

ASIA-PACIFIC'S FIRST MAGAZINE ON THE POSTERIOR SEGMENT

PIE magazine

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THE PIERATE ISSUE

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THE WORLD'S FIRST FUNKY OPHTHALMOLOGY MAGAZINE



START STRONG STAY STRONG¹⁻⁵



References: 1. Ikuno Y, Ohno-Matsui K, Wong TY, et al. Intravitreal afibbercept injection in patients with myopic choroidal neovascularization: the MYRROR Study. *Ophthalmology*. 2015;122(6):1220-1227. doi:10.1016/j.ophtha.2015.01.025. 2. Heier JS, Brown DM, Chong V, et al. Intravitreal afibbercept (VEGF Trap-Eye) in wet age-related macular degeneration. *Ophthalmology*. 2012;119(12):2537-2548. doi:10.1016/j.ophtha.2012.09.006. 3. Campochiaro PA, Clark WL, Boyer DS, et al. Intravitreal afibbercept for macular edema following branch retinal vein occlusion: the 24-week results of the VIBRANT study. *Ophthalmology*. 2015;122(3):538-544. doi:10.1016/j.ophtha.2014.08.031. 4. Korobelnik J-F, Holz FG, Roider J, et al. Intravitreal afibbercept injection for macular edema resulting from central retinal vein occlusion: one-year results of the phase 3 GALLIUS study. *Ophthalmology*. 2014;121:202-208. doi:10.1016/j.ophtha.2013.08.012. 5. Korobelnik J-F, Do DV, Schmidt-Erfurth U, et al. Intravitreal afibbercept for diabetic macular edema. *Ophthalmology*. 2014;121(11):2247-2254. doi:10.1016/j.ophtha.2014.05.006. 6. EYLEA 40mg/L solution for injection Prescribing Information Singapore, 8 Jan 2016.

ABBREVIATED PRESCRIBING INFORMATION

EYLEA SOLUTION FOR INJECTION IN VIAL 2MG. Approved name(s) of the active ingredient(s) One mL solution for injection contains 40 mg afibbercept. Each vial provides a usable amount to deliver a single dose of 50 µL containing 2 mg afibbercept. Indication EYLEA is indicated for the treatment of neovascular (wet) age-related macular degeneration (AMD), macular edema secondary to retinal vein occlusion (branch RVO or central RVO), diabetic macular edema (DME) and myopic choroidal neovascularization (myopic CNV). Dosage Regimen wAMD: The recommended dose for Eylea is 2 mg afibbercept, equivalent to 50 µL. EYLEA treatment is initiated with one injection per month for three consecutive months, followed by one injection every 2 months. There is no requirement for monitoring between injections. After the first 12 months of treatment with Eylea, the treatment interval may be extended based on visual and anatomic outcomes. In this case the schedule for monitoring should be determined by the treating physician and may be more frequent than the schedule of injections. Branch RVO or central RVO: The recommended dose for EYLEA is 2 mg afibbercept, equivalent to 50 microliters. After the initial injection, treatment is given monthly until visual and/or anatomic outcomes are stable. Three or more consecutive, monthly injections may be needed. The interval between two doses should not be shorter than one month. If there is no improvement in visual and anatomic outcomes over the course of the first three injections, continued treatment is not recommended. If necessary, treatment may be continued and the interval may be extended based on visual and/or anatomic outcomes (treat and extend regimen). Usually, monitoring should be done at the injection visits. During treatment interval extension through to completion of therapy, the monitoring schedule should be determined by the treating physician based on the individual patient's response and may be more frequent than the schedule of injections. DME: The recommended dose for EYLEA is 2 mg afibbercept, equivalent to 50 microliters. EYLEA treatment is initiated with one injection per month for five consecutive doses followed by one injection every two months. There is no requirement for monitoring between injections. After the first 12 months of treatment with EYLEA, the treatment interval may be extended based on visual and anatomic outcomes. The schedule for monitoring should be determined by the treating physician. If visual and anatomic outcomes indicate that the patient is not benefiting from continued treatment, EYLEA should be discontinued. Myopic CNV: The recommended dose for EYLEA is a single intravitreal injection of 2 mg afibbercept, equivalent to 50 microliters. Additional doses should be administered only if visual and anatomic outcomes indicate that the disease persists. Recurrences are treated like a new manifestation of the disease. The monitoring schedule should be determined by the treating physician based on the individual patient's response. The interval between two doses should not be shorter than one month. Method of administration Intravitreal injections must be carried out according to medical standards and applicable guidelines by a qualified physician experienced in administering intravitreal injections. Following intravitreal injection patients should be instructed to report any symptoms suggestive of endophthalmitis (e.g., eye pain, redness of the eye, photophobia, blurring of vision) without delay. Each vial should only be used for the treatment of a single eye. Contraindications Hypersensitivity to the active substance afibbercept or to any of the excipients, active or suspected ocular or periocular infection, active severe intraocular inflammation. Special warnings and special precautions for use Endophthalmitis, increase in intraocular pressure, immunogenicity, systemic adverse events including non-ocular haemorrhages and arterial thromboembolic events. As with other intravitreal anti-VEGF treatments for AMD, the safety and efficacy of Eylea therapy administered to both eyes concurrently have not been systematically studied. When initiating Eylea therapy, caution should be used in patients with risk factors for retinal pigment epithelial tears. The dose should be withheld and treatment should not be resumed earlier than the next scheduled treatment in the event of: a decrease in best-corrected visual acuity (BCVA) of ≥30 letters compared with the last assessment of visual acuity; a subretinal haemorrhage involving the centre of the fovea, or, if the size of the haemorrhage is ≥50% of the total lesion area. The dose should be withheld within the previous or next 28 days in the event of a performed or planned intraocular surgery. EYLEA should not be used in pregnancy unless the potential benefit outweighs the potential risk to the foetus. Women of childbearing potential have to use effective contraception during treatment and for at least 3 months after the last injection of afibbercept. Undesirable effects Very Common: Conjunctival hemorrhage, eye pain. Common: Retinal pigment epithelial tear, detachment of the retinal pigment epithelium, retinal degeneration, vitreous haemorrhage, cataract (cortical, nuclear, subcapsular), corneal erosion, corneal abrasion, intraocular pressure increased, vision blurred, vitreous floaters or detachment, injection site pain, foreign body sensation in eyes, lacrimation increased, eyelid edema, injection site hemorrhage, punctate keratitis, conjunctival hyperemia, ocular hyperemia. For a full listing of precautions and undesirable effects, please refer to the full product insert. For further prescribing information, please contact: Bayer (South East Asia) Pte Ltd 63 Chulia Street OCBC Centre East 14th Floor Singapore 049514. Date of revision of text 16 May 2016.

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Macular Degeneration and Thyroid Cancer
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COVER STORY

PIERates of the Posterior Segment

We at *PIE Magazine* believe
devastating visual robbery can occur
in the posterior segment.

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Coming Soon:
APAO 2019 Heads to Bangkok

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Being Forever Young... and More Pirate

*Be Fun. Be Active. Be Creative.
Touch Your Fantastic World.*

These words were engraved almost sacredly atop the entrance to Art In Paradise, a 3D art museum in Chiang Mai, Thailand.

Given that it was closed, I didn't go in. And there wouldn't be enough time to visit. Still, I received a good week's worth of inspiration I needed from those words. They spoke to me through the drizzly evening prior to the Asia-Pacific Association of Cataract and Refractive Surgeons (APACRS) conference.

So often, medicine takes us around the world to educational conferences, and yet so much can be explored on the periphery of those travels, and beyond the edges of science.

During my father's career, Dad (a.k.a. Dr. Young) would sometimes attend psychiatric conferences and as a family, we would always have fun on the side. Dr. Young is a character, a real jokester, even better in costume on Halloween, and best as a pirate. But he would drive away in the mornings around 8 o'clock with a businesslike ring to his voice, and in the evenings when he arrived, it took some time before the air became light again.

His world was the business of psychiatry, and for the most part, it was all business. His career path took a different trajectory, though. Before Dr. Young was a doctor, he was an artist. And after he left his shrinking couch behind, he took the paintbrush back, and deep dove into the world of plein air painting, winning awards up and down the eastern United States.

Dr. Young has lived different lives. He has lived as a doctor, and he has lived as an artist. It was a "Never the twain shall meet" sort of thing.

In some ways the spitting image of my father, I also must object. I don't look at the medical world and see a desert where artistry cannot grow. I see a fertile valley where the seeds of imagination can be planted, without waiting 30 years to be harvested.

Dr. Young will always be, in my eyes, the Original Pirate (OP). Or as I call him, POP. To this day, he paints in costume, which has brought him local notoriety in my hometown of New Castle, Delaware. The pirate turned out to be a great promoter.



My additional thought is to combine the theatre of costume and artistry, and bring these elements back into medicine. But really, it's an idea whose time has come. The theme of the Asia-Pacific Academy of Ophthalmology (APAO) in 2019 will be "The Science and Arts of Ophthalmology," and although we work with the APAO, we don't compare notes. Perhaps this twain shall meet after all.

I think, therefore I am, noted Rene Descartes. My thinking is informed by delightful screams of the night on October 31, a myriad of Dr. Young's paintings in my childhood home's front room, and a man who devoted decades to medicine in the treatment of an untold numbers of patients who lived better in his care.

I shall not be my truth's denier, but rather shine my light of experience upon the world, in order to touch our fantastic world fantastically.

We bring you PIE Magazine, the infant, at 1.5 years of life, in its 06 edition. Just wait until we learn to run with a wet paintbrush.

Argghhhhhhhh Matey!!!

Matt Young
CEO & Publisher
PIE (Posterior Segment - Innovation - Enlightenment) Magazine





Dr. Gemmy Cheung, MBBS(Lond), FRCOphth(UK)



Dr. Cheung currently serves as deputy head and senior consultant of the medial retina service for Singapore National Eye Centre (SNEC), as well as senior clinician investigator for the Singapore Eye Research Institute (SERI). Her research interests include the study of risk factors and clinical features of macular diseases that may be unique in Asian populations.

Dr. Cheung has published more than 150 articles, mostly regarding age-related macular degeneration, including polypoidal choroidal vasculopathy, and conducted several clinical trials in anti-vascular endothelial growth factor therapies. Dr. Cheung has also been actively involved in training and education, and has served as an instructor on Asia-Pacific Academy of Ophthalmology (APAO) and American Academy of Ophthalmology (AAO) courses and many other educational programmes. In addition, she is also a volunteer faculty member for the ORBIS Flying Eye Hospital Programme.

Dr. Cheung has received a number of prestigious awards, including the Macula Society Young Investigator Award (2017), APAO achievement award (2017), APAO Nakajima Award (2014), APAO Outstanding Service in Prevention of Blindness Award (2013), the Bayer Global Ophthalmology Research Award (2012), the Roper-Hall Medal (2005) and the Elizabeth Hunt Medal (Royal College of Ophthalmologists, UK). [Email: gemmy.cheung.c.m@singhealth.com.sg]

Prof. Mark Gillies, M.D., Ph.D.



Dr. Gillies presently holds a number of positions including: director of research and director of the Macula Research Group for the Save Sight Institute; foundation fellow for the Sydney Medical School; professor in the Department of Clinical Ophthalmology at the University of Sydney; head of the Medical Retina Unit at the Sydney Eye Hospital; deputy chair for the Ophthalmic Research Institute of Australia; and director of Eye Associates in Sydney.

Dr. Gillies has served as a principal investigator or associate investigator in more than 70 clinical trials, and his research regarding macular degeneration and drug safety and efficacy has been published in 188 journals. He has also received a number of grants to study treatments for age-related macular degeneration, retinal disease and Muller cell dysfunction – among other treatments and studies. Dr. Gillies has also appeared in national media on numerous occasions, including the evening news of all major networks, on ABC radio as a local expert, as well as in print media.

His dedication and research has resulted in multiple awards. Most recently, he received Gerard Crock trophies for the best papers at the Royal Australian and New Zealand College of Ophthalmologists (RANZCO) Annual Scientific Meeting (2013 and 2015), an achievement award from the Asia-Pacific Academy of Ophthalmology (APAO) in 2014, and an achievement award from the American Academy of Ophthalmology (AAO) in 2015. [Email: mark.gillies@sydney.edu.au]

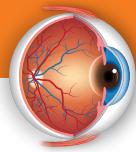
Dr. Vishali Gupta, M.D.



Dr. Gupta currently serves as a professor of ophthalmology at Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh in India. Throughout her career, she has completed original work in the fields of intraocular tuberculosis, optical coherence tomography, diabetic retinopathy, and fungal endophthalmitis. In addition, she is actively studying vitreoretina and uveitis diseases.

She has been published in 65 per-reviewed journals, and has authored 17 book chapters and four complete books. Dr. Gupta also holds a US patent for the development of multiplex PCR for uveitis. In addition, she is a sought after speaker, and has made more than 350 presentations in various national and international meetings.

Dr. Gupta has received several awards for her work, including the first JN Pahwa award from the Vitreo Retinal Society of India, the first NA Rao Award from the Uveitis Society of India, and the first NA Rao award from All India Ophthalmological Society (AIOS). [Email: vishalisara@yahoo.co.in]



BEYOND THE COMBAT ZONE

The Sight Casualties of War



by April Ingram

Although we may live thousands of miles away from war zones, we bear witness to its horrific effects through social and news media. This accessibility to information is a powerful connector, giving us insight into the loss of lives, culture and well-being in these war-torn areas. And while there is much reporting on lives lost and serious injuries (like limb amputation) to military personnel, there are other traumatic consequences of war, including ocular damage to both military personnel and civilians. The impacts of these often-overlooked injuries are significant, and they create ongoing social and economic burdens.

Late last year, Syed Abid Hassan Naqvi and colleagues from Rawalpindi, in the Punjab province of Pakistan, reported their findings from an observational study of 210 soldiers who presented with ocular war injuries to the

Combined Military Hospital in Peshawar between 2012 and 2016. The paper described demographic details and severity of eye injuries, as well as providing an analysis of prognostic influences to good or poor outcomes.¹

They found that more than half (54.3%) of the ocular injuries were caused by a blast from an improvised explosive device, followed by blunt trauma (20%) and road traffic accidents (11.4%). Closed globe injuries occurred most frequently (57.1%). Outcomes were quite evenly distributed, while 29.5% were considered to have a good outcome (20/40 or better), 24.3% were considered fair, 21.9% poor and 24.3% experienced the worst visual outcome. Improvised explosive device blast, open globe injury, injury to Zone III (posterior region) and ocular trauma score grade 1 (most severe injury and

73% probability of no light perception at 6 months follow-up) were poor prognostic features and resulted in significantly higher frequency of poor visual outcome.

These findings are important because they include some of the most commonly used weapons, that despite protective measures are leading to severe eye injuries. Many of the advancements in body armour are aimed at protecting vital organs and the skull and saving lives, leaving troops' eyes and limbs particularly vulnerable to the blizzard of shrapnel from explosions. Each explosion unleashes large metal shards and thousands of fragments, like tiny missiles. Those fragments are generally innocuous if they hit the protected areas but can have devastating when they make contact with the eye.

Unfortunately, the answer isn't as simple as wearing protective eyewear. These blasts can hit with a force that has reportedly stripped soldiers of their helmets and goggles or even driven the frame of protective eyewear into the face and eyes. Serious eye injuries are reportedly accumulating at almost twice the rate of wounds requiring amputation and have life-long consequences, as approximately 70% of all sensory perception comes from vision.

Based on this work, the authors advocated that patients presenting with improvised explosive device blast, open globe, zone-III injury and/or an ocular trauma score grade 1 should be suspected to result in a poor visual outcome, therefore meticulous care should be provided to save as much vision as possible, and to minimize the social and economic effects of blindness.

And while the effects of war are debilitating to soldiers, the damage often extends into the civilian community, affecting its youngest residents – children. In Syria, the civil war has deliberately targeted healthcare services, resulting in an additional humanitarian crisis in the devastated war zone. Children's healthcare has been severely impacted. After hearing reports stating that there was just one pediatrician remaining in Aleppo, Dr. Gerlant van Berlaer, a pediatrician and emergency physician in Belgium with a PhD in disaster medicine, wanted to help.

