individual or a broader population – is this solution meant to solve? Asking ourselves these questions helps to focus our attention and resources from ideation through commercialization.

We have a robust process that enables us to gain insight from the end user, including surgeons and other stakeholders, during the development processes. We don't simply commercialize the solutions we think patients and eye care professionals want; we develop the solutions that meet a critical unmet need – because we've been deeply involved with them, bringing them along the entire R&D journey.

Further, we have increased multifunctional representation in the R&D process and are ensuring diverse perspectives are incorporated along the way. For instance, in recent trials and testing, we have modified our design approach for certain products like our hand-activated forceps to be more inclusive of women. As a historically underrepresented group in medical and clinical trials, we have secured the feedback of women surgeons during product development, taking into account physical differences in height and hand size and we plan to continue this representation moving forward.

Alcon

*www.alcon.com*

## Christopher Brittain

*Vice President, Global Head of Ophthalmology Product Development*
*Roche*

What is the Roche team excited about right now?

In the last six months, we achieved FDA approval of not one but two new therapies, Vabysmo and Susvimo. Both of these products have been in development for well over a decade. Vabysmo has a bispecific mechanism of action against VEGF and Ang-2, and its dosing regimen allows around half of the patients to receive treatment as infrequently as every four months. Susvimo is the first refillable eye implant to continuously release ranibizumab, enabling patients to go six months between treatments. Finally seeing these therapies – both of which can significantly reduce the burden of treatment – offered to patients means so much to us all.

What role does R&D play in the success of Roche?

R&D is the lifeblood of Roche/Genentech. Well over 1,000 people worked on Vabysmo and Susvimo over the years, and similar numbers of our colleagues are currently working on new developments across the company. Successful innovation enables us to reinvest in R&D: Roche invested 13.7 billion CHF ($14.7 billion) in R&D in 2021 alone. For those of us in ophthalmology that means we are currently running four Phase III trials for Susvimo and Vabysmo in DME, DR, CRVO, and BRVO, three Phase II trials in GA and DR, and – even more excitingly – several Phase I studies that we hope will enable the Port Delivery System eye implant to be used with a new range of therapeutics.

What are the biggest challenges of running a successful R&D program?

Our people are the most important part of all of our programs. Ensuring we find the best scientists and medics is one of our biggest priorities. I am incredibly proud to say that we have built out an impressive organization that allows individuals to contribute to all stages of drug development. We all continue to learn from an incredible breadth of fellow scientists specializing in areas from manufacturing and quality to preclinical testing – and through to Phase III studies and beyond. Another challenge is accepting failure and learning from it. When our Phase III lampalizumab study in GA failed to demonstrate a treatment effect, we didn't give up. Instead, we have published numerous papers with many collaborators, sharing what we have learned. Today, we have used those lessons to enable our four ongoing clinical programs in GA.

Who are the unsung heroes within your R&D team?

There are countless unsung heroes, but the one group I would mention are those who work on the manufacturing and distribution of our products. As we develop therapeutics, scale up production, distribute products for trials and then commercially, the complexities of understanding and controlling the biological processes at play for the manufacture of the antibodies, gene therapies, and cell therapies we investigate cannot be underestimated. The teams involved are large, global, diverse, and incredibly important.

Roche

## GERD U. AUFFARTH

Professor and Chairman, Heidelberg University Eye Clinic, Director, The David J. Apple International Laboratory for Ocular Pathology, Heidelberg, Germany

*Do you have any controversial opinions?*

I summarized my strongest opinion in last year's ESCRS Binkhorst Lecture: "There is no free lunch in optics." Regardless of what companies say to doctors, there is no perfect lens that has no side effects and provides perfect vision at all distances. Despite this, however, it is always worth trying to reach perfection.

## GRAHAM D. BARRETT

Clinical Professor of Ophthalmology, University of Western Australia, Lions Eye Institute, Sir Charles Gairdner Hospital, Australia

*A little-known or interesting thing about you...*

I'm an amateur astronomer.

*If you weren't an ophthalmologist...*

I'd be an engineer.

*The biggest breakthrough in your field in the last decades…*

Toric IOLs.

*Do you have any controversial opinions?*

Target less than 0.5 residual astigmatism in all cases!

## GERRIT MELLES

Cornea Specialist/Director of NIIOS, Rotterdam, The Netherlands

*Your predictions for the field…*

The field may benefit from a simplification of the ophthalmic infrastructure, with better professional focus, autonomy, and flexibility. Projects like SurgiCube (standalone surgical unit) and Ophthalmic e-Device (patient self-monitoring at home) have been initiated by NIIOS with this in mind.

## HARRY QUIGLEY

Edward Maumenee Professor, Wilmer Institute, Johns Hopkins Medicine, Baltimore, Maryland, USA

*A little-known or interesting thing about you...*
I plant trees.

*If you weren't an ophthalmologist…*
I would be doing musical comedy.

*Do you have any controversial opinions?*
MIGS surgeries need more evidence before being used so widely.

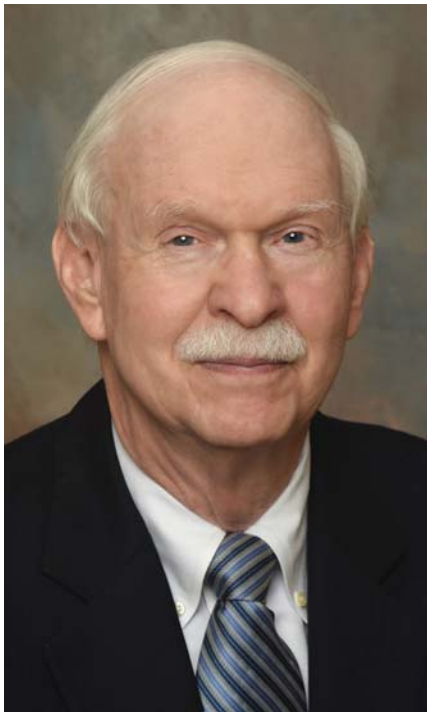
*What techniques are likely to come into prominence in the next five years in glaucoma?*
Sustained delivery of eye drugs.

## HARRY W. FLYNN JR.

The J. Donald M. Gass Distinguished Chair in Ophthalmology, Professor of Ophthalmology, Bascom Palmer Eye Institute, UHealth - University of Miami Health System, Miami, Florida, USA

*Practical tips for a fellow expert...*
Always put the patient's best interest first in deciding management strategies. In running your clinic, 1. Arrive early 2. Do not take long breaks in the middle of busy clinics and 3. Finish-up all details at the end of the day. Stay humble and laugh a lot.

*What is the single biggest challenge facing your field in 2022 and beyond?*
With the aging population, patients with age-related macular degeneration (AMD) and various retinal vascular diseases including diabetic retinopathy and venous occlusive disease will increase. Caregivers will need improved efficiency in order to manage larger clinical volumes and to determine the best treatments for our patients. Home OCT monitoring could be a major benefit if the price and efficiency of this technique could be improved. Artificial intelligence screening of fundus photography would be a great way to accomplish these goals.



## HAYDEE E. P. BAZAN

Professor of Neuroscience, Ophthalmology, Biochemistry and Molecular Biology, Neuroscience Center of Excellence, School of Medicine, LSU Health, New Orleans, Louisiana, USA

*One of her nominators stated:*
"Haydee Bazan has been NIH-funded for the last 35 years and has extensive service in study sections. She mentored graduate students, fellows, medical students, and young scientists interested in ophthalmology. Her awards include a Role Model for the Young Leadership Council of the City of New Orleans, LSU School of Medicine's Honorary Alumnus, LSU Excellence in Mentoring, and ARVO Gold Fellow. She has organized national/international meetings."

## HELEN DANESH-MEYER

Sir William and Lady Stevenson Professor of Ophthalmology Chair at the New Zealand National Eye Centre, University of Auckland, New Zealand

*In the words of one of her many nominators:*
"Helen has managed to 'break the glass ceiling' for women in surgery. She has achieved numerous 'firsts' for New Zealand ophthalmologists: first New Zealand member of the Glaucoma Research Society, first Australian/New Zealander to be appointed to the AAO Basic Clinical Science Course, first female Chair of the RANZCO Scientific Programme Committee, and first NZ ophthalmologist to serve on the Editorial Board of AJO and previously, Ophthalmology."

## JOAN W. MILLER

Chief of Ophthalmology, Massachusetts Eye and Ear, Chair of the Department of Ophthalmology, David Glendenning Cogan Professor of Ophthalmology, Harvard Medical School, Boston, Massachusetts, USA

*In the words of her nominators:*
"She developed PDT and anti-VEGF therapies helping millions of people, she runs one of the biggest eye departments in the world - she's an amazing person!" "She's an exemplary leader in academic medicine."

## JOD S. MEHTA

Distinguished Professor in Clinical Innovation in Ophthalmology, SNEC, Singapore

*A little-known or interesting thing about you...*
Despite spending my professional life and education in cities, I am actually from a very small town in the UK where my brother and I were the only non-Caucasian people.

*If you weren't an ophthalmologist…*
I think I would be a human rights lawyer.

## JOHN BERDAHL

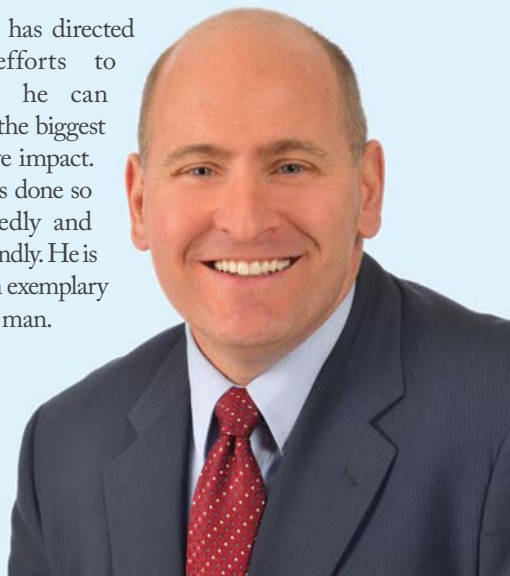
Partner at Vance Thompson Vision and Founder of Equinox, Melt Pharmaceuticals, ExpertOpinion.MD, Astigmatismfix.com, Sioux Falls, South Dakota, USA

*One practical tip for a fellow expert...*
People don't care what you know until they know that you care. Caring about people in their moments of vulnerability is the first charge of being a doctor.

