

HIGHLIGHTS

- 04** Experts convened to discuss treatment updates in retinal diseases
- 08** Neuro-ophthalmic conditions are a threat to vision, know the red flags!
- 11** YO's explore crucial issues in uveitis, thyroid eye disease, and more...

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Myopia Control

On Spotlight at APAO 2021

by Tan Sher Lynn

On Day 3 of the 36th Asia-Pacific Academy of Ophthalmology Virtual Congress (APAO 2021), leading experts in the field of myopia research — representative members of the Asia-Pacific Society of Eye Genetics (APSEG) — discussed ways to control myopia progression and manage the complications of pathological myopia.

Atropine concentration in myopia control

Prof. Jason Yam from the Hong Kong Children's Hospital presented his findings from the Low-concentration Atropine for Myopia Progression

(LAMP) Study (phases 1 and 2). The aim of the study is to determine the optimal concentration of atropine eye drops in retarding myopia progression.

The study demonstrated that 0.05% atropine is the best concentration over a two-year period. Meanwhile, 0.01% atropine was mildly more effective in the second year than the first year, but not 0.05% and 0.025% atropine. Prof. Yam and his teammates also found out that low-concentration atropine has no effect on corneal power and lens power.

"Contributions to spherical equivalent (SE) progression from axial length, corneal and lens

power in each atropine concentration and placebo were similar. Its antimyopic effect acts via retarding axial elongation, and thus can reduce the risk of myopia complications,” Prof. Yam said.

There is also an age-dependent effect in each treatment group of 0.05%, 0.025% and 0.01% atropine. The younger the age, the poorer the response. In terms of concentration-dependent response in each age group, they found that the higher the concentration, the better the response.

“Among atropine concentration (0.05%, 0.025% and 0.01%) studies, younger children required the highest concentration (0.05%) to achieve similar reduction in myopic progression as older children on lower concentrations. For example, the myopia progression of 10-year-olds in the 0.01% group was similar to the 8-year-olds in the 0.025% group and 6-year-olds in the 0.05% group over 2 years.

“Therefore a higher concentration (i.e., 0.05%) should be administered as a starting dose in younger children, given that they have a greater risk of myopia progression. Treatment on young children should be more aggressive to reduce the burden of high myopia,” he said.

Currently in the third year (phase 3) of the study, they plan to evaluate the efficacy of 0.05%, 0.025% and 0.01% atropine over 3 years, and whether atropine treatment should be stopped or continued after 2 years, as well as the rebound phenomenon after treatment cessation.

Following the LAMP study, Prof. Yam advised using low-concentration atropine eye drop therapy for 4 to 14 years until there is no more progression of myopia, with patients who have early onset of myopia and both parents myopic, requiring a higher concentration.

Pathologic myopia progression and prevention

A/Prof. Quan Hoang from the Duke-NUS Medical School, Singapore, talked about

the prediction of progression from high myopia to pathologic myopia (PM) and the potential preventive therapies.

According to him, PM occurs when high myopia is accompanied by characteristic degenerative changes in the sclera, choroid and retinal pigment epithelium (RPE), and is associated with decreased vision. “In PM, the elongation is so excessive that there may be scleral thinning that encourages the formation of staphyloma, which tends to precede vision-threatening maculopathy, a leading cause of blindness worldwide — especially in Asian countries,” he said.

Determining biomechanical changes in the optic nerve head (ONH) can serve as a biomarker for high myopia progression. He and his colleagues used a novel magnetic resonance imaging (MRI) processing pipeline in highly myopic and emmetropic eyes undergoing stress and strain of normal eye movements to assess for changes in 3D global eye shape, in addition to 2D axial length. They found out that pathologic eyes experience significantly ($p < 0.05$) higher strains than eyes with low or high myopia. “ONH strain differs significantly between low, high and PM eyes, and has the potential to serve as a biomarker for progression,” he said.



“Our novel MRI heat map algorithm has the potential to pinpoint focal areas of scleral weakness, and may allow for personalized scleral strengthening treatments in highly myopic eyes,” he said.

He also noted that at present, there is no effective treatment to stop myopic progression to avoid visual loss from degenerative myopia. Nevertheless, visible, safe light-activated corneal collagen crosslinking (CXL) and non-light-activated scleral collagen crosslinking may have the potential to arrest progression of high myopia to PM.

Complications of pathologic myopia

Meanwhile, Dr. Kyoko Ohno-Matsui from the Tokyo Medical and Dental University,

Japan, said that PM was the second to fifth most common cause of blindness in four studies of white populations (6.0-9.1%), and the most common cause in the Chinese study (26.1%), as well as in the Japanese study (22.4%).

“There are three complications in PM that lead to blindness — myopic maculopathy (especially neovascularization), myopic traction maculopathy, and glaucoma or myopic optic neuropathy. The cause of developing these complications is eye deformity characterized by posterior staphyloma,” she said.