As Dr. van Berlaer's current position restricts his travel to war zones, he had to find an alternative way to make an impact. He, along with colleague Abdallah Elsafti, persisted until they found an opportunity. "When the Qatar Red Crescent conducted an immunization campaign with permission from the Syrian Ministry of Health, my colleague and I thought it would be a good opportunity to look into the physical and mental health of these children. We trained the healthcare workers of the campaign to collect our data while they received their vaccinations."

What they found was shocking – but not entirely unexpected in a war zone. They studied the living conditions of 1,000 Syrian children and published "Children in the Syrian Civil War: The Familial, Educational and Public Health Impact of Ongoing Violence" in *Disaster Med Public Health Preparedness* 2016. "We found that one in five children did not live in their own house anymore; 5% had deceased or missing parents; more than 50% had dropped out of school; 15% lacked access to safe drinking water; 23% did not have toilets; and 16% did not have healthy food to eat. In addition, 64% could not reach medical care, and 72% lacked proper vaccinations."

More recently, Dr. van Berlaer and colleagues published their follow-up findings from the Syrian civil war in *PLoS One*: "Diagnoses, infections and injuries in Northern Syrian children during the civil war: A cross-sectional study." They

"Urgent coordinated and global action is needed to deal with this complex humanitarian emergency, and to prevent worsening of health threats to this generation of children in Syria, as they are the nation's only asset for the future."

– Dr. van Berlaer

found that four years into the conflict, 64% of the studied children suffer from serious infections – 5% of these ocular – while most were from respiratory, neurological or digestive origin.

The authors discuss how these children's living conditions during the war will impede both their health and opportunities for the future. Dr. van Berlaer explains: "Many Syrian children will possibly bear the consequences of lifelong disability, physically as well as mentally, imposing an extra burden on the country's future. As physicians we urge to immediately cease attacks on hospitals, schools, and other critical civilian infrastructure, and to respect international humanitarian laws. Urgent coordinated and global action is needed to deal with this complex humanitarian emergency, and to prevent worsening of health threats to this generation of children in Syria, as they are the nation's only asset for the future."

Editor's Note: The group of Pakistani investigators couldn't have their biographies or photos published due to their military positions and the extreme confidential nature of their work. Dr. van Berlaer, although his work did not have a real eye-related focus, but more about the health crisis resulting from war, was generous enough to contribute to this story.

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- van Berlaer sG, Elsafti AM, Al Safadi M, et al. Diagnoses, infections and injuries in Northern Syrian children during the civil war: A cross-sectional study. *PLoS One*. 2017;8;12(9):e0182770.

About the Contributing Doctor



Prof. Dr. Gerlant van Berlaer, M.D., M.Sc., Ph.D., is a pediatrician, emergency physician, pediatric Intensivist and master in disaster medicine. He is Chief of Clinic for Pediatric Critical Care at the University Hospital in Brussels, Belgium. He has participated in Humanitarian Medical Aid in Banda Aceh, Gaza, Haiti and Switzerland. He is member of ReGEDiM, the Research Group on Emergency and Disaster Medicine (Free University Brussels), instructor for Advanced Pediatric Life Support and Prehospital Pediatric Life Support (co-course director Belgium) and invited Professor at several University Associations in Belgium (Brussels, Antwerp, Ghent). Next to that he is foster father of five, father of two, elected City Council member in his home town Grimbergen in Belgium and founder of PICARO (Pediatric International Catastrophe Aid and Relief Organization) that built the first earthquake-proof schools in Haiti. [Email: gerlant.vanberlaer@uzbrussel.be]



Retinitis Pigmentosa Treatment

Exploring All the Angles

9 out of 10 mad scientists agree that more testing is needed.

by April Ingram

Around the world, nearly two million people are experiencing progressive deterioration of their vision from heterogeneous inherited retinal disorders. Collectively referred to as retinitis pigmentosa (RP), vision is lost as the light-sensing photoreceptors and/or retinal pigment epithelium gradually degenerate and die. And in the general population the prevalence has been reported as high as 1 in 3,500 – making two million a conservative estimate.

Although great amounts of time, effort and research funds have been invested into refining the understanding of the pathophysiology of RP, strategies for prevention and treatment remain limited.

Dr. Xiu-Feng Huang, from Wenzhou Medical University in China, has dedicated his research to studying the molecular basis for Mendelian diseases, including inherited retinal disease like RP. He recently published a chapter, “Current Pharmacological Concepts in the Treatment of the Retinitis Pigmentosa,” in the book *Retinal Degenerative Diseases – Mechanisms and Experimental Therapy*, which is part of the prestigious series called, *Advances in Experimental Medicine and Biology* from Springer International Publishing AG.

Dr. Huang explains the importance and motivation for researching and writing his chapter: “Over 70 causative genes have been defined in RP families

and numerous animal models have been defined – and yet, we still do not have any widely recognized treatments that are able to prevent, recover or reverse the degenerating retina.”

“That said, there have been important therapeutic advancements, including gene therapy, pharmacotherapy, cell replacement, neurotrophic factors and retinal prosthesis. This review focuses on the pharmaceutical options and emphasizes drug discovery, development and clinical translation,” he added.

Dr. Huang’s chapter begins with a discussion of dietary supplements, most of which have already been recognized as somewhat beneficial

to degenerative retinal disease. Since the 1960s, vitamin A supplementation has been considered to be of possible benefit in slowing retinal degeneration. Dr. Huang reviews the long-term study of vitamin A use, which showed a slowing in the loss of ERG amplitudes and was considered safe for daily use in 18 to 54-year-olds. Alternately, vitamin E supplementation at 4000 IU per day had an adverse effect.

It's important to note that vitamin A showed no significant effects on these patients' decline in distance or visual acuity. The overall impression seems to be that there is marginal benefit to Vitamin A, but some studies, although somewhat controversial, have showed vitamin A could be toxic and should be avoided in patients with RP caused by mutations in the *ABCA4* gene, as well as women planning to conceive or with severe osteoporosis. The conclusion on vitamin A, is that there is really no consensus about the utility of it as a treatment for RP.

Dr. Huang next explored the evidence for lutein in patients with RP and the presumption of it as a potential therapeutic modality in preserving visual function. Lutein is a recognized antioxidant and neuroprotective supplement with no significant adverse effects – however, the mechanistic evidence at a molecular level reporting significant effects on the visual field is not terribly strong, and claims should be interpreted with caution.

Delivering neuroprotection to patients with RP is the focus of many studies. Dr. Huang describes how docosahexaenoic acid (DHA) has been investigated as a neuroprotective factor against oxidative stress in photoreceptors and plays an important role in retinal development. Beneficial findings in rats held some promise in reducing ganglion cell loss and improving function. A trial of oral supplementation with 1200 mg/day of DHA in addition to vitamin A initially slowed down the progress of RP, but

disappointingly, this beneficial effect did not extend beyond two years. Similarly, patients eating a diet rich in omega-3 fatty acids, in addition to vitamin A supplements and no DHA supplement, also showed some benefit.

Valproic acid looked like a good candidate for RP, demonstrating the ability to stimulate glial cells to differentiate into photoreceptor-like cells, and provide neuroprotection and axonal regrowth after optic nerve crush. A small study showed visual field improvement in nine of 13 eyes studied. However the methods, rationale and side effects were criticized. This led Dr. Huang to suggest that a placebo-controlled clinical trial should be necessary to rigorously assess the efficacy and safety of valproic acid.

Lastly, Dr. Huang reviewed the use of neurotrophic factor and growth factor to protect photoreceptor degeneration. More specifically, ciliary neurotrophic factor (CNTF), glial cell-derived neurotrophic factor (GDNF), and basic fibroblast growth factor (bFGF).

CNTF has delayed photoreceptor degeneration in several animal models. A phase 1 study of CNTF delivered by intravitreal implantation of a device containing encapsulated cells transfected with the human CNTF gene showed positive results in 10 patients with inherited retinal degeneration. Two phase 2 studies soon

followed with highly anticipated results, but a longitudinal study of the cone photoreceptor structure and function in three patients with inherited retinal degeneration showed no significant changes in visual acuity, visual field sensitivity, or ERG responses. Dr. Huang suggests that larger studies are urgently needed.

GDNF has also been shown to have a neuroprotective effect on degenerating photoreceptors and its increased expression in the retina slows the death of rod photoreceptors in retinal degeneration models. BFGF administration has shown delays in photoreceptor degeneration for two months following a single injection in a rat model. Promising news for the rat; however, further research is needed to show the safety and effectiveness of BFGF treatment in people with RP.

Dr. Huang summarizes that there is no satisfactorily effective pharmacologic treatment to prevent, reverse or delay vision loss for these patients. He notes enormous potential in stem cell transplantation and gene therapy, but hurdles remain. The extensive genetic and clinical heterogeneity of RP makes designing clinical research difficult and following these patients for long periods of time is required. ●

Reference:

Huang XF. Current Pharmacological Concepts in the Treatment of the Retinitis Pigmentosa. *Adv Exp Med Biol.* 2018;1074:439-445.

About the Contributing Doctor



genotyping arrays. When not uncovering the molecular genetic breakthroughs in ocular diseases, Xiu-Feng enjoys reading detective fiction. [Email: hxfwzmc@163.com]

Dr. Xiu-Feng Huang received his MBBS from Wenzhou Medical University in 2011 and began studying for a Master of Medicine in 2014. His work focuses on the molecular genetics of ocular diseases. He is dedicated to his research to improve understanding of the molecular basis of Mendelian diseases (nonsyndromic/syndromic inherited retinal disease, nystagmus, microphthalmia, etc.) and complex diseases like uveitis and myopia. He has developed comprehensive approaches of genetic analyses for patients, including targeted exome sequencing, whole-exome sequencing, whole-genome sequencing and whole-genome wide



Navigating the Anterior Vitreous

All Hail the Intraocu

by Olawale Salami and Gloria D. Gamat

Recent years have witnessed a remarkable increase in the indications for intraocular endoscopy. This has been largely driven by the availability of improved endoscopes and probes with major optimizations in size, image resolution and maneuverability.

Today, intraocular endoscopy has become a vital component in the management of several ocular pathologies, including: goniosynechialysis; retained lens fragments; dislocated posterior intraocular lens; transscleral suture fixation; ciliary body photocoagulation; proliferative vitreoretinopathy (PVR); intraocular foreign bodies (IOFBs); retinal detachment repair (especially for undetectable breaks in the peripheral

retina); perforating injuries of the globe; post-traumatic endophthalmitis; endogenous; post-cataract and bleb-related endophthalmitis; and retinal assessment in forensic cases.

Intraocular endoscopy is associated with several key benefits. The Endo Optiks® endoscope (Beaver-Visitec, International, Inc.) can bypass opacities in the anterior segment to visualize the posterior segment structures at high magnification and at different angles. Therefore, endoscopy is advantageous in cases of hemorrhage, lenticular opacity, corneal opacity and scarring. In addition, endoscopy provides unique views of anterior structures not feasible with conventional microscopy, such as the sub-iris space and ciliary bodies.

Furthermore, the flexibility of the endoscope probe and the ability to visualize posterior segment structures at close range facilitates the diagnosis and treatment of micro lesions in the retina.

A recent review article by Yu-Ping Zou and colleagues from the Department of Ophthalmology at the Guangzhou General Hospital in China, provided a synopsis of the common anatomical features and pathologies observed in the anterior vitreous, as well as the applications and indications of endoscopy-assisted vitrectomy in the anterior vitreous.

The paper, titled “Endoscopy-assisted Vitrectomy in the Anterior Vitreous” was published in the *International Journal of Ophthalmology*.¹



Intraocular Endoscope

In this paper, Dr. Yu-Ping Zou and co-authors chronicled the evolution and development of the modern intraocular endoscope, from its use in the removal of intraocular foreign bodies by Thorpe in the 1930s, to sulcus localization in sulcus-fixated, sutured, posterior chamber IOL implantation in the 1990s. The intraocular endoscope comprises three main parts: the camera, the xenon illuminating system and an optical laser. Fiber optic cables transmit the intraocular images from the camera and illumination source to an electronic monitor.

The imaging resolution and the field of view (FOV) are determined by the size of the endoscope. For example, a 19-G endoscope produces an image resolution of 17k pixels and a 140° FOV, a 20-G endoscope generates a 10k pixel image and a 110° FOV, and a 23-G endoscope creates a 6K pixel image and a 90° FOV. However, newer, high-resolution 23-G endoscopes can generate up to 10k pixel images and 120° FOVs.

Traditional microscopes versus endoscopes?

The authors summarized the key differences between conventional surgical microscopes and intraocular endoscopes. Traditional microscopes require a clear anterior media to visualize intraocular objects, while endoscopes need to traverse the anterior segment to capture images using their distal tip.

In addition, according to the authors, intraocular endoscopes produce panoramic, unobstructed views of the space between the vitreous

base and the anterior segments behind the iris at high magnifications, which cannot be obtained by conventional microscopy.

Furthermore, endoscopes provide a unique intraoperative view from inside the vitreous cavity while traditional microscopes only provide a top-down perspective from outside the patient's cornea.

However, according to Dr. Igor Kozak, clinical lead at Moorfields Eye Hospital Centre in Abu Dhabi, United Arab Emirates, while endoscopic probes provide an unprecedented view to areas of the eye that are otherwise difficult to visualize, the quality of current visualization is somewhat inferior to standard microscopic view.

"This relates to three qualitative aspects: field of view, intensity of illumination and stereopsis – all of which are limited in endoscopic retinal surgery. The best view is provided by the largest gauge endoscopes which, in turn, are more traumatic to the sclera and conjunctiva, and may be less desired in cases of pediatric vitrectomy. An ideal combination would be to have thinner endoscopes with superior visualization available," explained Dr. Kozak.

Zooming in on the anterior vitreous: What's the role of endoscopy-assisted vitrectomy (EV)?

The authors summarized published studies that evaluated clinical outcomes and complications of endoscopy-assisted vitrectomy in a variety of indications.

Furthermore, they described the common pathologies of the anterior vitreous. They noted that anterior vitreous retraction, prolapse, incarceration or adhesions are characterized by fibrotic changes, neovascularization and traction which could result in retinal breaks or detachment, and that these pathological changes can be clearly and directly visualized using an endoscope. Moreover, in the ciliary sulcus, endoscopy can facilitate complete capsulectomy during vitreolensectomy in cases with uveitis, and in cases with retained lens matter causing chronic uveitis.

The authors then itemized several benefits of using EV during the repair of retinal detachment. For example, it provides better visualization for retinal repair or re-attachment in cases with anterior media opacity, and is a useful tool for identifying undetectable retinal breaks, especially in pseudophakic or aphakic eyes, including cases with complex retinal detachment.

Additionally, endoscopy reduces the probability of retinal tearing or vitreous hemorrhage, especially in cases with IOFBs located in the anterior retina or pre-existing endophthalmitis. In addition, the authors noted other reports that showed that endoscopy can preserve visual acuity in cases which would otherwise require delay of surgery due to hazy media or the non-availability of a donor cornea for simultaneous penetrating keratoplasty.

Regarding the pediatric population, the authors noted that in the very few published studies on clinical outcomes of EV, the evidence suggests that endoscopy provides clear advantages



during complex pediatric vitreoretinal surgery. In this context, the common pediatric vitreoretinal pathologies include retinopathy of prematurity, tractional retinal detachment and familial exudative vitreoretinopathy. Furthermore, pediatric eyes have a unique anatomy and physiology, as well as a high risk of aggressive and widespread PVR, especially in cases with traumatic retinal detachment and open globe injuries. Therefore, endoscopy, according to the authors, reduces the risk in these situations, as it can directly guide the surgery with minimal manipulation, thereby reducing the risk of iatrogenic events.

What are the challenge points to remember?

The authors highlighted the possible pitfalls associated with the use of endoscopy assisted vitrectomy, especially by inexperienced users.

The first issue is the indirect viewing of the surgical field on a monitor, which requires training to adapt to precise hand-eye coordination. It is important to note that bimanual surgery is impossible, as only one hand is used to control the endoscope, which can be uncomfortable for first time users.

Furthermore, they highlighted that due to the highly magnified image, endoscopy can provide a false sense of security regarding distance from anatomical structures, heightening the risk of iatrogenic trauma. Therefore, caution should be taken to avoid this by observing the focus of the endoscopic image when close to the tissue. The

focus is fixed at 2mm to infinity so the image will blur when closer than 2mm.