## JOHN HOVANESIAN

Specialist in cataract, refractive and corneal surgery, Private Practice, Harvard Eye Associates, Laguna Hills California and Clinical Faculty at UCLA Stein Eye Institute

*A person I look up to:*
David Chang. David is a case study in living an examined life. From his research (discoverer of IFIS, endophthalmitis prevention) to his charitable work with the Chang - Crandall Humanitarian Award to his leadership efforts in curbing OR waste, David has directed his efforts to where he can make the biggest positive impact. He has done so repeatedly and profoundly. He is also an exemplary family man.



## JORGE L. ALIÓ

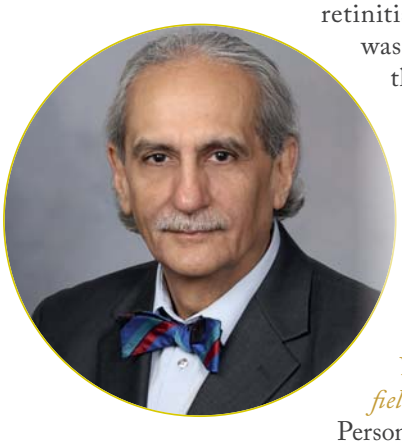
Professor and Chairman of Ophthalmology, Miguel Hernandez University, Founder Vissum Miranza Alicante, Spain

*One practical tip for a fellow expert...*

Read more top-quality peer-reviewed journals and have less confidence in meeting presentations, which can be biased by many factors that influence the speakers and the attendees of meetings.

## JOSE S. PULIDO

Larry Donoso Chair of Translational Ophthalmology, Wills Eye Hospital and Professor, Thomas Jefferson University, Philadelphia, Pennsylvania, USA, Professor Emeritus, Departments of Ophthalmology and Molecular Medicine, Mayo Clinic



*A little-known or interesting thing about you...*

I met my wife while she was doing ERGs on rabbits and when I was testing intravitreal injections of a new drug called BW-B759u for CMV retinitis, in a disease that was newly emerging back then, called AIDS. We showed that it could be safely injected into the eye, and this drug is now called ganciclovir. We were engaged three weeks later.

*Your predictions for the field...*

Personalized genetic therapy will be able to help a vast number of patients in the next 10 to 15 years.

## JOST B. JONAS

Professor and Chairman of Ophthalmology, Medical Faculty Mannheim, Heidelberg University and Institute of Molecular and Clinical Ophthalmology Basel, Switzerland

*A technique you would not have been able to live without over the past 10 years…*

Optical coherence tomography.

*The biggest breakthrough in your field...*

Intravitreal application of medication for the therapy of intraocular neovascular and edematous diseases.

*A person in your field you look up to…*

Sohan S. Hayreh.

## JUDY E. KIM

Professor, Ophthalmology and Visual Sciences, Vitreoretinal Diseases and Surgery, Professor, Graduate School of Biomedical Sciences, Director, Teleophthalmology and Research, The Eye Institute, Medical College of Wisconsin, Wisconsin, USA

*What is the most interesting or little-known fact about you?*

Have you heard of Carnegie Hall in New York City? Well, I have sung there. Of course, it was with a chorus that I was a member of called "Bel Conto". I have been in a choir or a chorus throughout my life ever since I was 9 years old. Over the years I have sung as part of an all girls' chorus, church choir, school band, praise team band and community chorus, amongst others. For me, singing is an extension of breathing.

*If you weren't an ophthalmologist…*

Given my myriad of interests, I could consider doing many things. When I was little, I wanted to be a teacher. Then I wanted to be a nun (that lasted about two weeks). Being a researcher or a professor has always been my goal, and I guess I am already doing some of that. I really wanted to work towards getting a Nobel Prize, Nobel Peace Prize that is! It's a good thing that I did not become a professional singer, since I would be starving right now. I would have loved to be an architect, an interior decorator, photographer or an artist, something that can satisfy my creative and artistic side.

## JULIA A. HALLER

Ophthalmologist-in-Chief and William Tasman, MD Endowed Chair, Wills Eye Hospital; Professor and Chair of Ophthalmology, Sidney Kimmel Medical College at Thomas Jefferson University and Hospital, Philadelphia, Pennsylvania, USA

*What is the most interesting or little-known fact about you?*

Tom Clancy's Jack Ryan series of action thrillers featured a character named Cathy Ryan, Jack's wife and a retina surgeon, that was based, in part, on me. Six different actresses have "played me" in the film adaptations, none of whom, unfortunately, I really look like! Over the years, Tom became a good friend and rollicking good company for me and my family.

## KEITH BARTON

Consultant Ophthalmologist, Moorfields Eye Hospital, Professor of Ophthalmology, UCL, Co-Chair of Ophthalmology Futures Forums, London, England

*Do you have any controversial opinions?*

Inadequate training, experience and surgical volume in more conventional glaucoma surgical techniques is driving surgeons towards safer but lower efficacy glaucoma surgical options. This may be good for patients with early disease, but this trend offers little hope for the future of effective treatment for the less commercially attractive and more serious challenges presented by advanced glaucoma patients.

*The biggest glaucoma breakthrough of the past two decades…*

Sadly, there has not really been a single big breakthrough in the management of recalcitrant secondary and complex glaucomas in the last 10-20 years. However, the Baerveldt Glaucoma Implant, introduced just over 25 years ago, revolutionized the management of these patients as the first glaucoma drainage device that could actually achieve relatively low target pressures across the spectrum of complex glaucomas. The Paul Glaucoma Implant has been a recent advance in this area with a smaller, less intrusive tube.

## KENDALL E. DONALDSON

Professor of Clinical Ophthalmology, Cornea/External Disease/Cataract/Refractive Surgery, Medical Director, Bascom Palmer Eye Institute in Plantation, Florida, USA

*A person in your field you look up to…*

The leaders who have influenced me the most include Doug Koch, Dick Lindstrom, David Chang, and Marguerite McDonald. They each have changed the way we practice and learn ophthalmology, and they are all impressive individuals beyond the field of medicine.

## KYOKO OHNO-MATSUI

Professor and Chair, Tokyo Medical and Dental University, Tokyo, Japan

*If you weren't an ophthalmologist...*

I was actually a dermatologist for a year and then changed my specialty to ophthalmology. I like seeing things, so dermatology, pathology, and ophthalmology were my candidates at residency. Finally, I became an ophthalmologist because there are no dirty things in the eye!

## LISA M. NIJM

Creator & Program Director, RealWorldOphthalmology.com, Warrenville EyeCare and LASIK, Founder & Medical Director, Assistant Clinical Professor of Ophthalmology, University of Illinois Eye and Ear Infirmary, CEO, Women in Ophthalmology

*A little-known or interesting thing about you...*

One of my favorite pastimes is vegetable gardening. My late father and I used to plant it together. Each year, I plant an international organic garden with vegetables from around the world. I have been touched by patients who discovered my hobby and have brought me some of the most amazing heirloom vegetable seeds that have been passed down through the years! I take great joy in growing and sharing my international garden each year. Now, if I could only figure out how to take care of that rascally rabbit!

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## LOUISA WICKHAM

Medical Director, Moorfields Eye Hospital, London, UK

*If you weren't an ophthalmologist...*

As a medical student, I had a passion for genetics and undertook an additional degree in human genetics as part of my medical degree. I was particularly interested in the possibility of using genetics to identify and treat cancers and think I would have pursued this had I not developed an interest in ophthalmology once I qualified as a doctor.

*What is the single biggest challenge facing your field in 2022 – and beyond?*

Following the COVID-19 pandemic there is a large burden of disease that requires treatment if we are to avoid irreversible visual loss, particularly in patients with glaucoma and chronic retinal disease such as age related medical degeneration. In order to avoid this, we need to radically transform the way in which we assess and monitor patients. One way we have addressed this is to develop diagnostic hubs to gather data asynchronously so that patients can be assessed remotely and risk assessed appropriately. Patients with unstable disease can then be booked for face to face follow up whilst those who are stable can be reassured and booked for further assessment in an appropriate time scale.

## MALIK Y. KAHOOK

The Slater Family Endowed Chair in Ophthalmology, Professor and Chief, Glaucoma Service at the Sue Anschutz-Rodgers Eye Center, The University of Colorado's Department of Ophthalmology, Aurora, Colorado, USA

*If you weren't an ophthalmologist...*

If I were not a practising clinician-surgeon, I hope I would still be involved in the research and development of new medical devices. My career has been split between patient care and working in startup companies over the last 15 years. I have had the good fortune of bringing several devices from benchside to bedside and my enthusiasm for this type of work has only increased over time. We started ClarVista Medical over a decade ago and developed a novel intraocular lens that was eventually acquired by Alcon in 2017. That experience was very educational and influenced me to continue with new ideas working with New World Medical and others to launch medical devices on the global market.

## MARGUERITE MCDONALD

Clinical Professor of Ophthalmology, NYU Langone Medical Center, New York, Clinical Professor of Ophthalmology, Tulane University Health Sciences Center, New Orleans, Louisiana, OCLI Vision, Oceanside, New York, USA

*A little-known or interesting thing about you...*

I skated in the Ice Capades at age 5, and performed professionally – as a child – in Chicago.

*If you weren't an ophthalmologist....*

I would be an actress, and a painter/sculptor in my free time.

## MARIE-JOSÉ TASSIGNON

Past chair and chief of the department of ophthalmology of the University of Antwerp and the Antwerp university hospital, Belgium

*If you weren't an ophthalmologist...*

Fashion was my passion. I considered it a way to help people express their personality through choosing colors and design in which they feel comfortable that was amusing or challenging for others. I realized that pleasing a large group of people would be more difficult than understanding the human body, so I chose medicine.