According to the International Photographic Classification, PM is categorized into five groups. These are Category 0: no maculopathy; Category 1: tessellated fundus; Category 2: diffuse atrophy; Category 3: patchy atrophy; and Category 4: macular neovascularization (MNV) related macular atrophy. “PM is defined as an eye having maculopathy is equal to or more serious than diffuse atrophy, or eyes having staphylomas,” she said.

Dr. Ohno-Matsui noted that MNV is the most common cause of central vision loss in patients with PM, which develops in about 10% of cases. Anti-VEGF therapy is currently the first-line treatment for myopic MNV, with ranibizumab and aflibercept being widely used in many countries.

Meanwhile, myopic retinoschisis (MRS) is found in 9-34% of highly myopic eyes. A novel surgical technique called fovea-sparing ILM peeling (FSIP) has been reported to be useful in treating this condition.

“On the other hand, glaucoma is difficult to diagnose and is often overlooked in PM due to deformity and tilting of the optic disc. It is also difficult to measure nerve fiber layer thickness, as well as ganglion cell complex thickness.

“Finally, posterior staphyloma refers to the outpouching of the wall of the eye. The presence of staphyloma significantly affects vision in myopic patients. However, despite its importance, there are no standardized methods to analyze the condition. Wide-field OCT is useful to observe the full extent of staphyloma. Future therapies to prevent the progression of staphyloma are highly expected,” she concluded. 🌿

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5. DOF2020CT4014 - Forte 1: A comparative clinical evaluation of a NEW TECNIS Presbyopia correcting IOL against a PanOptix IOL - Defocus curves and visual acuity results

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Updates in Retinal Disease Management

by Tan Sher Lynn

On Day 2 of the 36th Asia-Pacific Academy of Ophthalmology Virtual Congress (APAO 2021), experts from around the world discussed management paradigms and treatment regimens for neovascular AMD, home-monitoring of retinal diseases, and real-time telemedicine laser treatment for retinal disease.

Treatment regimens for nAMD: T&E vs PRN

Dr. Voraporn Chaikitmongkol from the Chiang Mai University, Thailand, began by noting that intravitreal anti-VEGF injections have been the first-line treatment for eyes with neovascular age-related macular degeneration (nAMD).

"Its efficacy has been proven in landmark clinical trials, including the MARINA and ANCHOR studies. However, these trials used a fixed monthly dosing regimen — and although a fixed monthly dosing regimen maximizes visual outcome for patients, it requires 24 visits and 24 injections

over two years, which increases burden for the patient and is not practical in real practice," she said.

According to the 2019 ASRS Global Trends in Retina survey, the majority of retinal specialists around the globe are currently applying either pro re nata (PRN) or treat-and-extend (T&E) as the preferred treatment regimen for wet AMD patients

Dr. Chaikitmongkol said that in the T&E regimen, treatment is initiated with monthly loading doses until no disease activity is seen on optical coherence tomography (OCT). Treatment is then continued at every visit with increasing follow-up (FU) intervals extended by two weeks per visit, to a maximum of 12 weeks to determine the "maximal fluid-free interval". When disease activity returns (showing decreased visual acuity and fluid on OCT), treatment is given, but the FU interval is reduced by two weeks. This regimen is sometimes called a "proactive regimen" as an anti-VEGF injection is given at every visit, even in the absence of disease activity.

"Both regimens should be presented to every patient. The ability to follow-up and affordability of the treatment will determine the proper regimen for each patient."

— Dr. Voraporn Chaikitmongkol,
Chiang Mai University, Thailand

On the other hand, the PRN regimen, which is a reactive regimen, requires monthly FU visits after receiving one or three consecutive loading of anti-VEGF injections. At each FU visit, anti-VEGF will be given only when disease activity is present.

So, which regimen is better? Data reveals that nAMD eyes under either PRN or T&E regimens had non-inferior visual outcomes versus a fixed-dosing regimen, as shown by the CATT and HARBOR

studies (for PRN), and TREND and CANTREAT studies (for T&E).

“Both regimens should be presented to every patient. The ability to follow-up and affordability of the treatment will determine the proper regimen for each patient,” she said.

Meanwhile, Prof. Gemmy Cheung from the Singapore National Eye Centre (SNEC), said that active nAMD is generally treated based on several factors: the natural history of macular neovascularization, the presenting vision (that predicts the outcome), and structural activity (that precedes functional loss).

“Treatment should be considered for active nAMD lesions that pose immediate or imminent threat to vision. This should be communicated to patients, even if they are asymptomatic. Certain lesions/background aetiology, such as type 1 lesions (like pachychoroid or with a central serous chorioretinopathy (CSC) background), may have less aggressive natural history. These should be considered as exceptions,” she said.

Monitoring visual acuity at home in patients with retinal disease

According to Prof. Neil Bressler from The Johns Hopkins Hospital, USA, frequent clinic visits to monitor visual acuity (VA), retinal thickness or other relevant parameters in clinical trials can be a burden — especially when treatment or other aspects of a clinic visit may not be needed, such as during pandemics, like COVID-19. Moreover, monthly or quarterly clinical visits do not necessarily measure day-to-day visual function.