In addition, the authors suggested a reduction in illumination intensity when working at high magnifications and short distances and stressed the importance of keeping the endoscope's tip clean to avoid obstruction or blurring of the endoscopic image.

Finally, the authors stressed the importance of extensive training in the successful use of this technique, preferably using an artificial eye, where available.

Final Thoughts

The authors concluded the paper by emphasizing the crucial role of intraocular endoscopy in aiding clear and accurate AV dissection intraoperatively, especially in cases with media opacity, small pupil or iris

adhesion. Thus, they noted, it is likely that endoscopy assisted vitrectomy will become an increasingly valuable technique in this field.

In addition, Dr. Kozak highlighted that the trend in vitreoretinal, and ocular surgery in general, is gearing towards 3-D surgery due to excellent visualization and ergonomic reasons.

"As such, intraocular endoscopy has been at the forefront of ergonomics for many years. Currently, there is a wide array of indications and procedures available for intraocular endoscopy. Another application which could be explored more is the collection of intraocular fluid (vitreous) samples in uveitis cases with media opacities," said Dr. Kozak.

Editor's Note: Dr. Kozak was generous enough to contribute on this story, but he was not a part of the mentioned study.

“Intraocular endoscopy has been at the forefront of ergonomics for many years. Currently, there is a wide array of indications and procedures available for intraocular endoscopy. Another application which could be explored more is the collection of intraocular fluid (vitreous) samples in uveitis cases with media opacities.”

– Dr. Igor Kozak

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About the Contributing Doctor



Igor Kozak, MD, PhD, MSc is a vitreoretinal surgeon and a retina and ocular imaging specialist who specializes in introducing the newest technologies into clinical practice. He is a graduate of P.J. Safarik University in Kosice, Slovak Republic and has completed both vitreoretinal and uveitis fellowships at the University of California, San Diego (UCSD). He also holds a master's degree in clinical research from UCSD. He is currently a clinical lead at the Moorfields Eye Hospital Centre in Abu Dhabi, United Arab Emirates. His clinical interests include age-related macular degeneration, diabetic and hypertensive retinopathy, uveitis and vitreoretinal surgery. In his research, Dr. Kozak focuses on retinal diagnostic imaging and image analysis, retinal pharmacology and drug delivery systems. [Email: igor.kozak@moorfields.ae]



POSTERIOR SEGMENT RETINAL DEGENERATION



The Role of JNK Pathway in Retinal Degeneration and Vision Loss

by Collins Santhanam

As researchers begin to explore various treatment options for vision loss and blindness, one particular target currently under investigation is the c-Jun N-Terminal Kinase (JNK) pathway. Activation of this pathway is associated with the cellular death of a variety of retinal cells. Genetic and pharmacological inhibition of JNK signaling in a number of different models of retinal degeneration has shown promising results in reducing pathologic progression and protection against cellular death.

Retinal degenerative diseases are responsible for vision loss, including complete blindness, in millions of people worldwide. For many of these patients, performing basic functions like reading, driving or even watching TV becomes a challenge, resulting in a loss of personal independence.

The retina has 10 different cell layers, including retinal ganglion cells (RGC), photoreceptor rods and cones, and retinal pigment epithelial cells (RPE). A key aspect to the pathology of retinal degenerative diseases is the dysfunction and/or death of many

of the cells that are involved in the complex process of vision whereby light waves, or photons, are converted into electrical signals in a process known as phototransduction. These electrical signals are then transmitted to the brain via the optic nerve, chiasm and tract.

In order for us to better understand and develop improved methods for the prevention and treatment of visual loss, numerous studies have been directed at understanding the underlying molecular mechanisms of injury in the visual system.

A mini-review¹ written by Byung-

Jin Kim and Donald J. Zack published in *Retinal Degenerative Diseases, Advances in Experimental Medicine and Biology* discusses the impact of c-Jun N-terminal kinase (JNK) signaling in retinal disease, focusing on RGCs, RPEs, photoreceptor cells in animal studies, with particular attention to the modulation of JNK signaling as a potential therapeutic target for the treatment of retinal disease.

"JNK, a member of the stress-induced mitogen-activated protein (MAP) kinase family, has been shown to modulate a variety of biological processes associated with the neurodegenerative pathology of the retina. In particular, various retinal cell culture and animal models related to glaucoma, age-related macular degeneration (AMD), and retinitis pigmentosa indicate that JNK signaling may contribute to disease pathogenesis," the authors reported.



POSTERIOR SEGMENT RETINAL DEGENERATION

Relation to Glaucoma and Other Diseases

As early as 1999, HA Quigley reported in *Progress in Retinal and Eye Research*² that RGCs transmit visual information from the bipolar cells in the retina to vision relay centers in the brain, such as the lateral geniculate nucleus (LGN) and superior colliculus (SC), and ultimately to the visual cortex. Injury and death of RGCs, which together constitute the so-called optic neuropathies, are a major cause of vision loss and blindness worldwide.

In later years, various in vivo models of optic nerve disease like neuronal excitotoxicity by N-methyl-D-aspartate (NMDA), experimental optic nerve crush (ONC) and retinal ischemic injury have been actively investigated to study the impact of JNK and its upstream/downstream pathways in RGC death.

As an example, Fernandes et al. (*Neurobiology Disease*, 2012)³ demonstrated that combined deletion of the JNK2 and JNK3 genes inhibited RGC death with long-term protection after ONC injury, and a similar effect was shown by conditional deletion of JUN, a downstream signaling molecule of JNK. In addition to this, according to Welsbie et al. (*Proceedings of the National Academy of Sciences of the United States of America*, 2013)⁴, blockage of upstream signaling of JNK led to significantly decreased JNK activation that was associated with enhanced RGC survival following ONC.

Several studies also suggested that pharmacological inhibition of JNK activation could significantly increase RGC viability and prevent inner retinal degeneration. Kim et al. (*Molecular Neurodegeneration*, 2016)⁵ demonstrated that ischemia/reperfusion (I/R) triggered JNK activation in various cells in the inner retinal layers and RGC axonal loss was significantly inhibited by administration of SP600125. This finding suggested that activation of JNK plays a pivotal role in RGC death.

When taken together, the numerous findings mentioned in Byung-Jin Kim and Donald J. Zack's paper¹ indicated that JNK inhibitors may be an interesting class of pharmacological molecules for the promotion of RGC survival through the inhibition of JNK activation to prevent RGC death and simultaneously inhibit proinflammatory responses in glial cells.

Possible Relationship with Age-Related Macular Degeneration

The biology of RPE cells in human diseases has been actively investigated, particularly in age-related macular degeneration (AMD), as already reported by RW Young (*Survey of Ophthalmology*, 1987)⁶ two decades earlier. Today, the late stages of AMD, which is a leading cause of vision loss in the elderly in the United States and other developed Western countries, can be categorized into two broad types: non-neovascular (dry) or neovascular (wet). The non-neovascular form is more common, but the neovascular form is generally associated with more severe vision loss.

RPE cells constitutively produce VEGF, and produce more in response to pathologic conditions (Blaauwgeers et al., *The American Journal of Pathology*, 1999; Holtkamp et al., *Progress in Retinal and Eye Research*, 2001).^{7,8} Importantly, JNK has been suggested as a key signaling molecule promoting VEGF expression through phosphorylation of c-Jun and binding to the VEGF promotor, thereby mediating neovascularization (Du et al., *Proceedings of the National Academy of Sciences of the United States of America*, 2013; Guma et al., *Proceedings of the National Academy of Sciences of the United States of America*, 2009).^{9,10} Despite these studies, the role of JNK in RPE viability remains controversial.

Cao and colleagues (*Molecular Medicine Reports*, 2012)¹¹ showed

that ultraviolet B radiation induced apoptotic cell death of the ARPE-19 RPE cell line and surprisingly, inhibition of JNK exacerbated apoptosis, whereas activation of JNK attenuated ARPE-19 cell death, suggesting an anti-apoptotic role of JNK. In contrast, Roduit and Schorderet reported enhanced RPE cell survival upon JNK inhibition under UV irradiation (*Apoptosis*, 2008).¹² This issue is not resolved and warrants further research.

JNK Signaling and Photoreceptor Degeneration

The association of JNK with photoreceptor cell death has been studied less than other retinal cell types. Nonetheless, several in vitro and animal models have suggested that JNK may mediate photoreceptor cell death, initiated by various genetic and environmental factors.

Using the photoreceptor cell line 661 W, Choudhury et al. (*Cell Death & Disease*, 2013)¹³ showed that reprogramming of the unfolded protein response (UPR) by genetic deletion of caspase 7 resulted in a decrease of JNK-induced apoptosis. This finding suggests that JNK is an important apoptotic mediator of UPR, which is known as a major causative process of photoreceptor cell death in some forms of retinitis pigmentosa (Galy et al., *Human Molecular Genetics*, 2005; Kang et al., *Nature Cell Biology*, 2012).^{14,15} These findings indicate that JNK may play an important role in photoreceptor cell death as well.

JNK Signaling Pathway: A Potential Therapeutic Target in Retinal Degenerative Disease?

In summary, Byung-Jin Kim and Donald J. Zack's mini-review¹ indicates that apoptosis of a variety of retinal cells is associated with the activation of the JNK pathway. In addition, genetic and pharmacological inhibition of JNK

signaling resulted in protection from cell death and reduced pathologic progression in a number of different models of retinal degeneration.

As a common mediator of retinal cell death, the pharmacological inhibition of JNK, or associated family members, may provide a pathway for a “generic” treatment strategy that is relatively independent of the specific genetic mutation causing the disease.

JNK inhibition strategies may also provide a complementary treatment approach to gene-specific therapies.

“For these reasons, it seems reasonable to pursue the JNK pathway as a promising target for the development of novel therapeutic strategies for treatment of the photoreceptor degenerative diseases,” concluded Byung-Jin Kim and Donald J. Zack. 

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INDUSTRY UPDATE

Quintel Medical Opens Polish Subsidiary

Global ophthalmic device company Quantel Medical has expanded into Poland with the opening of its new subsidiary: Quantel Medical Polska. The new location will focus on commercializing the company’s complete range of ultrasound, laser and dry eye diagnostic products. The Polish subsidiary has also been named the exclusive distributor for products from FCI (a Zeiss group company).

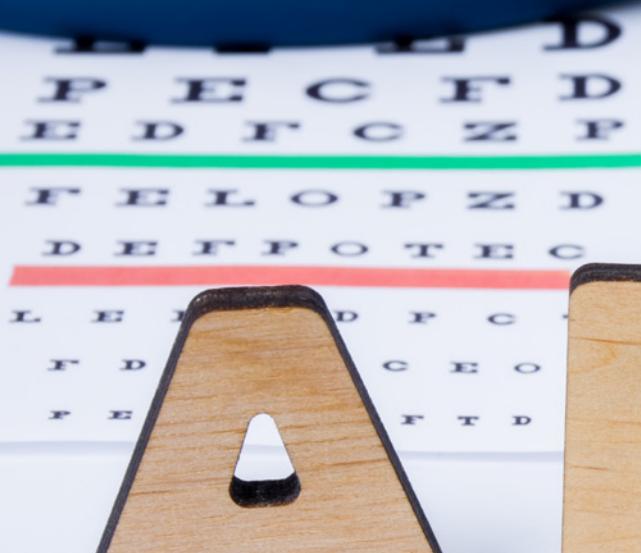
“We have been operating in the Polish market for more than 20 years and are the leading provider of ophthalmic ultrasound systems, as well as one of the top three suppliers of retinal lasers,” said Jean-Marc Gendre, CEO of Quantel Medical in a press release.

Poland is witnessing significant growth in demand for ophthalmological products as a result of a demographic change and an aging population. “Given the growth that the Polish ophthalmology market is currently experiencing, we’ve decided to set up our own subsidiary and directly address the needs of Polish ophthalmologists for diagnosis and treatment products for retinal diseases, glaucoma, AMD, cataracts and dry eye,” added Mr. Gendre. Poland currently has more than 4,500 ophthalmologists.

With a strong emphasis in research and development, the company has many first-to-market

product introductions and a comprehensive product portfolio of diagnostic ultrasound, surgical lasers and a range of disposable products for ophthalmologists. Quantel Medical Polska recently showcased Quantel Medical’s latest innovations at a national congress in June 2018. This included the LarcyDiag, a new ocular surface analyzer device for dry eye diagnosis and VITRA 1, a new generation retinal photocoagulation laser.

Products are available through direct sales operations in the U.S., France and Poland, and through 80 independent distributors in more than 110 countries. 



AMD

Spell it...

AMD

but don't...

AMD

get it.

Evidence of an Association Between Macular Degeneration and Thyroid Cancer in the Older Population

by Khor Hui Min

Age-related macular degeneration (AMD) results from gradual damage to the cells of the macula. Common in people over 60-years-old, the disease is characterized by drusen, pigmentary changes, choroidal neovascularization and geographic atrophy, and can lead to irreversible blindness.

A lot of research has been done on AMD, including its associations with other diseases. In animal models and in epidemiological research, the association of thyroid hormone levels with AMD has been studied – however, the relationship between thyroid cancer and AMD has been less clear.

To determine if thyroid cancer is a risk factor for AMD, a study was conducted in Taiwan on the association between AMD and thyroid cancer in the older population. The study included patients ≥50-years-old who were

diagnosed with thyroid cancer between 2000 and 2008. The patients were identified from the country's National Health Insurance Research Database (NHIRD), which contains the medical claims data of more than 22 million people in Taiwan, with a coverage rate of over 98 percent. The National Health Insurance Administration (NHIA) strictly monitors and checks the insurance claims for repayment to prevent healthcare fraud. Thus, the diagnosis and procedure codes in the NHIRD are reliable.

The study involved 5,253 thyroid cancer patients and 21,012 age- and gender-matched controls. Time-varying Cox proportional hazard models were used to evaluate the association between thyroid cancer and AMD. The multivariable models encompassed conventional cardiovascular risk factors, hypothyroidism, hyperthyroidism,

vitreous floaters, myopia and treatment modality of thyroid cancer. The analysis process was stratified by age, gender, and comorbidity. The comorbidities in the study were diabetes, hypertension, hyperlipidemia, coronary artery disease, high myopia, hyperthyroidism, hypothyroidism, asthma, chronic obstructive coronary disease, stroke and tobacco dependency.

The study found that thyroid cancer patients older than 50 have an increased risk of developing AMD.

The thyroid cancer cohort consisted of 24.5% men and the median age was 59.1 years (53.7–67.4 years). The AMD incidence reported was 40.7 per 10,000 persons per year. They found that the thyroid cancer cohort had a higher risk of AMD than the non-thyroid cohort, especially the male patients and patients with comorbidities.

This study on the association between AMD and thyroid cancer in the aged population was the first retrospective and largest cohort study. It found that thyroid cancer patients exhibited a 1.38-fold higher risk of AMD than control subjects.

Thyroid cancer patients aged over 65 exhibited a higher adjusted risk (1.52-fold) after stratification by age, compared with the controls across all age stratifications. This association is of concern for the elderly, thus close monitoring of vision impairment and retina conditions is necessary.

The researchers believe their findings associating thyroid cancer with AMD have several clarifications.

Firstly, thyroid cancer and AMD have some common etiologies, including hyperinsulinemia state, obesity and stimulation of thyroid growth. In fact, obesity and hyperinsulinemia state have been linked to an increased risk of thyroid

cancer. Considering that the thyroid cancer patients in the study had a higher prevalence of diabetes, hypertension, hyperlipidemia and coronary artery disease, the researchers suggested that the hyperinsulinemia state and oxidative stress cause the development of thyroid cancer as well as of RPE dysfunction and AMD. This would explain why the thyroid cancer patients examined had an increased risk of AMD.

Secondly, mitochondrial dysfunction would be another mechanism for the higher risk of AMD in thyroid cancer patients. Mitochondrial dysfunction plays a common role in metabolic diseases, cancer and degenerative disease. Tumour-specific markers of somatic mitochondrial DNA mutations have

been identified in thyroid tumours. However, more research needs to be conducted to investigate whether thyroid cancer and AMD have common pathogenic pathways involving genetic or somatic mutations. It's important to determine the extent to which these two diseases could be reversed or modulated.