*Do you have any controversial opinions?*

I am convinced that we can treat patients with complaints due to congenital, ageing, or post-traumatic vitreous opacities by means of non-invasive surgical technology, provided we know more about the viscosity of the vitreous, and how we can homogenize the vitreous body by means of volumetric approaches of laser vitreolysis.

*Your predictions for the field?*

It is obvious that we all have confidence in our self-perception of our own expertise in the field – only time will tell whether we were right or wrong. I am convinced that future challenges rely on finding an IOL that can be centered on a patient's visual axis, and can correct presbyopia – thereby reducing the side effects of glare and halos due to inadequate centration, as is often observed in the current complex optics IOL designs.

## MICHAEL MROCHEN

Founder of IROC Science, Serial Entrepreneur: Co-founder of Vivior AG, Allotex Inc, LiveLong Vision, IROC Innocross (Exit) AG, ClearSight Innovation Ltd (Exit), Zug, Switzerland

*A little-known or interesting thing about you...*

I have two grandsons and I enjoy heavy metal and rock concerts.

## MARIYA MOOSAJEE

Professor of Molecular Ophthalmology at UCL Institute of Ophthalmology, Group Leader of Ocular Genomics and Therapeutics at the Francis Crick Institute, Consultant Ophthalmologist specialising in Genetic Eye Disease at Moorfields Eye Hospital NHS Foundation Trust, London, UK

*If you weren't an ophthalmologist...*

I like to daydream that I would be a hyperrealist artist. I love oil painting and even sold my art during medical school. Maybe one day I will come back to this and rekindle a hidden talent!

## NEERU GUPTA

Professor of Ophthalmology & Vision Sciences, Professor of Laboratory Medicine and Pathobiology, Professor, Dalla Lana School of Public Health, Keenan Research Centre for Biomedical Science, St. Michael's Hospital, Unity Health Toronto, University of Toronto, Ontario, Canada

*The biggest challenge for your field…*

While glaucoma being the leading cause of preventable irreversible blindness worldwide, reaching all affected patients remains a major challenge. Approximately half of those with glaucoma have no idea they have it, and the numbers continue to climb. If we could detect and treat every patient with glaucoma, we would dramatically reduce the burden of vision loss both within our own communities and around the world.

## NINGLI WANG

Director of Beijing Tongren Eye Center, China

*Practical tips for a fellow expert...*

Learn to be observant in the clinical diagnosis and treatment process. Patients' overall performance, tone of voice, and different behavioral characteristics will all become a crucial part of a definitive diagnosis. In clinical practice, try to expand the "knowledge radius." The larger the knowledge radius, the higher the accuracy of diagnosis. Also, do not ignore systemic diseases, it's crucial to simultaneously treat the eye and body.

*What techniques are likely to come into prominence in the next five years in your field?*

AI-driven digital and teleophthalmology will become prominent in the next five years. The technology is gradually approaching maturity, and the cost-effectiveness is continuously compressed, which can solve the issue of uneven distribution of human resources, reduce transportation costs, and improve local hospitals' diagnosis and treatment capabilities. It's also an effective method to achieve the IAPB "2030 IN SIGHT" call. Most importantly, the development and improvement of such technologies facilitates the digitization of the management of ophthalmic diseases and make it possible for everyone to establish eye health records throughout the life cycle.

## PAISAN RUAMVIBOONSUK

Clinical Professor at College of Medicine, Rangsit University, Rajavithi Hospital, Bangkok, Thailand

*If you weren't an ophthalmologist…*

I would love to be a writer. A non-fiction writer, film critic or a screenplay writer. A movie director would also be a great job. However, I would love to write first to see if my imagination can work well in readers' minds before making it appear on screens!

## PAOLO LANZETTA

Professor of Ophthalmology, Chairman, Department of Medicine, Ophthalmology, University of Udine, Italy, Director of the Ophthalmology Residency Program, University of Udine, Italy, Founder and Scientific Director, IEMO, Istituto Europeo di Microchirurgia Oculare, Udine and Milan, Italy

*A little-known or interesting thing about you...*

I am involved in humanitarian missions in Africa, and attend a hospital in Ghana visiting and operating on patients during my summer annual leave.

*The biggest challenge of the retina field…*

Maintaining proper vision in the long term in patients with different types of maculopathies.

## SIR PENG TEE KHAW

Director, UK National Institute for Health Research Biomedical Research Centre in Ophthalmology, London, UK

*A little-known or interesting thing about you...*

I am a drummer – and have been lucky enough to play live with some of my rock heroes.

*If you weren't an ophthalmologist...*

I would love to be a general inventor – there are so many things that need improving with simple modifications.

## PHILIP J. ROSENFELD

Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, Florida, USA

*A little-known or interesting thing about you...*

I weighed 350 pounds when I entered college. I lost 200 pounds over two years by restricting refined carbohydrates and exercise, but I never counted calories. What's even more noteworthy is that I've kept the weight off for 45 years. For those of us prone to laying down fat – the devil can be found in refined carbohydrates.

## RANYA HABASH

CEO, LifeLong Vision, FDA Digital Health Network of Experts, Former Medical Director, Technology Innovation & Assistant Professor of Ophthalmology, Bascom Palmer Eye Institute, Florida, USA

*A tool you would not have been able to live without over the past 10 years…*

My iPhone! Whether I'm on Epic's Haiku, doing video calls through Doximity, taking ophthalmic photos, watching surgical videos, or looking up pharmacy info, my iPhone is a mobile office. Smartphones have revolutionized medicine, and will continue to do so. With all the digital health tools using native hardware and software on any device, there is no better gateway for democratizing healthcare.

## RICHARD LINDSTROM

Founder and Attending Surgeon of Minnesota Eye Consultants; Adjunct Clinical Professor Emeritus at The University of Minnesota Department of Ophthalmology, Minneapolis, Minnesota, USA

*What drives you?*

The joy of the journey and the adventure. Every single day, I take great joy in just caring for patients' health, and seeing the impact we have on their lives when we restore their vision. I also gain great satisfaction from looking for unmet needs, finding the solutions and getting them into the marketplace – as well as helping other doctors learn how to use them.

*Any advice for your younger self?*

I don't have many regrets. Looking back, I took time for myself and for my family, and I did most of the things that I wanted to do. I don't think I would change much. I would continue to be a planner, I would continue to be engaged in the field, and I would continue to say yes to opportunities. Maybe I will look back and wonder whether it was the right thing continuing to be as engaged as I am in ophthalmology – but I won't know that for a while yet! When I look back now, I am pretty satisfied with the decisions I have made.

## ROBERT H. OSHER

Professor of Ophthalmology, University of Cincinnati College of Medicine; Medical Director Emeritus, Cincinnati Eye Institute; Founder and Editor, Video Journal of Cataract, Refractive & Glaucoma Surgery; Founder & Program Director, Cataract Surgery: Telling It Like It Is! Annual Meeting, based in Cincinnati, Ohio, USA

"Robert Osher has limited his practice to referral cataract surgery for over 40 years since completing his residency and multiple fellowships at the Bascom Palmer Eye Institute and Wills Eye Hospital. He joined his father in private practice in 1980 and built the Cincinnati Eye Institute into one of the largest practices in the United States. As Medical Director, he recruited more than 50 fellowship trained ophthalmologists and merged CEI with the residency at the University of Cincinnati College of Medicine where he continues to serve as Professor of Ophthalmology.

Dr. Osher introduced the Video Symposium as a new educational format in the early 1980s and about the same time founded the first Video Journal in Medicine for which he has served as the Editor for about four decades. The VJCRGS is donated quarterly as a free member benefit of nearly every cataract society in the world. The videos that he has produced have won more than 40 international awards at the ASCRS Film Festival and ESCRS Video Competition. Dr. Osher also founded Cataract Surgery Telling It Like It Is!, one of the largest subspecialty meetings in ophthalmology. He has designed numerous instruments and devices for cataract surgery as well as developed many techniques for challenging cases and complication management. In addition to delivering more than 50 named lectures, he is the recipient of the Binkhorst Award and the Innovator's Award from ASCRS as well as the Kelman Award and the Lifetime Achievement Award from the American Academy of Ophthalmology."

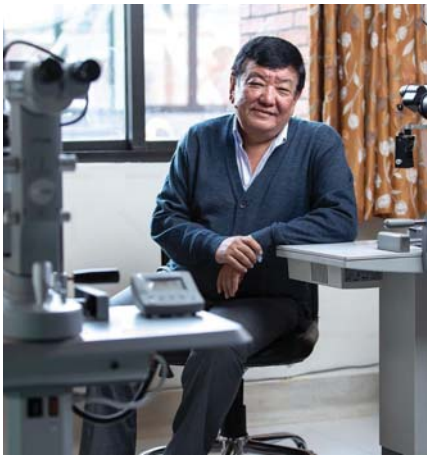
## ROHIT SHETTY

Vice Chairman of Narayana Nethralaya, Bangalore, India

*The biggest breakthrough of the past decades…*
I think that the power of precision lasers and optics are huge breakthroughs in ophthalmology.

*The biggest challenge for the field…*
A big challenge is needing to adopt and quickly adapt to rapidly changing technologies.

*Your predictions for the future…*
I predict that we will move forward to a more personalized style of medical care, rather than a one-fits-all concept.



## SANDUK RUIT

Executive director, Tilganga Institute of Ophthalmology, Nepal

*What would you not have been able to live without over the past 10 years?*
Definitely a slit lamp and the operating microscope.

*What techniques are likely to come into prominence in the next five years in y our field?*
I would say AI will become a strong factor in the years to come.

*One practical tip for a fellow expert…*
Focus and integrity are key qualities to have.

## SHIGERU KINOSHITA

Professor and Chair, Department of Frontier Medical Science and Technology for Ophthalmology, Kyoto Prefectural University of Medicine, Kyoto, Japan

*The most interesting fact about you…*
I am a 72-year-old Japanese ophthalmologist.

*Your predictions for the field…*
Corneal endothelial dysfunction will become a pathology curable by cultured endothelial cell injection therapy.