“Preliminary data showed most participants could perform VA self-assessment without any physical or cognitive barrier, whether at home or in the clinic, even though the ability to adhere to the testing schedule may be challenging for some patients. Any testing frequency and time of the day had less than a 1-line variation, similar to the Early Treatment Diabetic Retinopathy Study (ETDRS) chart reading. Validating clinical use of apps relative to in-clinic VA measurements may facilitate home monitoring in these common diseases in the future. Measuring VA at home may be the new

tool in the management of common retinal diseases,” he said.

Real time teleretinal laser photocoagulation for retinal disease

Prof. Chen Youxin, from Peking Union Medical College Hospital, noted that China ranks as the world's first in terms of the number of patients suffering from fundus (or posterior segment) diseases. Data showed that 87% of the country's diabetes patients receive treatment at county-level medical institutions, but medical measures and techniques for treating diabetic retinopathy are almost exclusive to the top hospitals in big cities.

“There is an obvious lack of capacity and capability to treat fundus diseases at a grassroots level. Difficult, expensive medical treatment and uneven distribution of medical resources have become prominent problems in China,” he said.

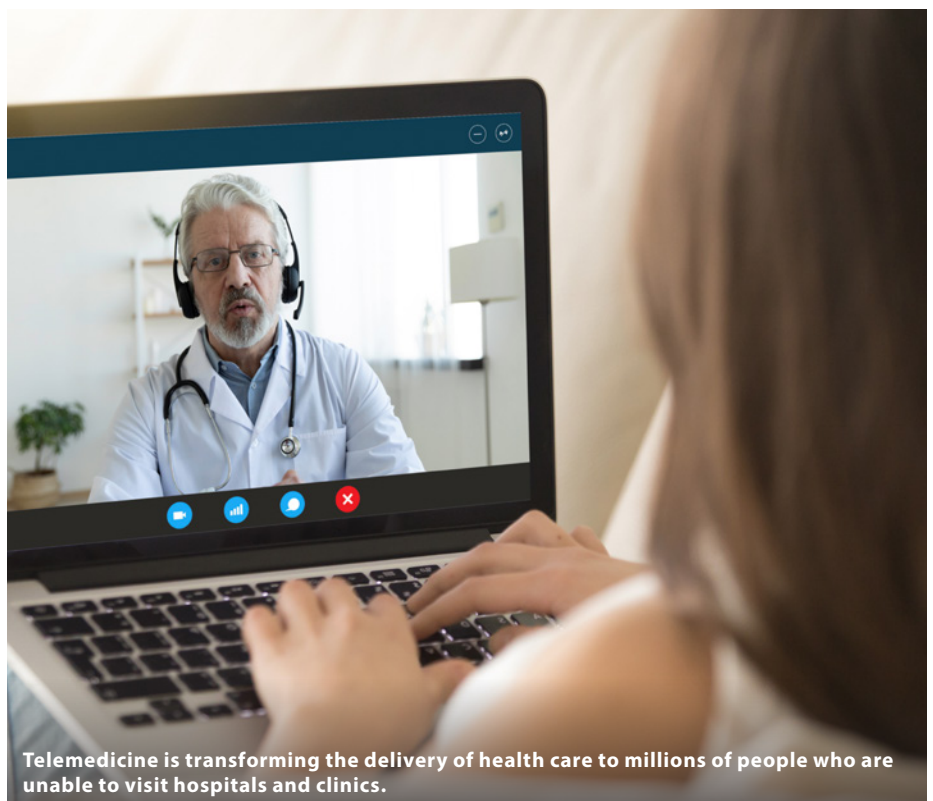
“Telemedicine is transforming the delivery of health care to millions of people who are unable to visit hospitals and clinics. Teleophthalmology-based evaluation and screening have been demonstrated in several studies.

“Retinal laser photocoagulation is an

important and economic treatment for retinal disease, including diabetic retinopathy, retinal breaks, ischemic retinopathy, etc. Nevertheless, laser treatment is difficult to carry out in primary hospitals in rural China, due to a long learning curve, experience required, among others. The 5G technology, taking advantage of low latency connections, allows doctors to perform surgery from a remote location,” he explained.

In the remote laser therapy approach, patients are examined in a primary local hospital. Data from the examination is uploaded to the cloud and experts will do laser planning remotely. Then, the experts direct the laser treatment remotely in real-time.

“The real-time telelaser approach, which includes a 5G high-speed network, navigated retinal laser photocoagulation, video-conferencing and real-time monitoring have been shown to be safe. Further studies will be needed to compare this teleretinal laser with the current standard laser to determine whether VA or safety outcomes differ. This approach may be more feasible for developing countries such as China, where network development is proceeding rapidly in many areas, while obtaining sufficient medical resources remains challenging,” he concluded. 🌱



Telemedicine is transforming the delivery of health care to millions of people who are unable to visit hospitals and clinics.

Myopia Remains a Major Concern in Asia-Pacific

by Brooke Herron



The combination of more near work and less time outdoors has created the perfect storm for a myopia epidemic in Asia.