According to the researchers, the study showed that thyroid cancer patients, especially males and those with comorbidities, had higher risk of AMD, suggesting that comorbidities and male sex may contribute to the development of AMD. Although a clear association between the risk of AMD and gender has not been determined, clinical attention is needed for these specific groups. ☺

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PIErates of the Posterior Segment

According to the Merriam-Webster dictionary, a pirate is “one who commits or practices piracy,” which is defined as “an act of robbery on the high seas.” We at PIE Magazine believe even more devastating visual robbery can occur in the posterior segment.

by Brooke Herron

We've all heard tales of piracy, from the likes of Disney's romantic and adventurous *Pirates of the Caribbean* movies, to the truly terrifying real stories of piracy occurring off the shores of Africa. But regardless if the tale is real or make-believe, the theme remains the same: Someone is being robbed of something.

This led us to think about eyeballs (which we do often at *PIE Magazine*) . . . and how often people are “robbed” of sight – whether due to disease, lack

of early detection or availability of treatment. Like pirates who pillage gold, there are ‘PIErates’ who plunder vision.

According to *PIE Magazine*, a PIERate is “something that robs patients of precious sight; this includes aggressive pathologies, lack of access to care and/or lack of treatment.”

So, what are these PIERates? Below, three heroic ophthalmologists from Asia-Pacific talk about which “PIErates of the Posterior Segment” they'd like to see walk the plank and be forever vanquished to Davy Jones Locker.





Diabetic Retinopathy (DR)



"In my opinion, the biggest threat for a patient's loss of sight is diabetic retinopathy." – Dr. Rajan

Prof. Dr. Mohan Rajan, Chairman and Medical Director, Head of Cataract and Retina Services, Rajan Eye Care Hospital, T. Nagar, Chennai, India.

Diabetic retinopathy (DR) is considered the most common cause of vision loss among people with diabetes and a leading cause of blindness among working-age adults. This is especially true in India, which is set to emerge as the diabetic capital of the world. According to the World Health Organization, by 2030, 79.4 million Indians will be affected by diabetes mellitus (DM) – more than any other country. This means that DM-related complications like DR will also rise: Almost two-thirds of all type 2, and nearly all type 1 diabetics are expected to develop DR.¹

DR occurs in diabetic patients with chronically high blood sugar. This results in damage to the tiny blood vessels in the retina, which may cause them to leak fluid or hemorrhage – which causes vision loss. In its most advanced stage, complications can lead to irreversible damage and vision loss. Early treatment can prevent the

pathology's progression, so awareness and accessibility to professional care is critical.

"The main reason for this alarmingly growing pathology is lack of awareness and the growing diabetes [epidemic] in the majority of population, especially the younger population," said Dr. Rajan. He believes that creating mass awareness of diabetes and its complications, as well as detecting the disease at an early stage, are essential to saving sight.

According to a 2013 study, awareness of DR in India is very poor. This Indian population-based study found that over half of the non-medical respondents were not aware of risk factors for DR. In addition, 80 percent of these respondents believe annual eye exams were essential, but only 43.5 percent had ever visited an ophthalmologist.² Low awareness coupled with issues surrounding access to care creates a volatile situation.

Hold On To Your Pearls, Industry!

PIEbeard the Pirate, the most fearsome of Southeast Asia, is roaming the high seas. In this photo series, he greets PIE Magazine supporters in Singapore and Bangkok (it's a real "Arghhh Matey!" in some cases).



"Ahoy Matey, be there treasure here at Santen?"



PIEbeard "trades" his worthless necklace for some fine pearls not pictured (in stowage already).



Dr. Rajan agrees that lack of access to care contributes to visual loss and believes the first step is to manage DR and control diabetes through patient education, appropriate medication, dieting and exercise. In the vast Indian subcontinent this can be a challenge due to a low doctor-to-patient ratio, and barriers to treatment including cost and lack of access.

"Lack of treatment definitely contributes to loss of sight," said Dr. Rajan. "Various reasons such as unavailability of tertiary eye care to patients is a major reason for the growth of the disease, and of course in a country like India, the cost of treatment plays a vital role and is difficult for the lower socio-economic group."

However, innovations in mobile imaging and technology are presenting an opportunity for more access to affordable care. "Mobile imaging technology will go a long way in detecting diabetic retinopathy at the very early stages and initiating appropriate treatment and prevent vision loss," continued Dr. Rajan.

New breakthroughs in artificial intelligence (AI) are also showing promise in diagnosis of DR. "This wonderful technology can enable us to detect and prevent future disease by taking several photographs of the retina, fundus and studying the retinal vasculature," explained Dr. Rajan.

“Mobile imaging technology will go a long way in detecting diabetic retinopathy at the very early stages and initiating appropriate treatment and prevent vision loss.”

— Dr. Mohan Rajan

His insights are echoed by a study published in June 2018. The authors' objective was to assess the role of AI-based automated software to detect DR and sight-threatening DR (STDR) by fundus photography taken using a smart-phone-based device, then validating the results against ophthalmologist's grading. In the study,

301 patients with type 2 diabetes underwent retinal photography with Remidio's "Fundus on phone" (FOP), a smartphone-based device, at a tertiary care diabetes center in India. [Editor's note: For more on Remidio's FOP, see page 26.]

In the end, retinal images of 296 patients were graded. DR was detected by the ophthalmologists in 64.5% and by the AI software in 68.6% patients, while STDR was detected in 37.8% and 49.3% patients, respectively. The AI software showed 95.8% (95% CI 92.9-98.7) sensitivity and 80.2% (95% CI 72.6-87.8) specificity for detecting any DR and 99.1% (95% CI 95.1-99.9) sensitivity and 80.4% (95% CI 73.9-85.9) specificity in detecting STDR with a kappa agreement of $k=0.78$ ($p<0.001$) and $k=0.75$ ($p<0.001$), respectively.³

These results led the authors to conclude that "automated AI analysis of FOP smartphone retinal imaging has very high sensitivity for detecting DR and STDR and thus can be an initial tool for mass retinal screening in people with diabetes."

Dr. Rajan is cautiously optimistic about AI as a diagnostic tool: "This modern software application may need corrections and up gradation to understand the disease in a better way."

To retire this PIErate, all technological advances are welcome: "My advice would be making the best treatment affordable and accessible to the patients," he concluded.



PIEbeard visits Alcon, and "borrows" some pink shades.

PIEbeard's skull cap has gone missing. X marks the spot alongside Bedok Reservoir, with a friend from ZEISS, who shortly after walked the plank.



Polypoidal Choroidal Vasculopathy (PCV)



"If left untreated, recurrent subretinal hemorrhage from PCV can eventually result in irreversible loss of vision."
— Dr. Wagle

Dr. Ajeet Madhav Wagle, Medical Director and Senior Consultant Ophthalmologist, International Eye Cataract Retina Centre, Singapore

Polypoidal choroidal vasculopathy (PCV) was first described by Yanuzzi et al. in 1990 as a distinct clinical entity characterized by persistent, recurrent serous leakage and hemorrhage in the macula.⁴ Prior to this designation, PCV was poorly understood. The pathology, which is a unique subtype of “wet” or neovascular age-related macular degeneration (nAMD), is a significant cause of vision loss in the middle-aged and elderly, impairing central vision and affecting daily activities like reading, recognizing faces and driving.

“The clinical course of PCV varies in severity depending on the extent and location of the disease, ranging from spontaneous resolution to recurrent serosanguinous retinal pigment epithelial detachments (PEDs), subretinal hemorrhage and scarring,” explained Dr. Wagle. “Typically, PCV presents with sudden onset unilateral blurred vision, central or paracentral scotoma and/or distortion of central vision.”

He added that PCV shares many risk factors with nAMD, including: age (generally occurring in individuals aged 50 to 65), genetic predisposition and a predilection for pigmented races.

And while PCV and nAMD may share risk factors, their treatment and prognosis differ considerably. “PCV needs to be differentiated from typical

nAMD using appropriate ocular imaging techniques such as indocyanine green angiography (ICGA),” said Dr. Wagle. “A strong clinical suspicion is required to diagnose PCV. In the presence of characteristic clinical features of PCV, multi-modality retinal imaging is essential to confirm the diagnosis . . . ICGA is a must.”

As a prompt and accurate diagnosis is necessary to treat PCV, lack of access to the correct imaging modalities can result in delayed treatment, and irreversible loss of vision. This is another scenario where mobile imaging devices can help save sight: “Digital imaging technologies and teleophthalmology consultations can now allow sharing of information with retina specialists and accredited digital image reading centers to help with a prompt and accurate diagnosis of the condition,” said Dr. Wagle.

“Digital imaging technologies and teleophthalmology consultations can now allow sharing of information with retina specialists and accredited digital image reading centers to help with a prompt and accurate diagnosis of the condition.”

— Dr. Ajeet Madhav Wagle

Other PCV-related PIErates include lack of access to care, high cost of treatment and poor patient compliance – all of which can result in a less than favorable visual outcome.

“Fortunately, the management options for PCV have rapidly expanded over the last decade. Symptomatic patients with PCV are managed effectively with anti-vascular endothelial growth factor (anti-VEGF) injection therapy, PDT and/ or thermal laser photocoagulation. These modalities are used either alone or in combination to treat the disease,” said Dr. Wagle.

[Editor’s Note: See page 44 for results from year two of the PLANET study, which evaluated the safety and efficacy of intravitreal afibercept (IVT-AFL) monotherapy compared with IVT-AFL plus active PDT in patients with PCV.]





Recurring Pathology, Late Detection



"It's tough to treat recurring PCV – very difficult in some cases – and it's quite common," said Dr. Ruamviboonksuk.

Dr. Paisan Ruamviboonksuk,
President of the Royal College
of Ophthalmologists of Thailand
(2013-2016) and Assistant
Director of the Centre of Medical
Excellence (Rajavithi Hospital),
Thailand

Dr. Ruamviboonksuk attributes PCV's affinity for recurrence to being a PIERate: "Some cases of PCV are like pirates to me – sometimes treatment doesn't work well, and vision keeps dropping. Or we have cases that respond very well to treatment in the first couple of years, but then it recurs. We still don't know the reasons why some cases have recurred after years of inactivity."

A study published in the *Japanese Journal of Ophthalmology* evaluated the recurrence of polypoidal lesions after photodynamic therapy (PDT) for polypoidal choroidal vasculopathy (PCV). The authors found that "recurrence of PCV occurs in about 40% of eyes treated for PCV even after a long period of inactivity, so careful follow-up is needed."⁵

Another study followed 47 eyes of 47 patients with PCV for two years

after their first PDT treatment. At the final visit, while visual acuity (VA) was preserved or improved in 79% of the eyes, recurrence of lesions was noted in 64%. The authors concluded that "patients with PCV need to be followed for long periods of time after PDT because of the high incidence of polypoidal lesion recurrence."⁶

"This is why PCV is like a PIERate to me . . . we still don't know why it recurs," said Dr. Ruamviboonksuk.

In addition to the pathology's recurrence, Dr. Ruamviboonksuk also emphasizes the need for early detection to preserve VA. "If it's a small lesion, and the patient comes to you early, that's okay. We can treat them with PDT, combined PDT and anti-VEGF, or anti-VEGF alone. But if the patient comes to you a little bit late, you can have trouble."



After a long sail to Bangkok, a meeting at the 1st DMS ASEAN Medical Conference with Dr. Paisan Ruamviboonksuk, also the APAO 2019 Congress President.

Sight Savers: The Anti-PIERates

Although there are many sight-stealing PIERates, there are also "sight-savers," those whose work preserves vision through medical or surgical care, research or technological innovation.

For example, Prof. Dr. Rajan notes that Rajan Eye Care Hospital has multiple projects working to eradicate blindness: "The most important is 'The Blind Free India Project,' which takes care of avoidable and preventable blindness."

They also have a teleophthalmology mobile van called "Nethra Vahana" that caters to the population within 150-kilometers of Chennai. The van is equipped with state-of-the-art diagnostic equipment, imaging technology and laser therapy for diabetic retinopathy (DR). In addition, there is also the "Slum Vision Project," where they go to the slums and test for diabetes and DR.

Dr. Wagle also routinely volunteers his services, performing free cataract surgeries for deserving patients in rural parts of India every year. He also works to raise awareness of age-related macular degeneration (AMD) in Singapore: "I've led many annual nationwide AMD Awareness Week campaigns in Singapore over the past decade." Dr. Wagle was awarded several public health education grants to fund these awareness campaigns.

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From Singapore... to around Asia-Pacific...and the world



Stay tuned, **pie** magazine is coming to an ophthalmic event near you!



INDUSTRY UPDATE

Hoya's Vivinex™ multiSert™ Receives European CE Mark

Hoya Surgical Optics will reveal its newest device to receive the European CE Mark – a 4-in-1 multiSert™ preloaded delivery system with the Vivinex™ intraocular lens (IOL) – at the 36th Congress of the European Society of Cataract and Refractive Surgeons (ESCRS) in Vienna, Austria, from September 22 to 26.

This new multiSert delivery system promises more flexibility and control for cataract surgeons by providing two options for IOL implantation – either a two-handed screw or a one-handed push of the IOL. In addition, when the multiSert's uniquely designed insert shield is advanced, the surgeon can implant the IOL either directly in the capsular bag or through the incision tunnel – allowing for even more

accommodation.

With nearly one million Vivinex IOLs implanted, it provides an ideal platform to introduce multiSert. Offering unprecedented clarity of vision, the IOL is made with a glistening-free hydrophobic acrylic material with a proprietary active oxygen processing treatment to significantly reduce posterior capsule opacification (PCO).

According to a press release from Hoya – the world's fastest growing IOL company and leader in preloaded delivery systems – the combination of Vivinex with multiSert will be a game changer in the preloaded IOL delivery system space. The company also says that usability assessments by cataract surgeons confirm that multiSert offers outstanding performance in controlled

delivery and release amongst other similar products in the market.

"The perfect combination of our new multiSert preloaded delivery system and our premier flagship Vivinex IOL brings together the best of both worlds to surgeons and patients alike – offering unprecedented clarity of vision complemented by unrivalled control in the palm of the surgeon's hands," said John Goltermann Lassen, Chief Executive Officer of HOYA Surgical Optics in a press release.

The Vivinex™ multiSert™ is expected to be commercially available to cataract surgeons in selected countries in September 2018. To learn more, visit the HOYA Surgical Optics booth (#B209) at ESCRs. ☺



Exciting New Developments in Ophthalmic Imaging Benefit Patient Outcomes



Images have come a long way from...drawings.

by Khor Hui Min

Research in OCT transitioned in the early 2000s from time domain optical coherence tomography (TD-OCT) to spectral domain OCT (SD-OCT). Now, it is again at a transition point from SD-OCT to swept-source OCT (SS-OCT). Certainly the latest developments in SS-OCT are appreciated. Optical coherence tomography angiography (OCTA) - a very new and exciting development in acquiring ophthalmic images from patients, also adds to the visualization landscape.

"When time domain OCT came out, I was fascinated by the images produced, but when spectral domain OCT started churning out beautiful images, I found it very impressive. Certainly, it helped a lot in our technical diagnosis and decision-making, to make better choices for our patients," said Dr. Augustinus Laude, adjunct

“When time domain OCT came out, I was fascinated by the images produced, but when spectral domain OCT started churning out beautiful images, I found it very impressive. Certainly, it helped a lot in our technical diagnosis and decision-making, to make better choices for our patients.”

– **Dr. Augustinus Laude,
Senior Consultant, National
Healthcare Group Eye
Institute, Tan Tock Seng
Hospital Singapore**

associate professor and senior consultant in the National Healthcare Group Eye Institute (NHGEI) at Tan Tock Seng Hospital Singapore (TTHS).

"The transition from the time domain to the spectral domain OCT was very natural, because the change is very obvious. You can get better quality images. You can see much better resolution and that gives us more information about the patient," explained Dr. Laude.

However, the main issue is that there are still many uncertainties among today's OCT options. Part of the reason is because of the variability in the type of images acquired. There are also uncertainties about what is actually being seen, because in OCTA, images are acquired by the movements of the red blood cells in the blood vessels.

"We are aware if the blood vessels travel too fast or too slow, the

images may not be acquired. So, if we see an image that is generated then disappears, it may be difficult to interpret whether it is due to lack of flow, or difficulty in image acquisition. So, this will lead to uncertainty about what it is we are seeing. We as humans will try to figure out what happened, and it may not be the accurate answer," added Dr. Laude.