## SHIN YAMANE

Yamane Eye Clinic, Yokohama, Japan

*If you weren't an ophthalmologist…*
I would be an engineer of cars or airplanes.

*The biggest breakthrough in retina in the past two decades…*
Anti-VEGF therapy. It is amazing how iris rubeosis and macular edema disappear the day after the injection.

*The biggest challenge for the field…*
Presbyopia correction will be our big challenge.

*Do you have a controversial opinion?*
Like FLACS, heads-up surgery can decline. A great technological innovation is needed to make a breakthrough.

*Is there a technology or instrument you would not have been able to live without over the past 10 years?*
The development of OCT technology has been crucial to my work and I'm sure others will say the same.

## SOBHA SIVAPRASAD

Consultant Ophthalmologist, Moorfields Eye Hospital and University College London, UK

*A person in your field you look up to…*

Alan Bird. His knowledge in the field attracted so many of us from around the world to the Moorfields Medical Retina Fellowship.

## SOOSAN JACOB

Director and Chief, Dr. Agarwal's Refractive and Cornea Foundation, Senior Consultant, Cataract and Glaucoma Services, Chennai, India

*Practical tips for a fellow expert...*

Start young, embrace change, work as a team, identify and correct your weaknesses, accept constructive criticism, stay abreast, connect with all the incredible colleagues and mentors we have in our wonderful field and most importantly – learn to also look outside the textbook in order to think out of the box!

## STELA VUJOSEVIC

Head of Medical Retina Unit, IRCCS MultiMedica, University of Milan, Italy

*A technological advance you would not have been able to live without over the past 10 years…*

The OCT has revolutionized the way we diagnose and manage numerous retinal diseases. Currently, it has become an indispensable tool in any retina clinic, with potential for reaching a broader population in screening settings and for home monitoring of macular diseases.

*The biggest breakthrough of the past couple of decades...*

The biggest breakthrough in the management of retinal diseases has been the understanding of the role of VEGF in the neurovascular homeostasis and pathogenesis of different blinding diseases. From this, the development of multiple therapeutic pathways targeting VEGF directly or indirectly has transformed our way of treating exudative maculopathies, which has led to a significant decrease in the incidence of blindness due to these conditions.

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## STEPHANIE WATSON

Professor and Head, Corneal Research Group, The University of Sydney, Save Sight Institute, Co-Deputy Director, Industry, Innovation and Commercialisation, Sydney Nano, Head, Corneal Unit, Sydney Eye Hospital, Chair, Australian Vision Research (formerly Ophthalmic Research Institute of Australia), Chair, Advocacy and Outreach Committee, Association for Research in Vision and Ophthalmology, Sydney, Australia

*If you weren't an ophthalmologist...*
I would enjoy exploring a career in pottery. In my youth, I really enjoyed creating with clay and found producing a finished product, which hopefully was an object of beauty, rewarding.

*The biggest challenge facing your field in 2022 – and beyond...*
Globally, corneal blindness remains a significant cause of vision impairment and vision loss that affects all ages. Corneal trauma is considered a "silent epidemic" and infection still leaves patients without sight due to corneal scarring. For the young working-age population, limbal stem cell deficiency remains a risk from workplace accidents. Keratoconus, though not typically causing blindness, progressively impairs vision to the extent that patients suffer worse quality of life than those with other eye diseases including macular degeneration. There are some treatments but few cures for these corneal diseases and access to available therapies is not universal. Many treatments also may fail over time. Regenerative medicine holds the promise of cures for corneal diseases. The challenge is now to develop curative therapies with regenerative medicinethat can be accessed by all and restore vision for life.

## STEVEN J. GEDDE

Professor of Ophthalmology, John G. Clarkson Chair, Vice Chair of Education, Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, USA

*If you weren't an ophthalmologist…*
I would be a high school teacher. I had several great teachers who influenced my career pathway, especially during high school. I could envision myself serving in a similar mentoring role.

## TAMARA R. FOUNTAIN

Professor of Ophthalmology, Rush University Medical Center, Chicago, IL
Ophthalmology Partners, Deerfield, USA

*If you weren't an ophthalmologist…*
If I weren't an ophthalmologist (and didn't have childhood myopia) I think that I would have followed my father into aviation and became an Air Force Pilot.

*Which tool or instrument you would not have been able to live without?*
My Castroviejo needle holder.

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## TIEN Y. WONG

Chair Professor & Founding Head, Tsinghua Medicine, Tsinghua University, China, Senior Advisor & Past Medical Director, Singapore National Eye Center, Singapore

*A person in your field you look up to…*

The late Ronald Klein at the University of Wisconsin, Madison, USA, "the father of ophthalmic epidemiology" and the PI of the landmark Beaver Dam Eye Study and the Wisconsin Epidemiological Study of Diabetic Retinopathy (WESDR). He provided the foundation for our understanding of the major causes of vision loss, the prevalence and long-term incidence of all major eye diseases and the risk factors for AMD and diabetic retinopathy, which has led to the foundation of clinical guidelines of care. He was my mentor and taught me clarity in formulating hypotheses, focused research questions and precision in analysis and interpretation of results. He was a giant in academic ophthalmology.

## WARREN HILL

Director, East Valley Ophthalmology, Mesa, Arizona, USA

*A household name among the Power List front-runners; as one nominator noted*

"Hill is extremely well known worldwide for intraocular lens power calculations."

## VANCE THOMPSON

Founder, Vance Thompson Vision, Professor of Ophthalmology, University of South Dakota Sanford School of Medicine, USA

*Do you have a controversial opinion?*

The patient comes second. At first blush, this sounds blasphemous, but understanding that we took an oath and – yes – we are going to do the right thing for the patient's medical or surgical issue, but if we truly want to touch our patient deeply with how our clinical experience makes them feel, we need to understand that culturally our team needs to come first, and the patient comes second. If your "work family" feels like they are the number one priority and they truly feel loved and cared for, they will love working together for a long, long time and the patient who comes into this atmosphere will say, "I love how they treat each other. I love how they treat me. I trust them to do my surgery and I am going to tell all my friends about this center." A "team first, patient second" mentality is key to creating a great team and patient experience.

## ZELIA MARIA CORREA

Professor of Ophthalmology, Co-Director, Ocular Oncology Service, University of Miami Health Service, Florida, USA

*As one of her nominators said:*

"I enthusiastically nominate Zelia M. Correa for the 2022 Power List. I am surprised that she has not already been elected to this elite List, as she has been an international thought leader in ophthalmic leadership, education, and ocular oncology for over a decade. She has held top leadership positions in the American Academy of Ophthalmology, Pan-American Association of Ophthalmology, Women in Ophthalmology, Women in Retina, and other international organizations. She founded the leadership development course for the PAAO and has trained many ophthalmology leaders around the world. She is a leading voice and role model for female and minority ophthalmologists worldwide. She is considered one of the top ocular oncologists in the world, having pioneered new vitreoretinal and intraocular biopsy techniques for patients with intraocular tumors. She has published many of the landmark papers in this field over the past decade. She is now the director of ocular oncology at Bascom Palmer Eye Institute and is training the next generation of leaders in this field. I can think of no ophthalmologist in the world more deserving of being added to the Power List than Correa."

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## With a single injection at the end of cataract surgery, anti-inflammatory efficacy begins as early as day 1 and continues through day 30[1]*

- The percentage of patients who received **DEXYCU®** (dexamethasone intraocular suspension) 9% (517 mcg) who had anterior chamber cell clearing on day 8 was 60% (n=94/156) vs 20% (n=16/80) in the placebo group[1]
- The cumulative percentage of subjects receiving rescue medication of ocular steroid or nonsteroidal anti-inflammatory drug (NSAID) by day 30 was significantly lower in the **DEXYCU** (517 mcg) treatment group (20%; n=31/156) compared to placebo (54%; n=43/80)[1]

*DEXYCU was studied in a randomized, double-masked, placebo-controlled trial. Patients received either DEXYCU or a vehicle administered by a physician at the end of the surgical procedure. The primary endpoint was the proportion of patients with anterior chamber cell clearing (cell score=0) on postoperative day 8.

### INDICATION AND USAGE

DEXYCU® (dexamethasone intraocular suspension) 9% is indicated for the treatment of postoperative inflammation.

### IMPORTANT SAFETY INFORMATION

### CONTRAINDICATIONS

None.

### WARNINGS AND PRECAUTIONS

**Increase in Intraocular Pressure**
- Prolonged use of corticosteroids, including DEXYCU, may result in glaucoma with damage to the optic nerve, defects in visual acuity and fields of vision
- Steroids should be used with caution in the presence of glaucoma

**Delayed Healing**
- The use of steroids after cataract surgery may delay healing and increase the incidence of bleb formation
- In those diseases causing thinning of the cornea or sclera, perforations have been known to occur with the use of corticosteroids

**Exacerbation of Infection**
- The use of DEXYCU, as with other ophthalmic corticosteroids, is not recommended in the presence of most active viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal disease of ocular structures
- Use of a corticosteroid in the treatment of patients with a history of herpes simplex requires caution and may prolong the course and may exacerbate the severity of many viral infections
- Fungal infections of the cornea are particularly prone to coincidentally develop with long-term local steroid application and must be considered in any persistent corneal ulceration where a steroid has been used or is in use. Fungal culture should be taken when appropriate
- Prolonged use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infections. In acute purulent conditions, steroids may mask infection or enhance existing infection

**Cataract Progression**
- The use of corticosteroids in phakic individuals may promote the development of posterior subcapsular cataracts

### ADVERSE REACTIONS

- The most commonly reported adverse reactions occurred in 5-15% of subjects and included increases in intraocular pressure, corneal edema and iritis

**Please see brief summary of full Prescribing Information on adjacent page.**

**References: 1.** DEXYCU® (dexamethasone intraocular suspension) 9% full U.S. Prescribing Information. EyePoint Pharmaceuticals, Inc. June 2020. **2.** Donnenfeld E, Holland E. Dexamethasone intracameral drug-delivery suspension for inflammation associated with cataract surgery: a randomized, placebo-controlled, phase III trial. *Ophthalmology.* 2018;125(6):799-806. **3.** Data on file. EyePoint Pharmaceuticals, Inc.