Often considered a “pandemic” in its own right, myopia is a major health concern around the world. This is especially true in Asia, where myopia rates surpass those in the West. Therefore, on 36th Asia-Pacific Academy of Ophthalmology Virtual Congress (APAO 2021), highlights from the 2nd Asia-Pacific Myopia Society (APMS) Congress were presented, covering important updates in myopia measurement and diagnosis, pathology of related myopic conditions, and new treatment paradigms.

Consider cycloplegic refraction

“There’s lots of new data, but most of it has been taken without cycloplegia ... which is the gold standard for myopia measurement,” began Prof. Ian Morgan, from the Australian National University in Canberra, during his presentation on *New Data on Myopia Prevalence*.

“These methods overestimate the prevalence of myopia and emmetropia and underestimate the prevalence of hyperopia.”

Although there are many gaps in the evidence, Prof. Morgan says this doesn’t change the myopia and high myopia epidemic in East and Southeast Asia. That said, there have also been some positive developments in the understanding of myopia. “Despite non-cycloplegic refractions, another thing we’ve discovered especially in data from China, is that the increase of myopia during the school years is due to educational exposures almost exclusively — and not due to increasing age,” said Prof. Morgan.

See the light: Myopia interventions

Next, Dr. Pei-Chang Wu, from Kaohsiung Chang Gung Memorial Hospital, Taiwan,

shared data from different studies that assessed the impact of time outdoors and myopia. He said that there is strong evidence for increasing time outdoors as a myopia intervention — and near work is a contributing factor as well: “Every one diopter-hour of near work per week appeared to increase the odds of myopia by 2%.”

Based on this idea that light exposure can prevent myopia progression, Prof. Mingguang He, from the University of Melbourne, Australia, introduced a new device involving repeated low-level red light treatment to control myopia. He presented results from a 12-month randomized clinical trial on the home-use device used in two three-minute sessions daily (five days per week). “This is able to control 70-80% of myopia and the efficacy improves with better compliance. When compliance was more than 75%, efficacy was 90% for the SER (spherical equivalent refraction),” he said, adding that there was no structural or functional damage.

Other pathologies and complications

“Myopia maculopathy is very important to consider because it is often bilateral and irreversible, and it frequently affects patients in their productive years,” said Dr. Yuxin Fang, from Beijing Tongren Hospital, China. She then covered the different types of lesions, and pointed out that “progressive and continuous choroidal thinning play a key role in no maculopathy to tessellated fundus and to diffuse atrophy.” Meanwhile, lacquer cracks, CNV, patchy atrophy and macular atrophy are all associated with Bruch’s membrane defects.

Refractive surgery-related retinal detachments were covered by Dr. Nishant Vijay Radke, from the Shenzhen C-MER Dennis Lam Eye Hospital, China. He shared that myopic retinal degenerations include: lattice degeneration, retinal holes, horseshoe tears and maculopathy.

The final speakers covered surgical treatments, including managing ICL complications and how to get started with SMILE. Unfortunately, we don’t have the space to cover all those details here — but we do highly recommend visiting the APAO Virtual Congress website to watch these videos on-demand! 🌱

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Don't Miss These Neuro-Ophthalmic Red Flags

by Tan Sher Lynn



Experts discussed the diagnosis and management for sight-threatening, neuro-ophthalmic red flags, including diplopia, sudden visual loss and eye pain, in a symposium co-organized with the North American Neuro-ophthalmology Society (NANOS) on Day 2 of the 36th Asia-Pacific Academy of Ophthalmology Virtual Congress (APAO 2021).

Dire diplopia

Diplopia, commonly known as double vision, can be a serious cause of concern. According to Prof. Clare Fraser from the University of Sydney, Australia, when it comes to diagnosing dire diplopia, there are five causes that should not be missed. These are aneurysmal third palsy, non-isolated sixth nerve palsy, giant cell arteritis, pituitary apoplexy, and cancer (metastatic or perineural spread).

She noted that a clinical feature that is especially worrisome is headache, particularly if it's associated with skull tenderness, fever and chills, and if it's a new onset headache located at the temple region. Other localization signs are vision loss, facial sensory changes, pupil changes and ptosis, facial weakness, and auditory or balance issues.

"Be suspicious, make sure nerve palsy is truly isolated. In case of third nerve palsy, particularly if it's partial and the pupil is involved, make sure you do the appropriate imaging of the aneurysm of the posterior communicating artery. Headache and double vision can be due to space occupying the lesion/aneurysm, pituitary apoplexy and carotid cavernous fistula. Myasthenia gravis and giant cell arteritis always needs to be on the list. Be prepared to reassess your diagnosis. Microvascular nerve palsy can only be diagnosed in retrospect once it has recovered," she summed up.

A case of dramatic and sudden vision loss

Meanwhile, Prof. Dan Milea from the Singapore National Eye Centre (SNEC), talked about dramatic and sudden vision loss. He shared a case involving a 28-year-old female patient with painful and rapid visual loss (20/50) in the left eye, with no past medical history. Three months earlier, she had a similar episode where the MRI was normal and she had a rapid spontaneous recovery.