OCTA brings a host of advantages over traditional angiography. Firstly, the time taken for OCTA image acquisition can be completed in a much shorter time. Secondly, it is a much safer and non-invasive procedure that does not involve injecting any medications into the patient. To be able to acquire the images in the shortest time and in the safest way possible is a very good advantage. On the other hand, doctors have to interpret what is shown in the images and decide whether or not it is the pathology that they think they are seeing. Traditional invasive OCTs are still needed in certain circumstances, but doctors are doing less and less of them.

"In the vast majority of cases, such as in patients with macular degeneration, if there are signs of macular degeneration in the OCT, I can get an OCTA of the blood vessels, and that is enough for me to be comfortable making a diagnosis," said Dr. Nadia Waheed, retinal specialist at the New England Eye Center and director of the Boston Image Reading Center. "Similarly, I use it to visualize the vascular changes that happen in diabetics. If I have a proliferative diabetic retinopathy patient, I'll often use the OCTA over the area of the abnormal vascular degeneration to make sure that it is truly proliferative and not just due to vascular abnormalities. Normally, I will get my answer through an OCTA. If I don't, I will go to the next step, which is to do fluorescence or an ICG."

Now, instead of just looking at the surface, we can look into the retina

and into the underlying tissues. That is the excitement with new technologies such as the Triton swept source OCT (Topcon, Tokyo, Japan).

"It is one of the first instruments that besides having the ability to take fundus photographs, auto-fluorescence and standard fluorescent angiograms, it also comes with swept source OCT, and it will eventually have the ability to perform angio-OCTs as well," said Dr. Victor Gonzales, retinal specialist and medical director of the Valley Retina Institute, as well as head of Retinal Research Center, Valley Retina Research (Texas, USA). "It's an all-inclusive machine that saves space. You don't need multiple machines to do different things."

Artificial intelligence (AI) seems to be the buzzword today, and there are many applications that are being explored. It is a very powerful tool, and it is possible to find applications for it within the field of OCTA as well.

"One of the potential applications of AI would be to train an algorithm to be able to rapidly classify the acquired images into either disease or non-disease state, and further into more categories as required," said Dr. Laude.

It is advantageous to use deep learning particularly to process vast amounts of information which is very time consuming and requires substantial manpower to look through and process manually. AI can be used

to help predict who is going to have a disease as well.

"AI makes it possible to have a very precise characterization of the retina by analyzing OCT scans. It is accurate in identifying lesions – it not only makes it possible to identify lesions, but to quantify it in a precise manner," said Dr. Hrvoje Bogunovic, Department of Ophthalmology, Medical University of Vienna (Vienna, Austria).

"Before the advent of AI, this was not possible because clinicians did not have time to view every single slide of the OCT to make annotations. At this moment, this type of measurement simply does not exist. So, this will bring the whole practice to a new level, and the best part is we already have the technology ready to be used," added Dr. Bogunovic.

Undoubtedly, many new discoveries and developments in research and development are underway with regard to OCT, OCTA, SS-OCTA and AI. We look forward to more exciting developments and advances in treatments to help patients improve their vision and quality of life in the future. ☺

Editor's Note: This article is an excerpt from PIE Talks 2: Interviews at ARVO 2018 Honolulu. Search YouTube for "PIE Talks Episode 02" for the complete videos of the individual interviews.

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– Dr. Hrvoje Bogunovic, Department of Ophthalmology, Medical University of Vienna (Vienna, Austria)



Imaging Goes Mobile

by Hazlin Hassan

Digital retinal imaging uses high-resolution imaging systems to take pictures of the inside of the eye, helping doctors to detect and manage diseases like glaucoma, diabetes, macular degeneration, cancer, diabetic retinopathy and retinal detachment. Finding such disorders as early as possible is critical to prevent serious disease progression and vision loss.

However, one of the problems ophthalmologists sometimes face in retinal screening is the high cost of imaging equipment. This can make diagnosing and treating conditions difficult, which may ultimately result in total and irreversible vision loss.

Due to lack of affordable and accessible imaging services, babies and people with diabetes in India, in particular, are at risk. Without early detection or annual screenings, patients with retinopathy of prematurity (ROP) or diabetic retinopathy (DR) can lose their eyesight. Unfortunately, not many hospitals – especially those in rural areas in developing countries like India can afford conventional eye screening

equipment. Not only are these imaging systems expensive, they are usually bulky and require specialists to operate them, making them impractical in rural areas lacking in access, not to mention resources.

Thankfully, two companies are creating smart-phone or hand-held-based hardware and applications to provide imaging services to these underserved areas.

Anand Sivaraman, co-founder and CEO of Remidio Innovative Solutions (Bangalore, India) has come up with a low-cost imaging device, the “Fundus on Phone” (FOP), which can be hooked onto a mobile phone camera to take images of the retina.

And Carl ZEISS Meditec (Jena, Germany) is offering a hand-held device called the VISUSCOUT 100 to make screening more accessible.

“More than 90% of preventable vision loss is due to diabetic retinopathy, glaucoma, cataract and refractive error,” explained Dr. Sivaraman. “Many of these cases are present in rural areas in the developing world. A low specialist-to-patient ratio of 1:1000, together with the high cost of existing high-quality desktop imaging devices, results in poor access to quality healthcare in the screening, diagnosis and management of eye diseases in the remote areas.”

Devices like the FOP, that provide high-quality non-mydriatic (no pupillary dilation required) images at the quarter of the cost of existing high-quality desktop systems, play a very important role in remote areas. “It is the only smartphone-based retinal imaging device that uses infrared live view to ensure that pupils as small as 3 mm can be imaged,” said Dr. Sivaraman. A 45-degree field-of-view in a 3 mm pupil



can be observed on the smartphone, in an extremely compact, portable format.

This technology used in Remidio's FOP has also been demonstrated to produce high-quality images, with a clinical sensitivity of 93% and specificity of 98%. The device is simple to use with its smartphone touch display interface and it can be used either on a slit lamp or in a handheld mode or with a unique accessory for patient stabilization called the portable chinrest. Remidio's FOP has so far impacted more than 5 million people globally in over 12 countries, according to Dr. Sivaraman.



Angelo Rago of Zeiss testing the VISUSCOUT 100 on Hannah Nguyen of Media MICE while at the ASCRS 2018 congress in Washington D.C., USA.



The VISUSCOUT 100 from ZEISS is a mobile fundus camera with non-mydriatic operation and a precise autofocus function – which means that, like the FOP, pupil dilation is not required. In addition, the optional WiFi functionality enables instant transfer of images to the VISUHEALTH online platform where images are saved together with patient's data and shared with a remote ophthalmologist for diagnosis. The VISUSCOUT 100 uses the VISUHEALTH platform (also from ZEISS) to connect more than 40 remote clinics to three ophthalmic clinics in Theni, Bangalore and Hyderabad.

“In a recent meeting with India’s Health Minister, Health Secretary and various bureaucrats in Nirman Bhavan, New Delhi, I have proposed nationwide screening of diabetic retinopathy, a program to prevent blindness: STOP (Screening Tele Ophthalmology Prevent) Blindness. The screening will be conducted using Remidio’s “Fundus on Phone” (FOP) imaging device. Non-skilled personnel will be trained to take retina photos and send them to the reading center at Aditya Jyot Eye Hospital through a cloud-based app. We have requested the support of Tata Trust, the Indian Government and even Google to support this preventive initiative which will benefit the whole nation.”

— Prof. Dr. S. Natarajan, President Elect, All India Ophthalmological Society and Director, Aditya Jyot Eye Hospital

The VISUSCOUT 100 takes color and red-free images instantly with a 40-degree field-of-view, while nine internal fixation LEDs help align the patient correctly and facilitate the capture of peripheral images. This technology gives people in remote villages an access to early detection for diseases like DR, without having to visit an ophthalmologist in a larger city. In addition, the VISUSCOUT 100 can be operated by a family doctor, technician

or nurse, and then the images can be sent to an ophthalmologist through VISUHEALTH. (The VISUSCOUT 100 and VISUHEALTH online platform are not available in all markets.)

“ZEISS Medical Technology uses the VISUHEALTH platform in providing eye care to remote regions of the world, giving patients access to state-of-the-art eye exams,” shared Dr. Ludwin Monz, President, and CEO of Carl ZEISS Meditec. 

About the Contributors



Anand Sivaraman, PhD, is the co-founder and CEO of Remidio Innovative Solutions (Bangalore, India), building innovative, smartphone-based imaging technology solutions for screening, diagnosis and management of eye diseases. Founded in 2009 by Anand Sivaraman and Pramod Kummaya, Remidio is an ophthalmic products company that aims to offer items at affordable prices. Remidio seeks to create healthcare access by combining simplicity of product design with cutting-edge technology and sustainable business model innovations. The company creates locally relevant product solutions that are simple to use, reliable and scalable, while meeting global regulatory standards. Prior to

his entrepreneurial pursuit, Anand Sivaraman worked extensively in the areas of product and business development in the in vitro diagnostics industry in India, in the field of HIV/ AIDS, and infection management. He completed his Masters, Doctoral and Postdoctoral degrees in Chemical Engineering and Bioengineering from Massachusetts Institute of Technology (MIT) in Boston (Mass., USA) after gaining his undergraduate degree in Chemical Engineering from the Indian Institute of Technology, Kharagpur. He returned to India in 2005, after his postdoctoral stint. His research interests lie at the intersection of technology and public health. [Email: anand@remidio.com]



Dr. Ludwin Monz has a degree in physics from the University of Mainz (Germany) and has obtained his doctorate (Dr. rer. nat.) from the Faculty of Physics at the University of Mainz. He also graduated with an MBA from Henley Management College in England. Currently, Dr. Monz is a member of the Executive Board of the ZEISS Group and heads the Medical Technology segment. In addition, he is the member of the Executive Board of the ZEISS Group responsible for Corporate Quality Management and Research & Technology, and oversees the Japan, Spain, France and Turkey sales regions. Dr. Monz became a member of the Executive Board of the ZEISS Group in 2014. He is also President and CEO of Carl ZEISS Meditec AG. [Email: ludwin.monz@zeiss.com]



ZEISS Innovation Work Smarter, Not Harder, With Multi-Modal Imaging

Worldwide, the disease burden is increasing, and more patients need eye care than ever before. Compound this need with busy clinic schedules and it creates added pressure for ophthalmologists to quickly assess and treat their patients. And while doctors have a variety of imaging systems to aid in diagnosis, they often provide a mountain of data that can be time-consuming to sift through.

So, how can ophthalmologists get the most out of their tools to provide optimum patient care? According to Dr. Peter A. Karth, M.D., a retina and vitreous physician & surgeon, board-certified ophthalmologist and fellowship trained retina specialist, the answer is simple – with improved data integration, visualization and analysis.

Enter the Integrated Diagnostic Imaging (IDI) platform from ZEISS. This system not only saves precious time, but it also allows technologies to work better together by integrating and registering data from multi-modality devices to provide greater insight in making informed treatment decisions.

For Dr. Karth, this integration has been a game-changer.

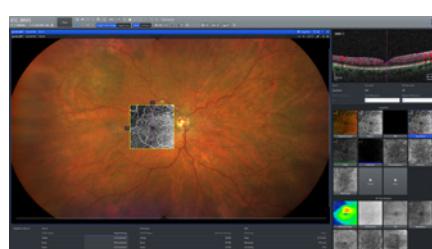
"In today's environment, I can no longer afford the time to log onto multiple platforms to review different images, and I refuse to skimp on critical aspects of care, settling only to view single snapshots of data-rich modalities," he said. "I need to be able to use this mountain of diagnostic data to support complex and often expensive treatment decisions."

This latest innovation from Zeiss is the first software-driven platform that easily and seamlessly integrates multi-modal imaging with the click of a button, between modalities, over all time periods, with treatment data.

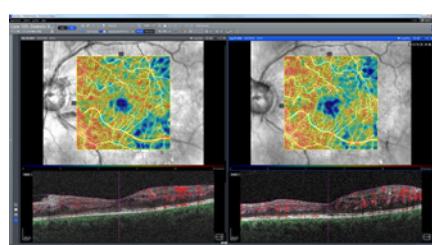
"For some time, it has been clear to me that it is no longer enough to casually view a single snapshot of just 'this time and last time,'" he said. "This leap forward brings the best in modern



IDI Glauoma case



IDI BRVO case



IDI 2Up screens

diagnostic data integration to my clinic and allows me to efficiently receive, integrate, analyze and interpret multi-modal data in a single view."

This integration is crucial for ophthalmologists detecting, diagnosing, correlating findings and treating retinal disease. The platform's Retina Workplace has key features that allow greater efficiency.

It can provide an overlay of OCT/OCTA, ultra-widefield, fluorescein angiography (FA), indocyanine green angiography (ICG) and other color photos, while its smooth transparency feature syncs to view these different modalities simultaneously. The images are linked to treatment via annotation which makes it easy to visualize the treatment response over time. Its data display can graph multiple parameters (e.g. OCT macular thickness) and the data synchronization makes it easy for an ophthalmologist to compare and

correlate data from multiple visits in a single screen. "Integrating a wide range of multi-modal data, both in the periphery and macula is simple with Retina Workplace, and the ability to do this quickly has altered my practice and supports me to give better patient care," said Dr. Karth.

The Integrated Diagnostic Imaging platform also provides added value for treating glaucoma patients with its Glaucoma Workplace, which shows structure and function data over time. Dr. Karth says he gains tremendous value by integrating this data to the system's multiple metric graphs (like the ability to easily view RNFL and GCL thickness plots, with mean deviation and cup to disc ratio on one screen) and comparing long time periods (up to 15 data points for each patient for each metric can be viewed and analyzed on one screen). Other key features like baseline adjustments, serial thumbnails and statistical analysis also add to the user's enhanced experience.

"Visual fields give me functional data and SD-OCT (with SLO) gives me structural data, but the key for me has been the data integration that is now at my fingertips with Glaucoma Workplace," explained Dr. Karth. "I have found tremendous insights with the integration of all the data, on one screen, over as many as 15-time points."

This synergy ultimately benefits the patient by allowing ophthalmologists to make the best treatment decision, efficiently and quickly. "The Zeiss Integrated Diagnostic Imaging platform is not a viewing station or PACS system. . . it is a truly different and amazingly advanced data integration solution like we have never seen before," said Dr. Karth. ☀

This content was supported by an educational grant from Carl Zeiss Meditec. The products mentioned in this article may not be available in all regions for all indications.



Diabetic Retinopathy Screening on Cloud-Based AI Platform, and Enhancing Practice Efficiency

Based on presentation by Dr. Ganesh Babu at the 3rd Asia Pacific Tele-Ophthalmology Society (APTOPS) Symposium on July 7-8, 2018 in Singapore

Preserving vision and preventing blindness remains a global challenge. Currently, there are 39 million blind people in the world. Sadly, 80% of blindness worldwide could be prevented with simple tools.

Retinal disorders such as diabetic retinopathy affect perceived vision only when they reach an advanced stage, at which treatment in most cases is limited to the prevention of further progress. Therefore, regular screening avoids unnecessary loss of vision by early detection and treatment.

India remains a key country when it comes to addressing the global burden. With more than 70 million diabetics, India is emerging as the diabetes capital of the world, with an estimated prevalence of DR in diabetic population of 20-30%. Vision problems and blindness caused by diabetic retinopathy may be prevented by good control of blood sugar, blood pressure levels and early detection.

The VISUSCOUT 100 (Carl Zeiss Meditec, Jena, Germany) is a handheld, non-mydriatic and portable device, with a connectivity-enabled fundus camera that's easy to handle in acquiring fundus images with minimal discomfort.

The VISUHEALTH online platform (Carl Zeiss Meditec, Jena, Germany) integrates a cloud based digital collaboration platform that includes a portal to de-identify patient data and securely transmit data to examiners for reporting; ensuring patient data security. The VISUHEALTH application incorporates an intuitive way to identify clinical findings, and an integrated clinical logic-based assistance that allows retina department trained non-specialists to read the images, grade them and generate reports.

Furthermore, increasing patient numbers requires task shifting to ensure that the retina specialist's expertise is focused on tertiary care, unburdening them of examining fundus images.