**DEXYCU (dexamethasone intraocular suspension) 9%,**
**for intraocular administration**
**Initial U.S. Approval: 1958**

**BRIEF SUMMARY: Please see package insert for full prescribing information.**

## 1 INDICATIONS AND USAGE

DEXYCU (dexamethasone intraocular suspension) 9% is indicated for the treatment of postoperative inflammation.

## 4 CONTRAINDICATIONS

None.

## 5 WARNINGS AND PRECAUTIONS

### 5.1 Increase in Intraocular Pressure

Prolonged use of corticosteroids including DEXYCU may result in glaucoma with damage to the optic nerve, defects in visual acuity and fields of vision. Steroids should be used with caution in the presence of glaucoma.

### 5.2 Delayed Healing

The use of steroids after cataract surgery may delay healing and increase the incidence of bleb formation. In those diseases causing thinning of the cornea or sclera, perforations have been known to occur with the use of corticosteroids.

### 5.3 Exacerbation of Infection

The use of DEXYCU, as with other ophthalmic corticosteroids, is not recommended in the presence of most active viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal disease of ocular structures.

Employment of a corticosteroid medication in the treatment of patients with a history of herpes simplex requires caution. Use of ocular steroids may prolong the course and may exacerbate the severity of many viral infections of the eye (including herpes simplex). Fungal infections of the cornea are particularly prone to develop coincidentally with long-term local steroid application. Fungus invasion must be considered in any persistent corneal ulceration where a steroid has been used or is in use. Fungal culture should be taken when appropriate.

Prolonged use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infections. In acute purulent conditions, steroids may mask infection or enhance existing infection.

### 5.4 Cataract Progression

The use of corticosteroids in phakic individuals may promote the development of posterior subcapsular cataracts.

## 6 ADVERSE REACTIONS

The following adverse reactions are described elsewhere in the labeling:

- Increase in Intraocular Pressure *[see Warnings and Precautions (5.1)]*
- Delayed Healing *[see Warnings and Precautions (5.2)]*
- Infection Exacerbation *[see Warnings and Precautions (5.3)]*
- Cataract Progression *[see Warnings and Precautions (5.4)]*

### 6.1 Clinical Trials Experience

Because clinical studies are conducted under widely varying conditions, adverse reaction rates observed in the clinical studies of a drug cannot be directly compared to rates in the clinical studies of another drug and may not reflect the rates observed in practice.

The following adverse events rates are derived from three clinical trials in which 339 patients received the 517 microgram dose of DEXYCU. The most commonly reported adverse reactions occurred in 5-15% of subjects and included increases in intraocular pressure, corneal edema and iritis. Other ocular adverse reactions occurring in 1-5% of subjects included, corneal endothelial cell loss, blepharitis, eye pain, cystoid macular edema, dry eye, ocular inflammation, posterior capsule opacification, blurred vision, reduced visual acuity, vitreous floaters, foreign body sensation, photophobia, and vitreous detachment.

## 8 USE IN SPECIFIC POPULATIONS

### 8.1 Pregnancy

Risk Summary

There are no adequate and well-controlled studies of DEXYCU (dexamethasone intraocular suspension) in pregnant women. Topical ocular administration of dexamethasone in mice and rabbits during the period of organogenesis produced cleft palate and embryofetal death in mice and malformations of abdominal wall/intestines and kidneys in rabbits at doses 7 and 5 times higher than the injected recommended human ophthalmic dose (RHOD) of DEXYCU (517 micrograms dexamethasone), respectively *[see Data in the full prescribing information]*.

In the US general population the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2 to 4% and 15 to 20%, respectively.

### 8.2 Lactation

Risk Summary

Systemically administered corticosteroids are present in human milk and can suppress growth, interfere with endogenous corticosteroid production, or cause other unwanted effects. There is no information regarding the presence of injected DEXYCU in human milk, the effects on breastfed infants, or the effects on milk production to inform risk of DEXYCU to an infant during lactation. The developmental and health benefits of breastfeeding should be considered, along with the mother's clinical need for DEXYCU and any potential adverse effects on the breastfed child from DEXYCU.

### 8.4 Pediatric Use

Safety and effectiveness of DEXYCU in pediatric patients have not been established.

### 8.5 Geriatric Use

No overall differences in safety or effectiveness have been observed between older and younger patients.

Manufactured for: EyePoint Pharmaceuticals US, Inc. Watertown, MA 02472

# TRANSFORMING THE DRY EYE TREATMENT ALGORITHM

Kala's innovative drug delivery technology is designed to enhance efficacy, empowering eye care professionals with a short-term Rx treatment to manage dry eye disease

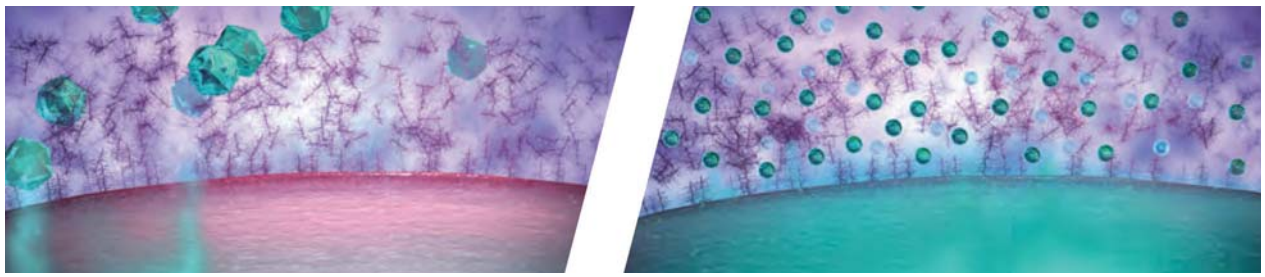


*Figure 1. Comparison of traditional corticosteroid (left) with AMPPLIFY® (right), which enhances ocular surface tissue distribution and penetration to the sites of Dry Eye-related ocular surface inflammation, specifically the cornea and and conjunctiva (3, 5).*

Kala Pharmaceuticals is focused on the discovery, development, and commercialization of innovative therapies for eye disease. The biopharmaceutical company's two marketed products, EYSUVIS® (loteprednol etabonate ophthalmic suspension) 0.25% and INVELTYS® (loteprednol etabonate ophthalmic suspension) 1.0%, both use its proprietary AMPPLIFY® drug-delivery technology, enabling enhanced drug distribution and penetration to the ocular surface.

While mucus plays a central role in protecting the body from harmful foreign materials, it hinders the ability of medications to penetrate mucus-protected tissues, thereby potentially reducing therapeutic effect (1, 2). Kala's proprietary AMPPLIFY® mucus penetrating particle (MPP) drug-delivery technology is designed to enhance distribution and penetration through the mucus barrier and deliver increased concentration of drug to the target ocular surface tissues, specifically the cornea and conjunctiva (3, 5).

"Our AMPPLIFY® technology is what enabled our first two products," says President & Chief Operating Officer, Todd Bazemore. "It has allowed us to meet the need within the ophthalmic community for more effective drug delivery to the ocular surface. EYSUVIS and INVELTYS have already had a significant impact on the ability of eye care professionals to effectively and efficiently treat their appropriate patients."

## The beginning

The MPP technology originated out of the largest biomedical engineering lab in the world, run by Robert S. Langer at the Massachusetts Institute of Technology (MIT). Langer is a world-renowned researcher in biotechnology, especially in the fields of drug delivery systems and tissue engineering. AMPPLIFY® uses nanoparticles (~300 nm in diameter) engineered via surface modification to penetrate through mucus pores (approximately 500 nm in diameter)

to the ocular surface without being bound up and eliminated by the tear film (1–5). In a preclinical study, AMPPLIFY® technology increased loteprednol etabonate penetration to the cornea and into the aqueous humor by more than three times compared with loteprednol etabonate without AMPPLIFY® (5).

## EYSUVIS: The short-term Rx treatment revolution in dry eye disease (DED)

In October 2020, EYSUVIS (loteprednol etabonate ophthalmic suspension) 0.25% became the first and only FDA-approved prescription corticosteroid therapy for the short-term (up to two weeks) treatment of the signs and symptoms of dry eye disease, including "dry eye flares."


Since DED has always been treated as a chronic condition, diagnosing and treating patients with dry eye flares is transforming the treatment paradigm. Research states that 75–90 percent of dry eye patients report suffering from acute episodes of worsening symptoms (dry eye flares) lasting a few days to a couple of weeks, even if they are currently being treated with OTC or chronic dry eye medications (6–9). EYSUVIS can be an appropriate acute therapy for dry eye patients to treat these flares. Eye care professionals can extinguish present flares and also provide symptomatic relief of future flares by ensuring appropriate patients have EYSUVIS on hand for those times throughout the year.

"EYSUVIS has the potential to be complementary to existing therapies and offers a differentiated product profile for the treatment of DED, including the management of dry eye flares," Bazemore says. "Kala has received extensive positive feedback from eye care professionals on the rapid onset of effect and safety of EYSUVIS. It fills an unmet need as the only FDA approved short-term therapy to treat signs and symptoms of dry eye disease, including dry eye flares."

Furthermore, EYSUVIS illustrated a beneficial safety profile in clinical trials. Focusing on IOP data, the treatment and vehicle groups, respectively, found 0.2 percent and 0.0 percent of subjects experienced a ≥10 mm Hg increase from baseline resulting in an intraocular pressure measurement of ≥21 mm Hg at any post-baseline visit up to 29 days (10). *Please see the Brief Summary of Prescribing Information on the next page.*

## Collaboration with eye care

Since its founding in 2009, Kala has focused on innovation and its relationship with eye care professionals. The company is dedicated to understanding and meeting their needs, as well as those of their patients, thereby maximizing its overall impact in the ophthalmic space.

"Kala is a company that was formed with an emphasis on listening to the eyecare community," says Bazemore. "From day one, we've listened to leading eye care professionals to understand how new products could benefit practices and more importantly patients."