MRI was repeated for the second episode and with contrast, it revealed a dark zone at the chiasm and a possibly squeezed left optic nerve. Looking back at the first MRI, Prof. Milea disagreed that it was normal as he observed a little bit of growth at one side of the top of the optic nerve close to the chiasm.

Results from a lumbar puncture were normal and systemic inflammatory

workup showed negative results. The only thing left was to do a biopsy. Metastatic melanoma was initially suspected, but Prof. Milea soon found out it was not the case when he joined the neurosurgeon in the biopsy procedure. Blood oozed out of the tumor when it was being dissected and the pathology confirmed it to be chiasmal cavernoma. After surgery, the patient had a complete recovery of visual acuity and visual field improvement.

“Cavernomas are lesions that can be difficult to diagnose on imaging. Do not hesitate to go for biopsy, especially if your differential diagnosis is glioma or metastasis. MRI cannot help you unless you are requiring T2 or gradient echo sequences. This condition is a sudden and very dangerous form of vision loss because it can cause chiasmal apoplexy, the rupture of the cavernoma, which can cause further blindness,” he said.

The purpose of pain

Prof. Prem Subramanian from the

University of Colorado School of Medicine, USA, presented cases which showcase the importance of neuroimaging in the presence of pain.

The first case is of a 58-year-old man who had intermittent left eye pain for several days. He presented at the neuro-ophthalmology clinic with foreign body sensation and blurred vision because other physicians could not explain the cause of his pain. He underwent a visual field test, which led to the decision of getting a neuroimaging, which showed that there's some opacification of the tissue at the posterior aspect of his left orbit.

“With that, the differential diagnosis is quite broad for this condition. It can be: meningioma, sarcoidosis, lymphoma, IgG4(+) disease, or granulomatosis with polyangiitis. It was the pain that led him to seek neuro-ophthalmic consultation. So, if pain is present with persistent blurred vision, don't hesitate to get a visual field test so that you don't miss the underlying

process,” said Prof. Subramanian.

In another case, a man lost vision in his left eye due to subtle signs of inflammation at his left orbit that were not picked up early, as contrast and T1 fat suppressed imaging was not done. “Without any ocular surface findings in a 50-year-old man who had never had headache before, early workup should have included neuroimaging, which would have potentially led to the early discovery of the orbital inflammatory process and prevented his permanent left eye vision loss, which we presumed is a combined inflammatory and ischemic optic neuropathy,” he said.

“Pain and foreign body sensation may occur from orbital or central nervous system (CNS) processes. Nonspecific initial symptoms may mislead. Thorough history and examination are required. Don't image all patients with pain, look for additional signs of dysfunction which may be subtle. Follow closely if needed. You'll save a life when it's not just dry eye,” he concluded. 🐸

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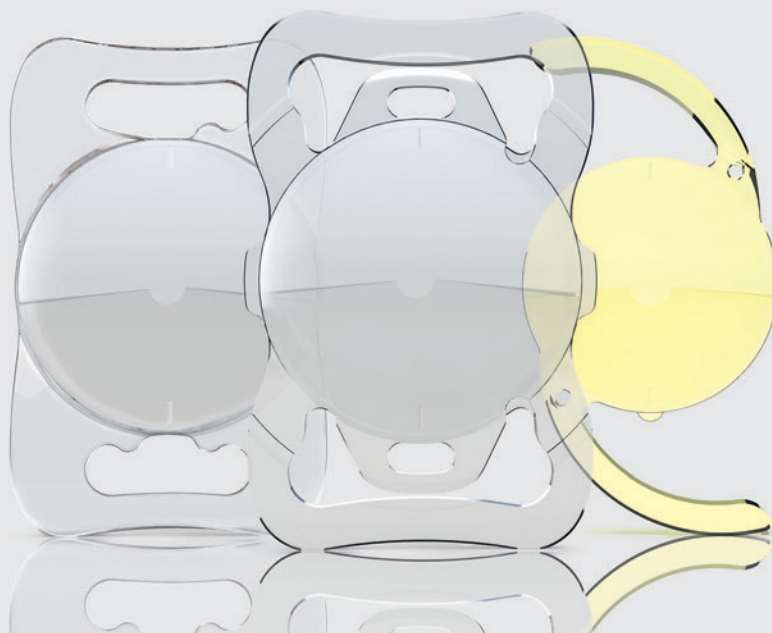
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Rapid Fire Retina Session Rivets Audience

by Andrew Sweeney



Nothing gets an intellectual's blood pumping quite like a rapid-fire quiz or seminar, something that really speeds up those brainy juices. The first two days of the 36th Asia-Pacific Academy of Ophthalmology Virtual Congress (APAO 2021) have certainly provided us with plenty of symposiums at a blistering pace. One of the foremost when it comes to relentless energy was *Rapid Fire Retina 2 (Medical – other) Update Session*, which went live on Monday, September 6.