A recent study compared diabetic retinopathy screening by remote manual image grading ($n=238$) and automated image grading ($n=5000$) with reference standards. The study found that the sensitivity of remote grading of digital photographs by trained non-specialist readers compared with full examination by retina specialist was 96.1% (95% CI 91.25 – 98.74) and specificity was 82.09% (95% CI 70.80-90.39). In addition, the sensitivity of automatic DR screening solution compared with reference standard grading from retina specialists was 90.1% (95% CI 86.22 – 93.51) and specificity was 78.8% (95% CI 77.58-80.01).

ZEISS introduced the VISUHEALTH DR screening solution in India in 2016. So far ZEISS has screened more than 80,000 people in India, and 16% of the overall screened population had significant clinical findings requiring referral to an ophthalmologist.

In conclusion, the use of the VISUHEALTH cloud-based collaboration platform, in conjunction with VISUSCOUT 100, is rapidly enhancing the prevention of blindness due to diabetic retinopathy while also freeing resources for other areas in healthcare.

Based on presentation by Dr. Harvey Uy at the 3rd Asia Pacific Tele-Ophthalmology Society (APTOPS) Symposium on July 7-8, 2018 in Singapore

The optimization of practice efficiency is increasingly recognized as an important factor in time and cost savings as well as preventing burnout of eye physicians.

Dr. Harvey Uy, Medical Director of Peregrine Eye and Laser Institute, Philippines, shared insights into how the adoption of new innovations could help enhance overall practice efficiency.

He discussed several important ways to enhance efficiency. These include the adoption of digital medical data management systems, adequate staffing, less regulatory and

documentation burden and facilitating care coordination.

Importantly, Dr. Uy highlighted how the use of digital data systems results in remarkable time savings. This is because waiting time can be cut short across the whole cascade, from the time patients enter the clinic, through the ordering of test results, to reviews, clinical imaging and prescriptions. All of this can be performed over an integrated platform. In addition, patient data can be accessed in several clinics, interconnected over a secure network, using a single patient ID.

Furthermore, digitalization reduces errors and provides access to analytical data needed for key decision making. Surgical operative efficiency is also enhanced, as Dr. Uy emphasized. For example, the ZEISS cataract workspace is a component of ZEISS FORUM (a scalable ophthalmology software), through which automated reference and axis marking can result in hours of time savings on a busy clinic day.

From his clinical practice, Dr. Uy shared real life experience of digitalization using the ZEISS cataract workspace. He showed that with similar patient loads, the adoption of this platform resulted in a significant reduction in patient waiting time from 2-3 hours to <1 hour, with over 70% reduction in number of clinic staff needed, and a 20-fold increase in shareholder dividends (from 1% to 20%). Indeed, the ZEISS FORUM cataract workspace is a notable example of such digital platforms that would enhance practice efficiency.

"Practice efficiency as made possible using the features of ZEISS FORUM can reduce patient waiting time, decrease chance for errors, facilitate data analysis and improve patient experience. In turn, this leads to improved practice financial results and an overall improvement of staff and physician well-being," concluded Dr. Uy.

This content was supported by an educational grant from Carl Zeiss Meditec.



End-to-End Cataract Surgery with Innovative New Technologies

Based on video presentations by Dr. Thanapong Somkijrungroj, Dr. Fam Han Bor, Dr. Mohamad Rosman and Dr. S P S Grewal at the Asia-Pacific Association of Cataract and Refractive Surgeons (APACRS) annual meeting on July 19 to 21, 2018 in Chiang Mai, Thailand.

The ZEISS RESCAN 700 (Carl Zeiss Meditec, Jena, Germany) intraoperative optical coherence tomography (iOCT) is a system fully integrated with the OPMI LUMERA 700 (Carl Zeiss Meditec, Jena, Germany) surgical microscope, which can be used for both anterior segment and vitreo-retinal surgical procedures, said Dr. Thanapong Somkijrungroj. One of the key features of the system is that it is fully surgeon controlled with real-time tracking, providing real-time, high definition (HD) integrated OCT images.

In a case of pre-existing posterior capsular tear in a young male patient, with a history of traumatic retinal detachment repair and numerous deposits in the posterior lens surface, Dr. Somkijrungroj emphasized that: "RESCAN 700 intraoperative OCT enhanced the detection of defects on the posterior lens surface, allowing quick decision making on best surgical approach to prevent further complications."

More cases were presented by Dr. Somkijrungroj demonstrating the vital importance of intraoperative OCT in real time visualization of the posterior polar cataract patients with a variety of complications such as previous retinal detachment requiring capsulorhexis and membranorhexis.

"I think it is really good to have the picture when you need it. The iOCT is a modern and advanced technology that is beneficial in both anterior and posterior lens surgery, and is very useful for surgical planning and decision making when patient is undergoing surgery for complicated cataract," said Dr. Somkijrungroj.

Advances in cataract surgery have reached a stage when patients expect 20/20 vision, as well as good near and intermediate vision. However, according to Dr. S P S Grewal, there

has been increased recent interest in intermediate vision and the role of extended depth of focus (EDoF) intraocular lenses (IOLs). These lenses have elongated focal points which enhance range of vision. In addition, these lenses are associated with lesser visual phenomenon like glare and halos when compared to conventional multifocal lenses. With increasing computer use, there is a growing need to address intermediate vision.

The AT LARA (Carl Zeiss Meditec, Jena, Germany) is a 4-point haptic, hydrophilic lens with hydrophobic surface properties. It offers an extensive visual range of more than 2 diopters, and an impressively smooth edge achieved by a smooth micro phase technology. The smooth edge provides a significant reduction in halos, compared to other multifocal lenses. The AT LARA is a pre-loaded lens, packaged in a single use, disposable injector.

Dr. S P S Grewal shared data from 26 eyes of 20 patients with 1-month follow-up.

"Postoperative, all patients had good distance and intermediate VA, and in addition a good range of near vision and good lens stability," he shared. Furthermore, Dr. Grewal advised that a 6 mm capsulotomy is most ideal for the LARA IOL and stressed the importance of lens orientation during insertion.

"I found a good experience with the AT LARA. It gives you a good intermediate-distant vision," added Dr. Grewal.

In IOL implantation surgery, especially in correction of astigmatism with toric lenses, alignment plays a crucial part, emphasized Dr. Fam Han Bor, as he introduced ZEISS CALLISTO 3.6 system (Carl Zeiss Meditec, Jena, Germany) and its role in this procedure.

"I always use the ZEISS CALLISTO 3.6 system to guide me where I should make the incisions (i.e. main port, side port) depending on which side of the eye," explained Dr. Fam.

"The system provides an indication of how big a CCC [continuous curvilinear capsulorhexis] is," he added.

He further presented and discussed several interesting cases to demonstrate how the ZEISS CALLISTO 3.6 system provides a computer-assisted, real-time alignment and how it compensates for any translational error.

Furthermore, Dr. Fam explained that in cases of complex cataracts, the AK marker of the ZEISS CALLISTO 3.6 system allows for easy centration of the IOL during fixation. And because the ZEISS CALLISTO 3.6 system bisects the cornea through the center, it allows for easy fixation of the haptics, with less risk of postoperative decentration.

"In cases of subluxation, the AK marker is useful in determining the correct location of the Hoffman pocket," he said.

"The ZEISS CALLISTO 3.6 system enables consistent wound alignment. Therefore, the wound induced astigmatism would be consistent with the toric IOL alignment, IOL centration, CCC, and the AK marker incision," he concluded.

Dr. Mohammed Rosman shared his experience in using the ZEISS trifocal IOL AT LISA 839, which has been available since 2012. It also is a 4-point haptic, hydrophilic, aspherical lens with hydrophobic surface properties. It provides good near, intermediate and far vision.

"Why do I use trifocal IOLs? They provide excellent, first-day patient results. In terms of surgery, these are also very easy to use because of the pre-loaded aspect and possible implantation through very small incisions of 1.8 mm. It has good centration and excellent rotational stability," shared Dr. Rosman.

Furthermore, Dr. Rosman presented several more cases in which he has used the AT LISA toric 939. "The AT LISA IOL results in good visual outcomes for near, far and intermediate vision, excellent patient satisfaction and I think it is an extremely easy to use lens during surgery," he concluded.

This content was supported by an educational grant from Carl Zeiss Meditec.



Full Spectrum of Laser Vision Correction Using Innovative New Technologies

Based on presentations by Dr. Johan A. Hatauruk, Dr. Ekket Chansue, Dr. Mahipal Sachdev and Dr. Sri Ganesh at the Asia-Pacific Association of Cataract and Refractive Surgeons (APACRS) annual meeting on July 19 to 21, 2018 in Chiang Mai, Thailand.

Dr. Johan A. Hatauruk shared his practical experience on the adoption of small incision lenticule extraction (SMILE) in over a 5-year period. "In our experience, introducing SMILE resulted in an increase in the number of laser vision correction procedures in our practice," said Dr. Hatauruk.

On the other hand, Dr. Ekket Chansue talked about optimizing SMILE results in his practice and how to help patients towards faster recovery. "Using the SMILE procedure, our goal was to provide 99% of patients with 20/20 vision within the first day after surgery,"

he said. Also, Dr. Chansue highlighted the importance of having a good understanding of the instrument being used.

Furthermore, there are management strategies necessary to optimize patient outcomes, noted Dr. Mahipal Sachdev during his presentation. He also emphasized the value of surgeons having the appropriate knowledge not just about the instrument, but also the procedure itself. "SMILE is a safe, effective and consistent procedure that you should have in your armamentarium," he said.

Dr. Sri Ganesh noted in his presentation that presbyopia is a universal phenomenon effecting majority of people above the age of 45 years and amenable to treatment by multiple procedures. However, all these treatment options are associated with

risks of varying levels. As discussed by Dr. Sri Ganesh, the PRESBYOND Laser Blended Vision (Carl Zeiss Meditec, Jena, Germany) provides a way of treating presbyopic patients which aims to achieve clear sight at all distances: near, intermediate and far – with virtually no compromises.

"In our practice, over 92% of patients had 20/20 or better vision for distance following treatment," shared Dr. Sri Ganesh.

"The PRESBYOND Laser Blended Vision gives the highest patient satisfaction, has good contrast sensitivity that is easily adjustable, with no permanent visual side effects like glare and halos," he added.

This content was supported by an educational grant from Carl Zeiss Meditec.



INDUSTRY UPDATE

Bayer Receives First Approval for Eylea® in China

Good news for diabetic macular edema (DME) patients in China: Bayer recently received approval from the Chinese State Food and Drug Administration (CFDA) for Eylea® (aflibercept solution for injection into the eye) for the treatment of visual impairment from DME.

While DME is the first indication for Eylea approved by the CFDA, outside of China, it has been approved in most countries to treat patients with visual impairment for five indications. This includes DME, neovascular age-related macular degeneration (wet AMD) due to retinal vein occlusion (RVO; branch RVO or central RVO) and the treatment of myopic choroidal neovascularization. Since its launch, more than 16 million doses of Eylea have been administered worldwide.

According to a press release from Bayer, approximately one in three

adults with diabetes worldwide are affected by diabetic retinopathy (DR), a complication of diabetes which can lead to DME and blindness. Untreated, about half of patients with DME will lose more than two lines of vision within two years of diagnosis. This can result in a loss of independence as their ability to perform important daily activities such as working and driving deteriorates. Clearly, access to treatment is critical to these patients.

"With more than 110 million people in China suffering from diabetes, diabetic retinopathy coupled with DME is a serious complication that can threaten the vision of many working age adults," said Dr. Joerg Moeller, Member of the Executive Committee of Bayer AG's Pharmaceutical Division and Head of Research and Development in a press release. "The approval of Eylea in China in this important indication is

great news for the increasing number of patients."

Bayer reports that the results of phase 3 studies were very encouraging. Of the more than 1,200 patients with DME studied, most experienced a significant, greater than two-line, improvement in visual acuity with aflibercept solution for injection (also approved under the brand name Eylea).

Eylea's global development is a result of a collaboration between Bayer and Regeneron Pharmaceuticals, Inc. While Regeneron maintains exclusive rights to Eylea in the United States, Bayer has licensed the exclusive marketing rights outside the U.S. The companies share equally the profits from Eylea's sales, except for Japan where Regeneron receives a percentage of net sales. For more information, go to www.bayer.com.



Advanced Imaging as an Early Biomarker in Diagnosing Usher Syndrome Type 1

by Helin Räägel and Gloria D. Gamat

For many parents, learning that their child has a genetic disorder that causes progressive loss in one or more of the five senses would be their worst nightmare. Usher syndrome is one such nightmare – a rare and inherited genetic recessive condition that leads to both progressive vision and hearing loss.

Usher syndrome is the most common genetic disorder that affects both hearing and vision – in developed countries, it occurs in about four in every 100,000 births. Approximately three to six percent of children who are deaf and three to six percent who are hard-of-hearing have Usher syndrome.

Vision loss has been tied to retinitis pigmentosa (RP), which manifests through the breakdown and loss of light-sensitive retinal cells called photoreceptors that convert light into electrical signals that are then processed into the images we see. The loss of photoreceptors initially leads to poor night vision and loss of peripheral vision, but ultimately will result in total loss of vision.

The condition is classified into three types (1, 2 and 3) based on the hearing and vestibular symptoms observed in patients and onset of symptoms. Sixteen loci have been reported to be involved in Usher syndrome.

Usher syndrome type 1 accounts for about 30 to 40 percent of total Usher syndrome cases. It's characterized by profound congenital deafness and vestibular dysfunction with visual impairment manifesting before the child reaches 10-years-old. From birth, many children with syndrome display severe hearing loss and experience balance problems as a consequence.



The first signs of RP – night blindness and loss of peripheral vision – usually appear early in life, at or before early adolescence. For instance, in a case study¹ led by Dr. Radka Kremlíková Pourová, a 4-year-old Czech girl diagnosed with hearing loss during newborn screening underwent broad genetic screening and a comprehensive ophthalmic examination to identify the underlying genetic disorder causing her symptoms.

The team of scientists and medical doctors used spectral-domain optical coherence tomography (SD-OCT), utilizing the *in vivo* high-resolution imaging to assess the ocular health of the young patient's eyes. The ocular findings pointed to a loss of photoreceptors and slight reduction in total retinal thickness that correlated with the loss of visual acuity and emergence of RP. Genetic profiling also revealed pathogenic sequence

mutations in two genes (MYO7A and USH2A) associated with Usher syndrome.

Another related study² was recently conducted by researchers at the Scheie Eye Institute at the University of Pennsylvania. Macular scans of 16 individuals with Usher syndrome were analyzed with SD-OCT – and like the study reported by Dr. Kremlíkova Pourova, the findings indicated a loss of photoreceptors in patients' eyes that ultimately manifested itself as visual acuity loss and early signs of RP.

This accumulated evidence has built a strong case for using SD-OCT as a diagnostic tool to analyze the macular health in patients suffering from rare genetic diseases that result in the progressive degeneration of visual acuity and RP, such as in the case of the Usher syndrome.

"When monitoring functions such as visual acuity, visual fields and electroretinography have been traditional ways of following the progression of inherited retinal degenerations. Scientists have recently looked into morphologic features such as photoreceptor integrity," explained Dr. Igor Kozak, clinical lead, Moorfields Eye Hospital Centre, Abu Dhabi, United Arab Emirates.

Delineating areas of photoreceptor damage using SD-OCT, or even quantification of cellular loss using adaptive optics technology, are attractive approaches to supplement functional monitoring.³

"SD-OCT has become a standard imaging modality in diseases of the outer retina," said Dr. Kozak. Visualizing structures like the external limiting membrane, inner/outer photoreceptor segments, ellipsoid zone and Bruch's membrane and then associating their changes with visual acuity are frequent clinical correlations in common diseases such as age-related macular degeneration, central serous

chorioretinopathy or diabetic macular edema. In recent years, scientists have been collecting more information on using SD-OCT technology in inherited retinal diseases with subsequent imaging-to-phenotype correlations.⁴

Retinal imaging, including earlier generation of optical coherence tomography technology, has been employed in studying Usher syndrome.^{5,6} SD-OCT, alone or in combination with other technologies, has been used to stage and monitor the progression of Usher syndrome.^{2,7}

"Usher syndrome is a debilitating disease that is clinically and genetically a very heterogeneous group. It is the leading genetic cause of combined vision and hearing loss," added Dr. Kozak.