As Kala prepared to bring EYSUVIS to market, the company discovered that there was a disconnect between the number of patients reporting acute worsening of symptoms – or dry eye flares – and the number of patients eye care professionals reported as experiencing flares. "We began to understand that, historically, there hasn't been a lot of proactive discussion about dry eye flares, because there wasn't an FDA-approved Rx product for the short-term treatment of dry eye disease," Bazemore comments. "Now there is, and the discussion between eye care professionals and their patients can change."

## Future action

As the prevalence of dry eye disease continues to rise due to both the aging of the population as well as the ever-increasing amount of screen time, ocular surface health will remain a public health concern. EYSUVIS is poised to play a pivotal and growing role in the treatment arsenal. "We plan to be a leader in ophthalmic innovation with products targeted to treat anterior and posterior segment diseases, helping doctors to care more completely for their patients," says Bazemore.

kala PHARMACEUTICALS

## IMPORTANT SAFETY INFORMATION

### Contraindication:

EYSUVIS, as with other ophthalmic corticosteroids, is contraindicated in most viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal diseases of ocular structures.

### Warnings and Precautions:

*Delayed Healing and Corneal Perforation:* Topical corticosteroids have been known to delay healing and cause corneal and scleral thinning. Use of topical corticosteroids in the presence of thin corneal or scleral tissue may lead to perforation. The initial prescription and each renewal of the medication order should be made by a physician only after examination of the patient with the aid of magnification, such as slit lamp biomicroscopy, and, where appropriate, fluorescein staining.

*Intraocular Pressure (IOP) Increase:* Prolonged use of corticosteroids may result in glaucoma with damage to the optic nerve, as well as defects in visual acuity and fields of vision. Corticosteroids should be used with caution in the presence of glaucoma. Renewal of the medication order should be made by a physician only after examination of the patient and evaluation of the IOP.

*Cataracts:* Use of corticosteroids may result in posterior subcapsular cataract formation.

*Bacterial Infections:* Use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infections. In acute purulent conditions, corticosteroids may mask infection or enhance existing infection.

*Viral Infections:* Use of a corticosteroid medication in the treatment of patients with a history of herpes simplex requires great caution. Use of ocular corticosteroids may prolong the course and may exacerbate the severity of many viral infections of the eye (including herpes simplex).

*Fungal Infections:* Fungal infections of the cornea are particularly prone to develop coincidentally with long-term local corticosteroid application. Fungus invasion must be considered in any persistent corneal ulceration where a corticosteroid has been used or is in use.

### Adverse Reactions:

The most common adverse drug reaction following the use of EYSUVIS for two weeks was instillation site pain, which was reported in 5% of patients.

## INDICATION

EYSUVIS is a corticosteroid indicated for the short-term (up to two weeks) treatment of the signs and symptoms of dry eye disease.

*References:*

1. *SS Olmsted et al., Biophys J. 81, 1930 (2001). PMID: 11566767.*
2. *HH Sigurdsson et al., "Int J Pharm, 453, 56 (2013). PMID: 23727593.*
3. *PA Popov, J Ocul Pharmacol Ther, 36, 366 (2020). PMID: 32667250.*
4. *Data on file. Kala Pharmaceuticals: Watertown, MA, USA.*
5. *L Schopf et al., Ophthalmol Ther, 3, 63 (2014). PMID: 25134493.*
6. *Based on a survey of 297 patients commissioned by Kala and performed by a third party.*
7. *Based on a survey of 500 patients diagnosed with dry eye disease commissioned by Kala and performed by a third party.*
8. *Based on a survey of 774 patients performed by a third party.*
9. *Based on in-depth interviews with 30 patients performed by a third party.*
10. *M Korenfeld et al., Cornea, 40, 564 (2021). PMID: 32826644.*

*Please see the Brief Summary of Prescribing Information on the next page.*

*View full Prescribing Information (https://www.eysuvis.com/pdf/prescribing-information.pdf).*

*US-EYS-2200097*

**EYSUVIS (loteprednol etabonate ophthalmic suspension) 0.25%, for topical ophthalmic use**

**BRIEF SUMMARY OF FULL PRESCRIBING INFORMATION**

## INDICATIONS AND USAGE

EYSUVIS is a corticosteroid indicated for the short-term (up to two weeks) treatment of the signs and symptoms of dry eye disease.

## CONTRAINDICATIONS

EYSUVIS, as with other ophthalmic corticosteroids, is contraindicated in most viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal diseases of ocular structures.

## WARNINGS AND PRECAUTIONS

**Delayed Healing and Corneal Perforation**—Topical corticosteroids have been known to delay healing and cause corneal and scleral thinning. Use of topical corticosteroids in the presence of thin corneal or scleral tissue may lead to perforation. The initial prescription and each renewal of the medication order should be made by a physician only after examination of the patient with the aid of magnification, such as slit lamp biomicroscopy, and, where appropriate, fluorescein staining.

**Intraocular Pressure (IOP) Increase**—Prolonged use of corticosteroids may result in glaucoma with damage to the optic nerve, as well as defects in visual acuity and fields of vision. Corticosteroids should be used with caution in the presence of glaucoma. Renewal of the medication order should be made by a physician only after examination of the patient and evaluation of the IOP.

**Cataracts**—Use of corticosteroids may result in posterior subcapsular cataract formation.

**Bacterial Infections**—Use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infections. In acute purulent conditions of the eye, corticosteroids may mask infection or enhance existing infection.

**Viral Infections**—Use of corticosteroid medication in the treatment of patients with a history of herpes simplex requires great caution. Use of ocular corticosteroids may prolong the course and may exacerbate the severity of many viral infections of the eye (including herpes simplex).

**Fungal Infections**—Fungal infections of the cornea are particularly prone to develop coincidentally with long-term local corticosteroid application. Fungus invasion must be considered in any persistent corneal ulceration where a corticosteroid has been used or is in use. Fungal cultures should be taken when appropriate.

**Risk of Contamination**—Do not to allow the dropper tip to touch any surface, as this may contaminate the suspension.

**Contact Lens Wear**—The preservative in EYSUVIS may be absorbed by soft contact lenses. Contact lenses should be removed prior to instillation of EYSUVIS and may be reinserted 15 minutes following administration.

## ADVERSE REACTIONS

Adverse reactions associated with ophthalmic corticosteroids include elevated intraocular pressure, which may be associated with infrequent optic nerve damage, visual acuity and field defects, posterior subcapsular cataract formation, delayed wound healing and secondary ocular infection from pathogens including herpes simplex, and perforation of the globe where there is thinning of the cornea or sclera.

**Clinical Trials Experience**—Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

The most common adverse reaction observed in clinical trials with EYSUVIS was instillation site pain, which was reported in 5% of patients.

## USE IN SPECIFIC POPULATIONS

**Pregnancy**—Risk Summary: There are no adequate and well controlled studies with loteprednol etabonate in pregnant women. Loteprednol etabonate produced teratogenicity at clinically relevant doses in the rabbit and rat when administered orally during pregnancy. Loteprednol etabonate produced malformations when administered orally to pregnant rabbits at doses 1.4 times the recommended human ophthalmic dose (RHOD) and to pregnant rats at doses 34 times the RHOD. In pregnant rats receiving oral doses of loteprednol etabonate during the period equivalent to the last trimester of pregnancy through lactation in humans, survival of offspring was reduced at doses 3.4 times the RHOD. Maternal toxicity was observed in rats at doses 347 times the RHOD, and a maternal no observed adverse effect level (NOAEL) was established at 34 times the RHOD.

The background risk in the U.S. general population of major birth defects is 2 to 4%, and of miscarriage is 15 to 20%, of clinically recognized pregnancies.

Data—*Animal Data:* Embryofetal studies were conducted in pregnant rabbits administered loteprednol etabonate by oral gavage on gestation days 6 to 18, to target the period of organogenesis. Loteprednol etabonate produced fetal malformations at 0.1 mg/kg (1.4 times the recommended human ophthalmic dose (RHOD) based on body surface area, assuming 100% absorption). Spina bifida (including meningocele) was observed at 0.1 mg/kg, and exencephaly and craniofacial malformations were observed at 0.4 mg/kg (5.6 times the RHOD). At 3 mg/kg (41 times the RHOD), loteprednol etabonate was associated with increased incidences of abnormal left common carotid artery, limb flexures, umbilical hernia, scoliosis, and delayed ossification. Abortion and embryofetal lethality (resorption) occurred at 6 mg/kg (83 times the RHOD). A NOAEL for developmental toxicity was not established in this study. The NOAEL for maternal toxicity in rabbits was 3 mg/kg/day.

Embryofetal studies were conducted in pregnant rats administered loteprednol etabonate by oral gavage on gestation days 6 to 15, to target the period of organogenesis. Loteprednol etabonate produced fetal malformations, including absent innominate artery at 5 mg/kg (34 times the RHOD); and cleft palate, agnathia, cardiovascular defects, umbilical hernia, decreased fetal body weight and decreased skeletal ossification at 50 mg/kg (347 times the RHOD). Embryofetal lethality (resorption) was observed at 100 mg/kg (695 times the RHOD). The NOAEL for developmental toxicity in rats was 0.5 mg/kg (3.4 times the RHOD). Loteprednol etabonate was maternally toxic (reduced body weight gain) at 50 mg/kg/day. The NOAEL for maternal toxicity was 5 mg/kg.

A peri-/postnatal study was conducted in rats administered loteprednol etabonate by oral gavage from gestation day 15 (start of fetal period) to postnatal day 21 (the end of lactation period). At 0.5 mg/kg (3.4 times the clinical dose), reduced survival was observed in live-born offspring. Doses ≥ 5 mg/kg (34 times the RHOD) caused umbilical hernia/incomplete gastrointestinal tract. Doses ≥ 50 mg/kg (347 times the RHOD) produced maternal toxicity (reduced body weight gain, death), decreased number of live-born offspring, decreased birth weight, and delays in postnatal development. A developmental NOAEL was not established in this study. The NOAEL for maternal toxicity was 5 mg/kg.

**Lactation**—There are no data on the presence of loteprednol etabonate in human milk, the effects on the breastfed infant, or the effects on milk production. The developmental and health benefits of breastfeeding should be considered, along with the mother's clinical need for EYSUVIS and any potential adverse effects on the breastfed infant from EYSUVIS.