Chaired by Dr. Prof. Xinyuan Zhang, PhD, professor and supervisor at the Beijing Institute

of Ophthalmology, Beijing TongRen Eye Center in China, the session covered a number of current issues in the retina field. Moving from a case study report on the use of *The Archway Phase 3 Trial of the Port Delivery System With Ranibizumab (PDS) for Neovascular Age-Related Macular Degeneration (nAMD): Data Update and Key Surgical Pearls*, to a report on the penetration of topical levofloxacin, and the presence

of lipoprotein A as a risk factor for polypoidal choroidal vasculopathy and AMD, this is one symposium you should return to view again.

Indeed, the first presentation about ranibizumab for nAMD really lived up to the name of the symposium and was delivered in blistering fashion by A/Prof. Andrew Chang, a clinical associate professor at the University of Sydney, Australia. He reported on a trial involving a port delivery system with ranibizumab, a permanent refillable ocular implant customized for the drug. Patients were observed over a 96-day period and less than 10% required additional treatment before each refill.

A/Prof. Chang stated that the change in best corrected visual acuity remained non-inferior through two refills after 44 weeks. Pointing to less than 10% requiring further treatment, he said the safety profile is “well categorized and manageable”. He concluded that the use of this delivery system is of benefit to patients, provided that optimized implant insertion procedures are maintained.

While we absolutely enjoyed his presentation, perhaps Dr. Sadik Etkan Bayramoglu, an ophthalmologist at the Kanuni Sultan Süleyman Training and Research Hospital Istanbul, Turkey, didn't get the memo about rapid-fire style. *Quantitative Vascular Growth and Anatomic and Refractive Outcomes of Eyes Treated with Bevacizumab in the Posterior Zone* is a bit of a mouthful. However, it also offered great insight into the use of this drug.

In one study he carried out, Dr. Bayramoglu examined 117 infant eyes using Image J software, and 38 eyes were confirmed as posterior zone I. Sadly, two patients died during the course of the study, however, after follow-up the retina was attached automatically in all but one patient with a mean time period of 13 months. He also concluded that peripapillary fibrovascular condensations regress when treated with anti-VEGF treatment and that “significant and substantial progression of retinal vascularization arises with primary anti-VEGF”. 🐸

Young Ophthalmologists Explore Uveitis, Thyroid and More

by Andrew Sweeney



Everybody likes a surprise from time to time, and one of the most joyous of these is an unexpected visit. When this occurs via media, we usually describe the unannounced arrival of a welcome visitor as a star guest. We don't usually get the opportunity to describe someone as such in the field of ophthalmology, and especially during well-planned online conferences, but today is a wonderful exception.

It took until Day 3 of the 36th Asia-Pacific Academy of Ophthalmology Virtual Congress (APAO 2021) for the stars to align and a guest visitor to appear. During the ambiguously titled *Miscellaneous: YO Symposium* (YO referring to young ophthalmologists), a very young potential future eye specialist appeared. The seminar's chair, Associate Prof. Marcus Ang from Singapore

National Eye Centre (SNEC), could barely begin his introduction before his daughter's interjections stole the show. Kudos and welcome to the world of eyes, kid.

Uveitis in Indonesia

This session had far more to offer than just guest star appearances and we heard from some of the leading ophthalmologists in the Asia-Pacific region. A particularly interesting presentation was provided by Dr. Rina La Distia Nora, an ophthalmologist at the University of Indonesia in Jakarta. *Patterns of Uveitis in a Tertiary Referral Center in Indonesia* examined rates of the eponymous disease in the country, its phenotypes, and demographic information.

Dr. La Distia Nora reported that uveitis was as common among Indonesian men as with women, but that males were more likely to experience sudden onset (60.5% versus 39.5%). Infectious uveitis was the most common etiology, with toxoplasmosis being the most common cause in 32.1% of patients, followed by tuberculosis at 19.1%. Also, she reported that 55% of patients presented with complications, including 44.5% with cataracts and 10.7% with glaucoma.

Uncovering thyroid eye disease

Another highlight of this seminar was a deep dive into thyroid eye disease (TED), a condition that can have a significant impact on patients' quality of life. Presented by Dr. Anmaria Devassy from Giridhar Eye Institute in Kochi, India, *Phenotypic Classification and Disease Activity in TED* found that there are six phenotypes of the disease. These are congestive, white eye expansion, hydraulic apex, white eye apex, cicatricial active, and cicatricial passive.

Dr. Devassy then went on to provide photographic examples of the various forms of TED which were highly informative and are well worth revisiting on-demand on the APAO platform. The most common variant was cicatricial active TED at 25%, followed by white eye expansion at 20%. The least common variation was white eye apex at just 10%.

As we mentioned this session should be available for on-demand viewing and it's well worth your time. Some of the brightest young ophthalmologists are highlighting their best work, so make sure you drop by. In the meantime, enjoy the rest of the conference and keep your eyes peeled for more guest stars. 🌟

The Cost-Effectiveness of Cataract Training

Capital Outlays Produce Results

by Sam McCommon

The costs of cataract surgery training are all over the place, and there's very little information detailing just how much that training is or should be. So, if you're looking for concrete numbers, look no further: Cataract surgery training has been shown to range anywhere from USD \$4,900 to \$306,400. If you're thinking that's all over the place and shouldn't be the case, you're onto something.