These technologies can detect subtle structural changes before the classic clinical picture develops. It has been also reported that cone density in Usher syndrome could be reduced by nearly 38 percent from normal, before best corrected visual acuity declines to clinically abnormal ranges (20/25 or less).⁷

"This places SD-OCT ahead of some functional tests, like visual field testing, for detection of early changes due to inherited retinal degenerations," said Dr. Kozak.

Therefore, SD-OCT could be used to monitor the progression of the phenotypic symptoms and diagnose diseases like Usher syndrome type 1, long before the child becomes

symptomatic or before visual acuity begins to deteriorate. Early diagnosis would allow time to adjust the child's environment and develop special educational plans to ease the transition into life with progressive degenerative visual acuity. Furthermore, with the fast-paced development of new technology, early diagnosis may also present opportunities for earlier treatment and thus, greater preservation of visual acuity in the future. 

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About the Contributing Doctor



diagnostic imaging and image analysis, retinal pharmacology and drug delivery systems.
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Igor Kozak, MD, PhD, MSc is a vitreoretinal surgeon and a retina and ocular imaging specialist who specializes in introducing the newest technologies into clinical practice. He is a graduate of P.J. Safarik University in Kosice, Slovak Republic and has completed both vitreoretinal and uveitis fellowships at the University of California, San Diego (UCSD). He also holds a master's degree in clinical research from UCSD. He is currently a clinical lead at the Moorfields Eye Hospital Centre in Abu Dhabi, United Arab Emirates. His clinical interests include age-related macular degeneration, diabetic and hypertensive retinopathy, uveitis, and vitreoretinal surgery. In his research, Dr. Kozak focuses on retinal



Seeing the Big Picture

An Insight into Ophthalmology in Different Markets

by Joanna Lee

India, Malaysia and Singapore are different and diverse places – as are their respective ophthalmic markets. India now has one of the fastest growing ophthalmic markets in the world, while Malaysia's market is still developing, and Singapore's is already quite established.

So, what do these ophthalmic markets have in common? And how do their needs differ? *PIE Magazine* examines the big picture of ophthalmology in India, Singapore and Malaysia, delving into the challenges doctors in these countries face, as well as their successes.

The current landscape

In India, the ophthalmic market is estimated to be worth \$1.8 billion by 2022. The country is also home to 30% of the world's blind population.¹ Dr. Alay Banker runs his own retinal specialist clinic, as well as a multidisciplinary charitable hospital in Ahmedabad, India. Over the last 21 years, he notes that the advancement of tools has helped to speed up procedures: "In the past, a complex vitreoretinal surgery case would last four to six hours without good visualization assistance. Now, when you open the eyes the next day, it's very difficult to judge which eye you'd operated on."

Consultant ophthalmologist and vitreoretinal professor at the National University of Malaysia's Ophthalmology Department, Dr. Mae-Lynn Bastion agrees: "Today's 25- and 27-gauge instruments mean shorter preparation and closure time," she said. "For certain surgeries, they may not be ideal ... but with experience and skills, they make posterior work better overall." Malaysia is still a developing market. While it's packed with possibilities and rising demands for ophthalmic care,



there are still funding limitations in research and human resources.³

In Singapore, major ophthalmic business leaders, like lens companies, have long leveraged the city-state's "environment that facilitates development of innovative therapies, pre-clinical development, clinical trials and translational research."² Dr. Chin Chee Fang, head of the neuro-ophthalmology subspecialty unit of the government restructured Tan Tock Seng Hospital (TTSH) in Singapore, says she has witnessed improvements in her subspecialty: "It has advanced as diagnostic modalities have become more detailed with better resolution, such as the increased use of spectral-domain optical coherence tomography for diagnosis and monitoring of patients."

The impact of technology

Clearly, improvements in technology have greatly impacted the field of ophthalmology. However, access

to these innovations – either due to unavailability or cost – can prove challenging.

Imaging systems, like those mentioned by Dr. Chin, have also emerged in India and Malaysia, although 3D surgery technology has yet to penetrate the Malaysian market. This is partly because resources can't always keep up with fast-changing technology. "Cost is a major issue with newer technology, particularly in India where most people can't afford things and don't have insurance. So, that's a slight barrier and you have to find ways to deal with it," said Dr. Banker.

India has broken this barrier by developing its own technology. "We're lucky to have many entrepreneurs in India who are manufacturing fairly competitive machines at about half the price of the imported ones. And we are able to give almost equal results," shared Dr. Banker.

According to Dr. Banker, the success of affordable instrumentation has translated into more vitreoretinal

surgeons in smaller Indian cities. This is huge in terms of early diagnosis, prevention and treatment.

Overcoming barriers

In Malaysia, besides a demand for more ophthalmologists in public service, high costs for posterior segment surgeries remains a hurdle for patients. Accessibility is also a challenge because of stringent official regulations for importing medical equipment. "It's good there's quality control, but it also means we are unable sometimes to do research with equipment that is available overseas but has not been used previously in Malaysia," said Dr. Bastion.

To overcome this, Malaysian ophthalmologists work closely with instrument and equipment companies to best help patients. To overcome equipment costs and accessibility in India, Dr. Banker says doctors share resources through inter-institutional loans of tools and equipment through Whatsapp chat groups.

Dr. Chin says that they're fortunate to enjoy the availability of new technology in Singapore. However, the question remains if new technology necessarily translates in better clinical care or patient outcomes: "Balancing the financial costs and clinical benefits is crucial."

Having the right equipment has made a difference: "In Malaysia, we have good results for vision, for reattachment, and we have very low rates of reoperation," said Dr. Bastion. She also sees a great potential for ophthalmology research in Malaysia, but wishes they had better support and funding.

In India, Dr. Banker would like to see universal healthcare insurance for all patients. In addition, he hopes that a centralized national eye database could be established: "That would help us identify diseases and loopholes in our medical healthcare system – like which region has a certain prevalence or lack of facilities."

Singapore's biggest challenge comes in the form of its aging population. "It has led to a much higher patient load, and an increase in age-related conditions. Diabetes is also an increasing health problem, bringing with it many potential complications involving the eye," said Dr. Chin.

However, things continue to march onward in Singapore. Dr. Chin says:

"Later this year, a national initiative for community eye care will commence, which will enable stable patients to be managed effectively and safely in the community, thus reducing the need to be seen in tertiary care centers. Hopefully, this shared responsibility brings about better patient care, better treatment compliance and informed expectations." ☀

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About the Contributing Doctors



Dr. Alay Banker is the director of Banker's Retina Clinic and Laser Centre in Ahmedabad, India. His practice has served the city since 2007. He started off his career as a clinical instructor and fellow at the Department of Diseases of Retina and Vitreous, Uvea and Inflammation of Eye at University of California, San Diego, USA. He was the first Indian to receive the "International Scholar Award" from American Academy of Ophthalmology in 2010, and the youngest Indian to receive the Achievement Award by the American Academy of Ophthalmology (2006). His contributions towards his medical peers and community services garnered also him the Senior Achievement Award from American Academy of Ophthalmology (2013) and the Dr. Piyush Patel Award for Service to Society and Mankind from Ahmedabad Medical Association (2013). [Email: alay.banker@gmail.com]



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Dr. Chin Chee Fang is a Consultant Ophthalmologist at the National Healthcare Group Eye Institute at Tan Tock Seng Hospital (TTSH), Singapore. She has a Bachelor of Medicine & Surgery from the University of Edinburgh, U.K. She has a Master of Medicine in Ophthalmology and is a Fellow of the Royal College of Surgeons of Edinburgh, as well as the Academy of Medicine Singapore. Awarded the Ministry of Health Training Scholarship, she underwent a clinical fellowship in Neuro-Ophthalmology at the National Hospital for Neurology & Neurosurgery in London, U.K. Dr. Chin is currently the Deputy Head of Department of Ophthalmology in TTSH. She is also the Neuro-Ophthalmology Head of Subspecialty, as well as the Chairman of the Clinic Management Committee in Ophthalmology. Dr. Chin is also active in teaching and is a National Examiner with the American Board of Medical Specialties and a member of the Ophthalmology Exam Working Committee. [Email: Chee_fang_chin@ttsh.com.sg]



Exploring Social Media's Role in Ophthalmology

#timetostartposting

by Ruchi Mahajan Ranga

Social media has exploded as an excellent and necessary way to connect, communicate and engage – and with the potential reach of sites like Facebook, Twitter and LinkedIn, more ophthalmologists are posting, tweeting and sharing their messages than ever before. These social media platforms have made it easier to share valuable information worldwide without any barriers. And with an increase in the number of tech savvy patients, more and more healthcare professionals are realizing that skipping out on social media could result in missed opportunities for growth.

Indeed, social media is an important medium for sharing

content – for both professional and personal reasons. Dr. Sheetal Brar from Nethradhama Superspeciality Eye Hospital in Bengaluru, India, says: “I feel social media is a great forum to showcase and share one’s achievements and success stories with friends, family and colleagues. I personally get immense happiness and joy when I post my professional achievements on social media as the responses are almost instant and very uplifting.”

Dr. Brar shares news, like her professional achievements, on social media with impressive results. Last year, Nethradhama Superspeciality Eye Hospital recognized her for completing

the highest number of surgeries in 2017, holding the most refractive trainings in 2017, and for winning the most national and international awards. She shared this news, along with photos, on Facebook and received 506 likes and 142 comments. More recently, she received the best paper of the session certificate for her free paper entitled “Long term outcomes of tissue addition for hyperopia” at the American Society of Cataract and Refractive Surgery (ASCRS) 2018 annual meeting in Washington D.C., USA. Her Facebook post announcing this news received an even higher response from followers – 745 likes and 233 comments.

Posting important personal and professional news on sites like Facebook can be helpful for people who want to share information with family, friends, acquaintances and colleagues, but who may not have time to call or meet with them in person. Dr. Brar has used social media for over a decade and says it’s a convenient way to share her professional achievements. She maintains a great social media following, with many interactions through likes and comments, by tailoring her messages to make them interesting to her audience.

“It takes time to prepare a good post for social media. You have to select the best pictures, caption them nicely and add apt descriptions to the post to convey the message in the most effective way,” she explained. “I always try to give a personal touch to my posts, as I feel it helps the readers relate



Dr. Sheetal Brar receiving the best paper of the session certificate for her free paper entitled “Long term outcomes of tissue addition for hyperopia” at the ASCRS 2018 in Washington D.C., USA.

better to the content of the post. I also try to keep the length of my posts just right – to convey the message in less, but more meaningful, words.”

The role of social media in ophthalmic marketing is still in the beginning stages – but one thing is clear: It's here to stay. To assist newer social media practitioners, we've compiled a few tips to cultivate great social media presence in ophthalmology:

- ▶ **Use the right images.** The fastest and easiest way to explain something on social media is to use a corresponding image. Not only that, they grab the viewer's attention – thus, potentially increasing the post's popularity.
- ▶ **Create engaging videos.** Even better than photos, videos can actively tell your story. They add extra humanity to posts and allow your followers a closer glimpse at you, or the content you're sharing. Of course, videos take more effort – but that reflects that you value your followers.
- ▶ **Post interesting and relevant content:** Know your audience and post news that encourages them to start a conversation. For example, ask a question that will illicit responses from your followers. A general Q & A can also be highly engaging. Use hashtags so your posts can be easily searched for and found online.
- ▶ **Leverage trending topics:** Stay up-to-date on the latest trends and news in ophthalmology. Form opinions on these topics and post them. By understanding how to organically insert yourself into the conversation, your post's likes and comments can increase.
- ▶ **Be yourself:** Be authentic and be yourself. Your followers want to hear from YOU.
- ▶ **Use the right platform.** Twitter, LinkedIn and Facebook are different platforms that reach different audiences. Do a bit of research to determine how to best utilize each site.

Without a doubt, social media is a powerful marketing tool. The ability to create a global network and its ease of use has resulted in an increasing number of healthcare professionals utilizing social platforms to inform and engage. This new method of communication is here to stay and there's no time like now to begin learning, posting and reaping the rewards of this powerful tool.

Have you tried something on social media that has brought on loads of engagement? It's your turn to share it with us! Feel free to write to us at: matt@mediamice.com. ☺



Dr. Sheetal Brar was awarded first prize in cornea/refractive category at the ASCRS film festival this year for her film entitled *SMILE for Cyclotorsion: A Twist in the Tale!*



Dr. Sheetal Brar received four awards from Dr. Sri Ganesh, Chief Medical Director, Nethradhama Group of Hospitals, Bangalore, for the highest number of surgeries done, maximum number of trainings done, and maximum number of awards and publications received in 2017 and for organizing the best event of 2017-2018 called “Phaco Festival,” the bi-annual conference of Nethradhama Eye Hospital.

About the Contributing Doctor



Dr. Sheetal Brar is a practicing ophthalmologist at Nethradhama Superspecialty Eye Hospital, Bengaluru, India. She has presented her research at both national and international levels and has won numerous awards. In a span of four years, Dr. Brar published 22 clinical papers in peer-review journals. Dr. Brar believes in dreaming big and meeting successful people and learning from their success stories. [Email: brar_sheetal@yahoo.co.in]



Restoring Eyesight off the Beaten Track

by Chow Ee-Tan

For the past 18 years, the East Timor Eye Program (ETEP) has restored eyesight and improved eye health in Timor-Leste, one of the world's newest and poorest countries, with more than 37% of the population living below the poverty line.

The prevalence of curable blindness and visual impairment in Timor-Leste is high. Recent statistics on the ETEP website indicate that more 33,000 Timorese (2.8% of the population) are blind, and that cataract is the leading cause of blindness (79.4%).

By training local doctors, eye care nurses and eye care technicians, the program has been instrumental in delivering curative eye care services for cataract and other ophthalmic conditions. Dr. Manoj Kumar Sharma, international consultant ophthalmologist

and a long-term adviser for RACS in Dili, Timor-Leste, says that more than 10,000 cataract surgeries have been performed in recent years, with more than 1,200 surgical outputs annually.

The program aims to make Timor-Leste's eye care services self-sufficient by 2020 and eradicate preventable blindness by 2025. Many of the country's eye impairment problems are caused by refractive error, cataract, vitamin A deficiency and trauma – many of which are preventable or treatable.

ETEP is made possible by support from partners like the Royal Australasian College of Surgeons (RACS), an organization that provides specialist medical education, training, capacity development and aid to 16 countries in Asia-Pacific. Other partners include the Perth

Eye Hospital Foundation, St. John Ambulance Australia and the Royal Australian and New Zealand College of Ophthalmologists (RANZCO).

Dr. Sharma says that ETEP's eye care program can be traced to Australian ophthalmologist teams who used to visit and provide surgical outreach. Since then, significant progress has been made to reduce the country's severe cataract backlog. With ETEP's effort, the population suffering from vision impairment has also been reduced.

The first RAAB (Rapid Assessment of Blindness) survey was conducted in Timor-Leste in 2005. It showed blindness prevalence at 4.1% and visual impairment at 17.7% among adults over 40-years-old. More recently, a 2016 RAAB survey reported that the prevalence of blindness has dropped



Dr. Sharma rejoicing with a patient.

In recent years, ETEP is becoming more focused on expanding its outreach program to improve access to eye care services for people living in rural or isolated areas outside Dili. The program is shifting from service delivery to capacity building around postgraduate teaching, training and infrastructure development.

to 2.8% and those with severe and moderate visual impairment were 4.5% and 12.5%, respectively.

Dr. Sharma said that in recent years, ETEP is becoming more focused on expanding its outreach program to improve access to eye care services for people living in rural or isolated areas outside Dili. The program is shifting from service delivery to capacity building around postgraduate teaching, training and infrastructure development.

"Since 2014, the program has focused its activity in infrastructure building and training higher level manpower in the country and abroad, as well as training general doctors to the diploma level of specialization in ophthalmology," explained Dr. Sharma, who is responsible for teaching basic medical and surgical ophthalmology skills to the postgraduate trainees. He says that by the end of this year, 10 Timorese will be graduating from the local university through this program.

Another key member of the outreach program team is Mr. Belmerio Jeronimo, head of the Department of Ophthalmology at the National Hospital of Dili. He organizes the outreach program for one week each month. Mr. Jeronimo is also trained as an ophthalmic nurse and performs patient eye checks during outreach.