**Pediatric Use**—Safety and effectiveness in pediatric patients have not been established.

**Geriatric Use**—No overall differences in safety and effectiveness have been observed between elderly and younger adult patients.

## NONCLINICAL TOXICOLOGY

**Carcinogenesis, Mutagenesis, Impairment of Fertility**—Long-term animal studies have not been conducted to evaluate the carcinogenic potential of loteprednol etabonate. Loteprednol etabonate was not genotoxic *in vitro* in the Ames test, the mouse lymphoma thymidine kinase (tk) assay, in a chromosome aberration test in human lymphocytes, or *in vivo* in the single dose mouse micronucleus assay. Treatment of male and female rats with 25 mg/kg/day of loteprednol etabonate (174 times the RHOD based on body surface area, assuming 100% absorption) prior to and during mating caused pre-implantation loss and decreased the number of live fetuses/live births. The NOAEL for fertility in rats was 5 mg/kg/day (34 times the RHOD).

**For a copy of the Full Prescribing Information, please visit www.EYSUVIS.com.**

Manufactured for:
Kala Pharmaceuticals, Inc.
Watertown, MA 02472

Part # 2026R02


October 2020
**Kala®**

US-EYS-2000115

0.18 mg
YUTIQ®
(fluocinolone acetonide intravitreal implant) 0.18 mg

# Discover continuous calm in uveitis[1]

YUTIQ is designed to deliver a sustained release of fluocinolone for up to 36 months for patients with chronic non-infectious uveitis affecting the posterior segment of the eye[1]

- Proven to reduce uveitis recurrence at 6 and 12 months[1]*
  At 6 months–18% for YUTIQ and 79% for sham for Study 1 and 22% for YUTIQ and 54% for sham for Study 2 (*P*<.01). At 12 months–28% for YUTIQ and 86% for sham for Study 1 and 33% for YUTIQ and 60% for sham for Study 2.
- Extended median time to first recurrence of uveitis[1,2]
  At 12 months–NE† for YUTIQ/92 days for sham in Study 1; NE for YUTIQ/187 days for sham in Study 2.
- Mean intraocular pressure (IOP) increase was comparable to sham[1,2]
  Study was not sized to detect statistically significant differences in mean IOP.

For more information, visit **YUTIQ.com**

*Study design: The efficacy of YUTIQ was assessed in 2 randomized, multicenter, sham-controlled, double-masked, Phase 3 studies in adult patients (N=282) with non-infectious uveitis affecting the posterior segment of the eye. The primary endpoint in both studies was the proportion of patients who experienced recurrence of uveitis in the study eye within 6 months of follow-up; recurrence was also assessed at 12 months. Recurrence was defined as either deterioration in visual acuity, vitreous haze attributable to non-infectious uveitis, or the need for rescue medications.

†NE=non-evaluable due to the low number of recurrences in the YUTIQ group.

## INDICATIONS AND USAGE

**YUTIQ®** (fluocinolone acetonide intravitreal implant) 0.18 mg is indicated for the treatment of chronic non-infectious uveitis affecting the posterior segment of the eye.

## IMPORTANT SAFETY INFORMATION

### CONTRAINDICATIONS

**Ocular or Periocular Infections:** YUTIQ is contraindicated in patients with active or suspected ocular or periocular infections including most viral disease of the cornea and conjunctiva including active epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, varicella, mycobacterial infections and fungal diseases.

**Hypersensitivity:** YUTIQ is contraindicated in patients with known hypersensitivity to any components of this product.

### WARNINGS AND PRECAUTIONS

**Intravitreal Injection-related Effects:** Intravitreal injections, including those with YUTIQ, have been associated with endophthalmitis, eye inflammation, increased or decreased intraocular pressure, and choroidal or retinal detachments. Hypotony has been observed within 24 hours of injection and has resolved within 2 weeks. Patients should be monitored following the intravitreal injection.

**Steroid-related Effects:** Use of corticosteroids including YUTIQ may produce posterior subcapsular cataracts, increased intraocular pressure and glaucoma. Use of corticosteroids may enhance the establishment of secondary ocular infections due to bacteria, fungi, or viruses. Corticosteroids are not recommended to be used in patients with a history of ocular herpes simplex because of the potential for reactivation of the viral infection.

**Risk of Implant Migration:** Patients in whom the posterior capsule of the lens is absent or has a tear are at risk of implant migration into the anterior chamber.

### ADVERSE REACTIONS

In controlled studies, the most common adverse reactions reported were cataract development and increases in intraocular pressure.

**Please see brief summary of full Prescribing Information on adjacent page.**

**References: 1.** YUTIQ® (fluocinolone acetonide intravitreal implant) 0.18 mg full US Prescribing Information. EyePoint Pharmaceuticals, Inc. May 2021. **2.** Data on file.

EYEPOINT® PHARMACEUTICALS


480 Pleasant Street, Suite B300, Watertown, MA 02472
08/2021
US-YUT-2100061

**YUTIQ® (fluocinolone acetonide intravitreal implant) 0.18 mg, for intravitreal injection**
**Initial U.S. Approval: 1963**

**BRIEF SUMMARY: Please see package insert for full prescribing information.**

**1. INDICATIONS AND USAGE.** YUTIQ® (fluocinolone acetonide intravitreal implant) 0.18 mg is indicated for the treatment of chronic non-infectious uveitis affecting the posterior segment of the eye.

**4. CONTRAINDICATIONS. 4.1. Ocular or Periocular Infections.** YUTIQ is contraindicated in patients with active or suspected ocular or periocular infections including most viral disease of the cornea and conjunctiva including active epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, varicella, mycobacterial infections and fungal diseases. **4.2. Hypersensitivity.** YUTIQ is contraindicated in patients with known hypersensitivity to any components of this product.

**5. WARNINGS AND PRECAUTIONS. 5.1. Intravitreal Injection-related Effects.** Intravitreal injections, including those with YUTIQ, have been associated with endophthalmitis, eye inflammation, increased or decreased intraocular pressure, and choroidal or retinal detachments. Hypotony has been observed within 24 hours of injection and has resolved within 2 weeks. Patients should be monitored following the intravitreal injection *[see Patient Counseling Information (17) in the full prescribing information]*. **5.2. Steroid-related Effects.** Use of corticosteroids including YUTIQ may produce posterior subcapsular cataracts, increased intraocular pressure and glaucoma. Use of corticosteroids may enhance the establishment of secondary ocular infections due to bacteria, fungi, or viruses. Corticosteroids are not recommended to be used in patients with a history of ocular herpes simplex because of the potential for reactivation of the viral infection. **5.3. Risk of Implant Migration.** Patients in whom the posterior capsule of the lens is absent or has a tear are at risk of implant migration into the anterior chamber.

**6. ADVERSE REACTIONS. 6.1. Clinical Studies Experience.** Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice. Adverse reactions associated with ophthalmic steroids including YUTIQ include cataract formation and subsequent cataract surgery, elevated intraocular pressure, which may be associated with optic nerve damage, visual acuity and field defects, secondary ocular infection from pathogens including herpes simplex, and perforation of the globe where there is thinning of the cornea or sclera. Studies 1 and 2 were multicenter, randomized, sham injection-controlled, masked trials in which patients with non-infectious uveitis affecting the posterior segment of the eye were treated once with either YUTIQ or sham injection, and then received standard care for the duration of the study. Study 3 was a multicenter, randomized, masked trial in which patients with non-infectious uveitis affecting the posterior segment of the eye were all treated once with YUTIQ, administered by one of two different applicators, and then received standard care for the duration of the study. Table 1 summarizes data available from studies 1, 2 and 3 through 12 months for study eyes treated with YUTIQ (n=226) or sham injection (n=94). The most common ocular (study eye) and non-ocular adverse reactions are shown in Table 1 and Table 2.

**Table 1: Ocular Adverse Reactions Reported in ≥ 1% of Subject Eyes and Non-Ocular Adverse Reactions Reported in ≥ 2% of Patients**

| Ocular | | |
|---|---|---|
| **ADVERSE REACTIONS** | **YUTIQ (N=226 Eyes) n (%)** | **Sham Injection (N=94 Eyes) n (%)** |
| Cataract[1] | 63/113 (56%) | 13/56 (23%) |
| Visual Acuity Reduced | 33 ( 15%) | 11 (12%) |
| Macular Edema | 25 ( 11%) | 33 (35%) |
| Uveitis | 22 ( 10%) | 33 (35%) |
| Conjunctival Hemorrhage | 17 ( 8%) | 5 ( 5%) |
| Eye Pain | 17 ( 8%) | 12 (13%) |
| Hypotony Of Eye | 16 ( 7%) | 1 ( 1%) |
| Anterior Chamber Inflammation | 12 ( 5%) | 6 ( 6%) |
| Dry Eye | 10 ( 4%) | 3 ( 3%) |
| Vitreous Opacities | 9 ( 4%) | 8 ( 9%) |
| Conjunctivitis | 9 ( 4%) | 5 ( 5%) |
| Posterior Capsule Opacification | 8 ( 4%) | 3 ( 3%) |
| Ocular Hyperemia | 8 ( 4%) | 7 ( 7%) |
| Vitreous Haze | 7 ( 3%) | 4 ( 4%) |
| Foreign Body Sensation In Eyes | 7 ( 3%) | 2 ( 2%) |
| Vitritis | 6 ( 3%) | 8 ( 9%) |
| Vitreous Floaters | 6 ( 3%) | 5 ( 5%) |
| Eye Pruritus | 6 ( 3%) | 5 ( 5%) |
| Conjunctival Hyperemia | 5 ( 2%) | 2 ( 2%) |
| Ocular Discomfort | 5 ( 2%) | 1 ( 1%) |
| Macular Fibrosis | 5 ( 2%) | 2 ( 2%) |
| Glaucoma | 4 ( 2%) | 1 ( 1%) |
| Photopsia | 4 ( 2%) | 2 ( 2%) |

(continued)