This point was brought to our attention by Dr. Danny Siu-Chun Ng, from the Chinese University of Hong Kong. Dr. Ng spoke on the cost effectiveness of different types of cataract surgery training — namely, wet laboratory simulation and virtual reality.

From a zoomed-out level, this kind of analysis makes sense: How much can universities and countries, for example, expect to spend to adequately train a cataract surgeon? Are virtual reality programs worth the added cost, and do they actually result in improved operation performance?

Simulations on the rise

As Dr. Ng pointed out, there has been a significant uptick in simulation cataract surgery training. For example, the Ophthalmologists' National Ophthalmology Database study in the U.K. demonstrated that less than 10% of first and second year trainee ophthalmic surgeons had received simulation training in 2009. By 2015, that number had skyrocketed to 80%.

If just a few students receive simulation training, the costs are largely negligible. At much higher numbers, the costs start to matter a lot more — especially since, as Dr. Ng noted, the association of cost of simulation cataract surgery training with clinical outcomes is not known. So, is the money used to train cataract surgeons being put to good use?

Dr. Ng presented data comparing students' and cost results from three groups. One group had used a virtual reality training program called Eyesi® (Haag-Streit Simulation, Mannheim, Germany) as well as time in the wet lab; a second group used only simulation in the wet lab; and the third group was the control, which received no simulation training.

What's actually cost effective?

Before we get to the cost, take a brief note: Students that had time both with the virtual reality program and the wet lab had better ICO-OSCAR phaco scores compared to the wet lab group. Both the VR/wet lab group and the wet lab group had better results than the control group. So, the training works.

This is where things get really interesting, however. From the perspective of capital investment, the combination training — both wet lab and virtual reality — was the least favorable option. However, from the perspective of recurring costs, combination training was the most favorable for cost effectiveness.

A university or similar training institution will have to consider their willingness to pay (WTP) when choosing between the phaco wet lab or a combination phaco wet lab and virtual reality simulator. In the first scenario presented by Dr. Ng, an institution with a basic wet lab and a capital investment WTP of less than \$22,500 per ICO OSCAR phaco score is better off upgrading to a phaco wet lab. North of \$22,500, and they're better off with the phaco wet lab plus virtual reality.

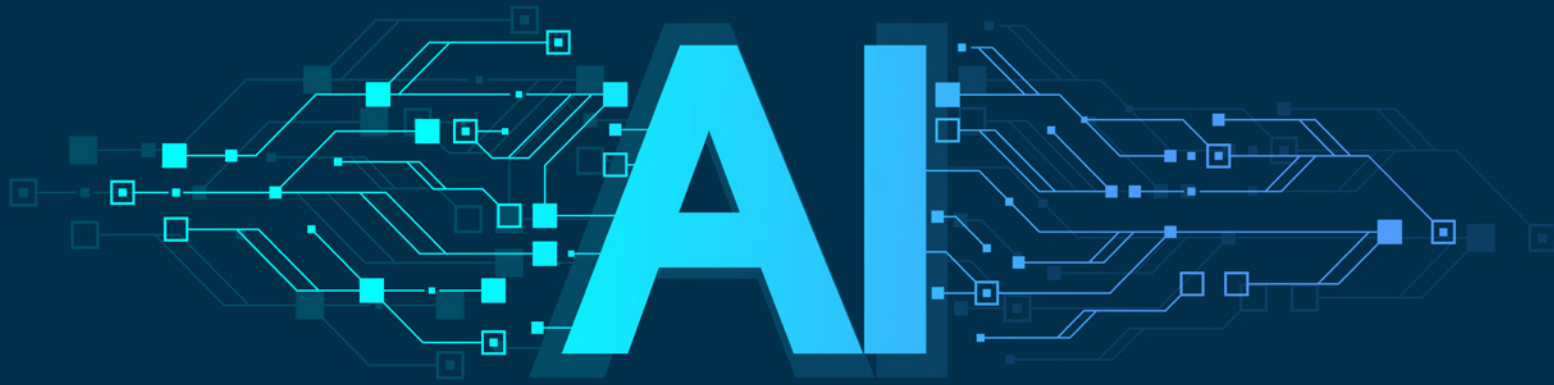
In the second scenario, an institution with a phaco wet lab and a capital investment WTP less than \$25,000 should stick with their phaco wet lab. North of that, and they can combine it with a virtual reality simulator.

In a third scenario — this time recurring cost — the numbers get much friendlier. Once the capital outlays have taken root, a phaco wet lab will be more cost effective at less than \$1,400 per ICO OSCAR score. The phaco wet lab in combination with virtual reality will be effective anywhere more than a WTP of \$1,850 per score.

Once the capital has been spent for both the virtual reality system and the phaco wet lab, costs go down significantly on a per-use basis.