"Our team consists of an ophthalmologist, one registrar, two theater nurses and three refractionists. We perform surgeries from Monday to Thursday, and see postoperative patients on Fridays," said Mr. Jeronimo. "We perform between 45 to 60 during the trip, covering mainly cataract and other minor surgeries."

Access to eye care is particularly difficult for people living in the more rural areas, who have to walk long distances for medical treatment. Mr. Jeronimo says that the outreach team visits remote areas in the country that don't have adequate space to perform surgery, such as Uatulari, located in the eastern part of country.

"Due to lack of eye care in the country, we need to bring services close to the people who cannot come to us. Some of these patients have no family in Dili to stay with and no one to take them to the city," shared Mr. Jeronimo.

To reach patients in need, the team conducts pre-screening and promotional work before their surgical week begins. In some remote, inaccessible mountainous regions where the operating theater is not adequate, Dr. Sharma says that they've started performing surgeries in a mobile surgery van: "Now, we do around 1,200 cataract surgeries and around 250 different types of eye surgeries per year, in the city as well as outreach in the country."



Dr. Sharma performing an eye surgery.



Dr. Sharma checking the eye of a young patient.



ENLIGHTENMENT OUTREACH PROGRAM

For Dr. Sharma, many memorable moments occur during outreach. "Once I operated on a 92-year-old man with bilateral cataract blindness . . . he had been blind for 10 years. He was so happy to have his vision back, he was crying in excitement and joy. He hugged one of his intimate friends tightly and he told us it was like his second birth after the cataract operation," said Dr. Sharma.

Mr. Jeronimo echoes that sentiment: "It is amazing when the team restores someone's sight after they have been blind for many years. On the next day when we open the bandage covering their eyes, we hear them shout in joy, saying that miracles exist."

In addition to helping patients, Dr. Sharma also takes comfort in the registrars who he's trained. They have begun to perform surgeries independently and are now able to contribute to the elimination of preventable blindness in Timor-Leste.

"It is amazing when the team restores someone's sight after they have been blind for many years. On the next day when we open the bandage covering their eyes, we hear them shout in joy, saying that miracles exist."

— Mr. Belmerio Jeronimo



Mr. Jeronimo administrating to a patient.

"Soon, there will be a core group of highly educated eye specialists in the country who can manage the bulk of eye health issues and make vision services in Timor Leste self-sufficient. There will be no need to have a resident overseas ophthalmologist like me here anymore," he said.

He highlighted that the aim of ETEP is to make Timor-Leste's eye care program self-sustaining. The program is gradually reducing its outreach as government funding increases. In the coming years, the government will conduct the outreach programs itself.

However, there are still many challenges. The biggest hurdle is the

low socio-economic condition of the people and the inconsistent supply of consumables and drugs. Education is also important as many patients are still going to traditional healers for treatment.

Dr. Sharma is confident that ETEP has laid a strong foundation for the outreach program, especially with the assured support from the Timor-Leste government. "There will be more highly-educated and responsible ophthalmologists before ETEP's departure in 2020, and they are expected to carry this program further. The progress of the outreach's surgical program indicates that we can have hope for a brighter future," he said. ☺

About the Contributors



Dr. Manoj Kumar Sharma is the international consultant ophthalmologist for the East Timor Eye Program and is affiliated with the Royal Australasian College of Surgeons as a long-term adviser in Dili, Timor-Leste. Dr. Sharma completed his medical training from Lvov Medical Institute in the Ukraine in 1993, his residency in Ophthalmology in Nepal in 1999 and a Fellowship in cornea and ocular surface diseases from UCLA in the United States in 2002. A native of Nepal, he has previously worked as an ophthalmologist and corneal surgeon in Nepal, Cambodia and Tibet. Prior to taking up his current position in April 2013, Dr. Sharma was an additional Professor of Ophthalmology at the B.P. Koirala Institute of Health Sciences in Dharan, Nepal, and before that, an Associate Professor in Lumbini

Eye Institute, a high volume surgery center in Nepal for 15 years. [Email: mansyu@gmail.com]



Mr. Belmerio Jeronimo was born and bred in Dili, Timor-Leste. Mr. Jeronimo is the head of Ophthalmology Department at Dili National Eye Centre, a post which he assumed in December 2015. Prior to that, he was manager of Clinical Services at The Fred Hollows Foundation NZ for four years. Mr. Jeronimo holds a Bachelor's degree in Public Health from Universidade da PAZ in Dili, Timor-Leste. He went on to obtain a Post Graduate Certificate in Essential Eye Care from Pacific Eye Institute, Fiji, an initiative of the Fred Hollows Foundation NZ. [Email: jeronimo.fhf nz@gmail.com]



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Sight Savers

Singapore's Global Clinic Focuses on Curing Preventable Blindness



by Brooke Herron

According to the World Health Organization (WHO), uncorrected refractive errors (53%), followed by un-operated cataract (25%), are the top two causes of vision impairment worldwide. And while more than 80% of vision loss can be prevented or cured, barriers to treatment like cost and lack of access to resources (like proper surgical equipment and doctors), results in unnecessary impairment or blindness in low- and middle-income countries.

Thankfully, Global Clinic – a Singapore-based nonprofit that provides free specialized healthcare in dentistry, ophthalmology and women's health – has stepped in to provide primary healthcare to alleviate preventable suffering. Founded in 1997, the charitable organization plans to extend its reach to all parts of the developing world, especially in Asia.

According to Global Clinic, the most common vision conditions encountered are uncorrected refractive error and cataracts – the WHO's top two causes of vision loss and preventable blindness. A typical mission lasts for one week; volunteers travel to underdeveloped areas in countries like Nepal and

Myanmar, where there is no access to eye care. The team will typically treat and examine 3,000 to 4,000 patients and perform 300 to 400 surgeries to restore sight. Since the charity was founded, it has improved the lives of more than 36,000 people in ethnic minority tribes and remote villages in 11 countries around Asia and beyond.

"The most rewarding aspect of leading missions is working with volunteers from all walks of life of different countries and cultures, coming together for one common goal – providing access to healthcare and providing cost-effective treatments for reversible or preventable blindness," said Dr. Marcus Ang, founding director of Global Clinic and head of the Global Clinic Vision Team.

In addition to dentistry and women's health, Global Clinic provides primary eye care including optometry (prescription and reading glasses); general ophthalmology for treatment of common conditions (like glaucoma); cataract surgery; and minor eye surgery (including pterygium excision and conjunctival autograft). They also provide services that focus on education, skills-transfer and knowledge sharing with local optometrists, ophthalmologists and nurses to ensure patients continue to receive appropriate care.

Global Clinic finds that ophthalmologists from Asia-Pacific are very active in volunteer work and prevention of blindness programs – and often, this work is supported by their own eye centers or hospitals. They note that many of the volunteer doctors, nurses and optometrists work at the Singapore National Eye Centre, which is very supportive and has its own philanthropy program.

The organization is always seeking volunteers and contributions – and 100% of contributions are directed towards medicine, equipment and medical supplies to improve the lives of beneficiaries. Global Clinic also requires that volunteers self-fund the medical trips to ensure that donations are maximized for patients. In addition, Global Clinic is seeking to engage with corporations to help bring additional aid to rural areas. To volunteer, donate or for more information, please visit www.global-clinic.org.

About the Contributing Doctor



As the founding Director, Global Clinic and head of Global Clinic Vision Team, **Dr. Marcus Ang** handles the ophthalmology medical missions in the Global Clinic. With 14 years' experience in the field of medical vision, Dr. Ang is currently a consultant at Singapore National Eye Centre (SNEC) and an Honourable Consultant at UK-based Moorfields Eye Hospital of the NHS Foundation Trust. In addition, Dr. Ang is an Assistant Professor at Duke-National University of Singapore (Duke-NUS) and a Clinical Lecturer at the National University of Singapore (NUS). [Email: marcus.ang.h.n@snecc.com.sg]



Treatment Hits and Misses in Latest Anti-VEGF Clinical Trials

by Brooke Herron

Aflibercept Monotherapy for Treating Polypoidal Choroidal Vasculopathy Shows Promise

Based on a presentation by Professor Y. Ogura, Department of Ophthalmology and Visual Science, Nagoya City University Graduate School of Medical Sciences, Nagoya, Japan

Prior clinical trials for treatment of polypoidal choroidal vasculopathy (PCV), a subtype of neovascular (or wet) age-related macular degeneration (AMD), have returned inconsistent results. Some suggest using anti-vascular endothelial growth factor (anti-VEGF) agents alone, while others recommend a combination of anti-VEGF and photodynamic therapy (PDT). In a lecture at the 2018 Association of Researchers in Vision and Ophthalmology (ARVO) conference in Honolulu, Hawaii, Prof. Ogura revealed the year two results (52 to 96 weeks) from the PLANET study, which evaluated the safety and efficacy of intravitreal aflibercept (IVT-AFL) monotherapy compared with IVT-AFL

plus active PDT in patients with PCV.

In this randomized, double-masked, sham-controlled study, 318 patients from 62 centers (mostly in Asia) were assessed from baseline to 52 weeks and from 52 to 96 weeks. According to Prof. Ogura, after randomization, about 85% of patients completed 96 weeks of treatment. The baseline demographics were similar between the two groups (active PDT and sham): over 90% were Asian, and almost half were Japanese. He stated that improved BCVA was well maintained in both groups up to week 96.

Results for the first year have been published online and showed substantial visual acuity (VA) gains with IVT-AFL monotherapy. There were

anatomical benefits as well: 80% of patients showed no active polyps at week 52, there was a 58% to 67% reduction in the mean area of polyps, and more than one third of patients experienced complete polyp regression. In this first follow-up phase, the investigators found that adding PDT did not appear to provide any additional functional benefit. From 52 to 96 weeks the results stayed consistent.

Prof. Ogura noted that from week 52 to 96, patients not needing rescue treatment were kept on a fixed treat-and-extend regimen according to investigator decision. Rescue treatment was given if there were poor visual outcomes or active polyps. More than 80% of patients did not require rescue



treatment during the study.

From the first year to the second year of the study, the mean number of injections decreased from 8.1 to 4.6, and the mean number of PDT was very similar. While both groups had improved and well-maintained BCVA up to 96 weeks, the IVT-AFL monotherapy group gained 10.7 letters by week 96. By week 96, more than 80% had no active polyps. The investigators found that the optional treat-and-extend regimen resulted in a meaningful reduction in office visits and total number of treatments. Prof. Ogura concluded that the safety profile of afibercept was consistent with previous reports, and there were no significant differences between the groups.

Lampalizumab Misses the Mark as Therapy for Geographic Atrophy in Age-related Macular Degeneration

Based on a presentation by Dr. Dante J. Pieramici, California Retina Consultants, Santa Barbara, California, USA

More than five million people worldwide have geographic atrophy (GA), a progressive and irreversible form of age-related degeneration (AMD). There is currently no approved treatment for this condition which affects daily activities like reading, driving, recognizing faces and activities in dim light. In a lecture at ARVO 2018, Dr. Dante J. Pieramici revealed the pooled results of the identical phase III trials Spectri and Chroma studies, which evaluated the safety and efficacy of lampalizumab as a therapy for GA.

During the trials, the experimental groups received 10 mg dose of lampalizumab administered every 4 or 6 weeks by intravitreal injection; another group received sham injections. The Spectri and Chroma studies enrolled more than 1,800 participants in more than 20 countries and had two main objectives. The first objective, measured at 48 weeks, was to demonstrate a mean change in GA lesion area in patients treated with lampalizumab compared to sham. The second, measured at 96 weeks, focused on assessing the impact of lampalizumab treatment on visual function.

According to the investigators, on average patients lost about 5 letters (or one line) of visual acuity (VA) during the 48 weeks of therapy or follow-up in the study. They found that the same was true for low luminance VA – patients started with a low luminance VA score of about 35 letters on average and lost somewhere between 2 to 3 letters. The investigators found no difference between treated and non-treated patients. Mesopic micrometry was used in a sub-group of around 200 patients to investigate two parameters: mean macular sensitivity and scotomatous points. Though micrometry did show a modest correlation with the absolute number of scotomatous points and mean macular sensitivity with the area of the GA lesions, after evaluating these patients over time, they found there was no benefit to therapy.

Binocular reading speed (BRS) was also reduced in these patients: at

baseline the mean BRS was about 105 letters, and at 48 weeks about 16 letters were lost on average – so, some of these patients fell below 80 words per minutes. Again, the investigators found the therapy had no benefit to BRS. The story was the same with patient reported outcomes using the National Eye Institute Visual Functioning Questionnaire 25-item (NEI VFQ-25) version composite score and the Functional Reading Independence (FRI) Index – there was a reduction in parameters and no benefit to therapy.

The investigators reported that no new safety signals were observed in patients for ocular and non-ocular events. Most of the adverse events with this therapy were associated with the intravitreal injections – there were some instances of intraocular pressure problems, but these were low and expected with intravitreal injections. The non-ocular events were similar between all treatment arms.

The study also reported very low rates of conversion to neovascularization (1 to 2%), which was similar between the treated and sham patients. The investigators found this to be in good correlation to what's been reported in these types of patients with bilateral GA. No patients had bilateral conversion in the trial.

These results led the investigators to conclude that lampalizumab wasn't an effective therapy for GA. And while the treatment failed in this trial, the investigators don't consider this a failed trial: "We collected a large amount of data on these patients, which represent the largest amount of comprehensive data on GA, with both anatomical and functional outcomes. I think we'll be evaluating this dataset for years to come, and there are a lot of things that can point us in a new direction of treatment for GA." ☺

Editor's Note: PIE Magazine Issue 05 was distributed at ARVO 2018, held in Honolulu, Hawaii. Reporting for this story, "Treatment Hits and Misses in Latest Anti-VEGF Clinical Trials," also took place at ARVO 2018.



by Brooke Herron

The Asia-Pacific Academy of Ophthalmology (APAO) will return to Bangkok, Thailand to host its 34th annual meeting from March 6 to 9, 2019. Held in conjunction with the 43rd meeting of the Royal College of Ophthalmologists of Thailand, the event will focus not only on the art and science of ophthalmology, but on friendship as well.

This is the second time the event has been hosted in Bangkok (the first meeting in Thailand was the 19th APAO Congress in 2003), and organizers are enthusiastic about the congress's return to the country.

"The ophthalmologists of Thailand warmly welcome our colleagues from around the world. When our Thai hospitality meets the academic spirit, APAO 2019 will bring out the best of art and science ophthalmology has to offer," said Dr. Anuchit Poonyathalang, President of the Royal College of Ophthalmologists of Thailand.

According to APAO President Prof. Charles NJ McGhee, the 2019 meeting will feature more than 600 internationally renowned speakers

presenting the latest discoveries and ideas in all the major ophthalmic subspecialties. An attendance figure of at least 5,000 delegates is anticipated. Additionally, he says that the APAO Congress also provides delegates with an excellent occasion to network and collaborate with peers and friends. "The APAO congress is a global event and the premier ophthalmology conference in the Asia-Pacific region," said Prof. McGhee.

APAO 2019 Congress President Dr. Paisan Ruamviboonsuk echoes Prof. McGhee's thoughts on networking and collaboration: "While the growing success of APAO is certainly due to the strength of the scientific programs, friendship, the social part or art of academic meetings, is also slowly built up through APAO Congresses. . . APAO Congress is not only about academics. It's about friendship."

Dr. Ruamviboonsuk served as president of the Royal College of Ophthalmologists of Thailand from 2013 to 2016.

APAO Secretary General Prof. Clement Tham further cements these

sentiments – not only does APAO provide a platform to share the latest discoveries and developments in ophthalmology, it also offers attendees an opportunity to bolster relationships and form new bonds. "The APAO Congress provides opportunities to learn the latest advancements in ophthalmology and visual sciences, to strengthen networks and partnerships among colleagues and institutions, and to form lasting friendships," said Prof. Tham.

Clearly the "Sciences, Arts and Friendship" tagline exemplifies the organizer's commitment to hosting yet another world-class event, in Bangkok, one of Asia's most-loved and vibrant cities.

APAO is accepting abstracts until September 3, 2018. For a complete list of guidelines, or for more information about the 2019 congress, please visit <http://2019.apaophth.org>.

Editor's Note: PIE Magazine's parent company Media MICE Pte Ltd was the official media partner of the APAO 2018 congress held earlier this year in Hong Kong.

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