**Table 1: Ocular Adverse Reactions Reported in ≥ 1% of Subject Eyes and Non-Ocular Adverse Reactions Reported in ≥ 2% of Patients**

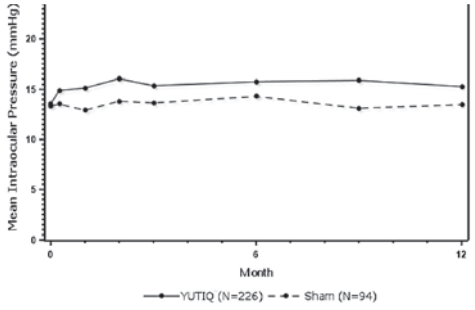
| Ocular | | |
|---|---|---|
| **ADVERSE REACTIONS** | **YUTIQ (N=226 Eyes) n (%)** | **Sham Injection (N=94 Eyes) n (%)** |
| Vitreous Hemorrhage | 4 ( 2%) | 0 |
| Iridocyclitis | 3 ( 1%) | 7 ( 7%) |
| Eye Inflammation | 3 ( 1%) | 2 ( 2%) |
| Choroiditis | 3 ( 1%) | 1 ( 1%) |
| Eye Irritation | 3 ( 1%) | 1 ( 1%) |
| Visual Field Defect | 3 ( 1%) | 0 |
| Lacrimation Increased | 3 ( 1%) | 0 |
| **Non-ocular** | | |
| **ADVERSE REACTIONS** | **YUTIQ (N=214 Patients) n (%)** | **Sham Injection (N=94 Patients) n (%)** |
| Nasopharyngitis | 10 ( 5%) | 5 ( 5%) |
| Hypertension | 6 ( 3%) | 1 ( 1%) |
| Arthralgia | 5 ( 2%) | 1 ( 1%) |

1. Includes cataract, cataract subcapsular and lenticular opacities in study eyes that were phakic at baseline. 113 of the 226 YUTIQ study eyes were phakic at baseline; 56 of 94 sham-controlled study eyes were phakic at baseline.

**Table 2: Summary of Elevated IOP Related Adverse Reactions**

| ADVERSE REACTIONS | YUTIQ (N=226 Eyes) n (%) | Sham (N=94 Eyes) n (%) |
|---|---|---|
| IOP elevation ≥ 10 mmHg from Baseline | 50 (22%) | 11 (12%) |
| IOP elevation > 30 mmHg | 28 (12%) | 3 (3%) |
| Any IOP-lowering medication | 98 (43%) | 39 (41%) |
| Any surgical intervention for elevated IOP | 5 (2%) | 2 (2%) |

**Figure 1: Mean IOP During the Studies**




**8. USE IN SPECIFIC POPULATIONS. 8.1 Pregnancy.** Risk Summary. Adequate and well-controlled studies with YUTIQ have not been conducted in pregnant women to inform drug associated risk. Animal reproduction studies have not been conducted with YUTIQ. It is not known whether YUTIQ can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Corticosteroids have been shown to be teratogenic in laboratory animals when administered systemically at relatively low dosage levels. YUTIQ should be given to a pregnant woman only if the potential benefit justifies the potential risk to the fetus. All pregnancies have a risk of birth defect, loss, or other adverse outcomes. In the United States general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2% to 4% and 15% to 20%, respectively. **8.2 Lactation.** Risk Summary. Systemically administered corticosteroids are present in human milk and can suppress growth, interfere with endogenous corticosteroid production. Clinical or nonclinical lactation studies have not been conducted with YUTIQ. It is not known whether intravitreal treatment with YUTIQ could result in sufficient systemic absorption to produce detectable quantities of fluocinolone acetonide in human milk, or affect breastfed infants or milk production. The developmental and health benefits of breastfeeding should be considered, along with the mother's clinical need for YUTIQ and any potential adverse effects on the breastfed child from YUTIQ. **8.4 Pediatric Use.** Safety and effectiveness of YUTIQ in pediatric patients have not been established. **8.5 Geriatric Use.** No overall differences in safety or effectiveness have been observed between elderly and younger patients.

Manufactured by:
EyePoint Pharmaceuticals US, Inc., 480 Pleasant Street, Watertown, MA 02472 USA
Patented.

# On the Front Line

**Sitting Down With… Andrii Ruban,**
President of the Ukrainian Vitreoretinal Society,
based in Kyiv, Ukraine

First of all, are you safe? How about your colleagues?

During the war, nobody can be sure of their safety anywhere in the country. I am currently in Kyiv, which has sustained constant shelling. Unfortunately, many of my colleagues and their families have been in danger. Many Ukrainian ophthalmologists with whom I am in contact continue to provide care in their cities, and those who left for central and western Ukraine offer their assistance to local clinics.

Please tell me about your background and your practice.

I specialize in vitreoretinal surgery. I completed my residency in ophthalmology in Kyiv, Ukraine, and worked in a state hospital for 20 years. I defended my PhD degree in collaboration with Columbia University, New York, USA. I prepared a doctoral dissertation on the surgical treatment of proliferative diabetic retinopathy and regularly trained in clinics in the UK (Moorfields Eye Hospital in London), Germany (EVRS Training School in Bremen), Italy, France, Austria, and the Czech Republic. I founded and was the head of the Department of Minimally Invasive Vitreoretinal Surgery, and held the position of an Associate Professor of the Department of Ophthalmology at the Academy of Postgraduate Education in Kyiv. For the last six years, I have been working in a private clinic and I am now President of the Ukrainian Vitreoretinal Society (UVRS).

Who were your mentors?

I've been really lucky with my teachers! They have been wonderful people and professionals, some of whom have now sadly passed: Mykola Sergienko and Yurii Kondratenko from Ukraine, Zdenek J. Gregor who practices in the UK, Claus Lucke from Germany, Basil Worgul, Vincent S. Reppucci, and George Bresnick from the USA.

How does the Russian invasion affect the practice of ophthalmology in Ukraine?

Russia's military aggression against Ukraine has made it impossible for ophthalmologists to continue their medical practice in many cities, especially in the north, east and south of Ukraine, where heavy fighting is currently taking place. The teaching in medical school in Ukraine has also been seriously disrupted.

Before the invasion, did you have any contingency plans?

I had no such plans. Despite the constant threats from Russia, none of us believed that a full-blown war would begin.

What are the major and most pressing challenges Ukrainian ophthalmologists are facing?

If we talk about a medical problem, then this is the severity of combat injuries and their combined nature. We have also seen high rates of endophthalmitis. Another difficult task is to provide all the necessary instruments and consumables for ophthalmic surgery in conditions of difficult logistics. This is exactly what we are doing now.

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If we talk about a medical problem, then this is the severity of combat injuries and their combined nature. We have also seen high rates of endophthalmitis. Another difficult task is to provide all the necessary instruments and consumables for ophthalmic surgery – supply chains are of course disrupted – and that's what we're currently working hard to fix.

What have you had to do in the past month that you never imagined yourself having to do?

As a practicing surgeon, I never thought that I would be spending so much time watching news from the front, and I did not imagine that I would be able to determine the source of an explosion by the sound of it. Now, my main task as the President of the UVRS and one of the coordinators in Ukraine is to organize the logistics of international ophthalmic care coming to us. And this is something I have never done before.

You traveled abroad professionally and worked with colleagues from abroad before. Have those colleagues been in touch?

After the start of the Russian invasion, many foreign colleagues and organizations expressed support and offered help. We really appreciate it. The support has come from around the world – but not from Russia. In the early days of the invasion, I talked a lot with my Russian colleagues, and almost all of them (except one) supported this war – a war to destroy the Ukrainian people. After that, I stopped considering them to be my colleagues. And that's why we prepared and sent letters to international ophthalmological societies with a request to suspend the membership of Russian ophthalmologists in these organizations.

What can ophthalmologists from other parts of the world do to help their Ukrainian colleagues?

First of all, we need the moral support of all ophthalmologists in the world condemning this barbaric war. Russia should be made to feel like an outcast in a civilized world. We also need help with consumables for surgery, as the purchase and delivery of them by Ukrainian distributors is extremely difficult in places where there is fighting.

And, if nothing else, simply remember that we are fighting against the second strongest army in the world – not only for our right to live and speak our language but also for the whole free world. We are on our own land, and we will win.

*If you'd like to help, please see the article What Can We Do? – available at: theophthalmologist.com.*

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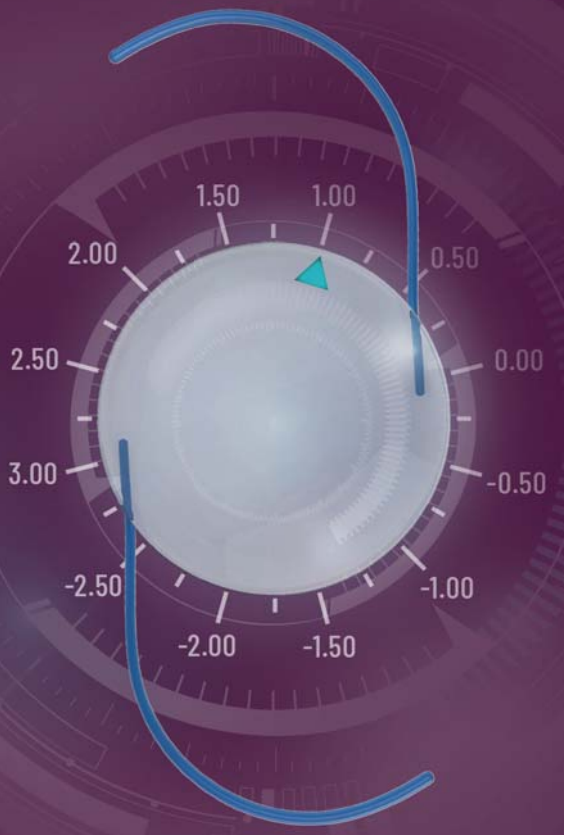


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**INDICATIONS FOR USE AND IMPORTANT SAFETY INFORMATION**

**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 brochure. 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 Brochure for a complete list of contraindications, warnings, precautions, and adverse events.**