There's a lot more to look into, like how much practice resulted in reduced operation time or reduced complication rates. But knowing how much to invest in students is a great start, and we're not terribly surprised to see that more investment led to better outcomes. 🌱





and Big Data in Ophthalmology

Inertia at Work *by Sam McCommon*

The big daddy of “big data” is on the scene, and it’s going to turn the whole world on its head. Change the whole scene, you see? Everything is going to be easier, with progress at the push of a button even easier than a check signed with the stroke of a pen.

Except it’s not that easy, as we all unfortunately know. Anyone with an inkling of the dot-com bubble can remember the rush of anticipation the world felt for what was, at the time, an underwhelming product — the internet of yesteryear. So, before anyone gets too excited about the AI and big data revolution in medicine, we would be wise to recall that every solid development takes time and nothing happens overnight.

Given enough time and the wise application of resources, however, Big Data (capitalization intentional) and AI can indeed bring about significant, positive changes in the medical world.

Such was the message from multiple presenters from the American Academy of Ophthalmology (AAO) at Day 3 of the 36th Asia-Pacific Academy of Ophthalmology Virtual Congress (APAO 2021). And although many are chomping at the bit to get AI and big data fully integrated in the medical world, some

words of caution and care are well advised here.

Hold your horses — it’s not always easy

The adoption of technology in medicine is complicated, and rarely follows a direct route from concept to implementation. As Dr. Thomas Hwang pointed out, the concept of electronic medical records was pioneered as early as 1969 by Lawrence Weed. Electronic health records (EHRs) are an “obviously” good idea, he noted, because they reduce errors related to handwriting, capture discrete data and make information transportable. So why did it take so long for EHRs to become anything close to standard?

Dr. Hwang had one possible answer — what he called the “Last Mile Problem”. In general, this problem refers to the user-end implementation of technology like cable or internet services. You can build the whole infrastructure, but developing a user base that’s comfortable with what they’re doing is a different game entirely.

Dr. Hwang also noted that even ophthalmic technologies that are now well-accepted had a long and

bumpy road to adoption — like phacoemulsification, vitrectomy or, indeed, EHRs. Adopting EHRs after U.S. federal initiatives led to doctor burnout and no clear savings — so let it be known that implementing new technology does not always make life easier, and definitely not immediately.

Advocating for change

Simply because big changes aren’t easy doesn’t mean they shouldn’t be done. AI and big data are part of the world now, and will become a larger part of the future, whether we want them to or not — barring solar flares that knock out the electrical grid or some such similar Hollywood-style disaster.

So, what can organizations like the APAO and AAO do to advocate not just for change, but for the right kind of change? Dr. J. Peter Campbell, the chair of the AAO’s AI Committee, might be the man to ask.

Dr. Campbell noted three specific areas of change that AI can help target — and that education via professional organizations needs to focus on. These areas that AI will hugely influence are research, education and patient care. In research, for example, AI can play a

huge role in image classification, image segmentation, disease prediction and federated learning.

Autonomous AI in patient care seems like the way of the future — but there are huge ethical issues that must be addressed and well understood before the industry goes diving down that rabbit hole.

As Dr. Campbell pointed out, AI is simply a very powerful tool — and like all tools, it has great potential for both benefit or harm depending on how it is implemented. He suggested that professional organizations like his advocate for AI reimbursement and research funding, and for improved interoperability in medical imaging. Additionally, doctors need to demonstrate added value for patients and not just added cost, while ensuring ethical and effective implementation everywhere.

Dr. Hwang also suggested relying on professional organizations to connect ophthalmologists who lead their practices in IT issues, helping take

experts out of silos and developing more community-centered IT practices. This will lead to further relationships built between manufacturers, doctors and developers to help everyone be on the same page.

The IRIS Registry

Dr. Flora Lum, vice president of quality and data science at the AAO, led her talk on the Intelligent Research in Sight (IRIS) Registry with a pertinent quote: “If you can’t measure it, you can’t improve it.” So spoke Lord Kelvin in 1880, a man who knew a thing or two about measuring things.

He’s right, though. The standardization of ophthalmic data is one of the most important developments in the field, as metrics help ophthalmologists improve their outcomes.

Dr. Emily Chew, director in the division of epidemiology and clinical applications at the National Eye Institute, gave us a taste of what IRIS looks like.

As of right now, there are 17,967 physicians from 4,189 practices in the IRIS registry, covering a roughly smaller amount of EHRs. That covers 397 million patient visits, representing more than 69 million patient points.

When you get to numbers this big, the world starts to look a bit different. This kind of huge data gathering may well change the course of ophthalmic research in many ways, especially now that there is sufficient computing power — and user know-how — to work with it.

We’ll close here with a bit from Dr. David W. Parke II, the AAO CEO. “The IRIS Registry will represent a seminal change in how the medical specialty of ophthalmology will improve performance and outcomes, while shortening the timeline for the dissemination of important clinical knowledge, research and results of drug and device surveillance.”

We could comment more, but that about sums it up. It’s a changing world out there. Tread lightly, but do tread. 🐾

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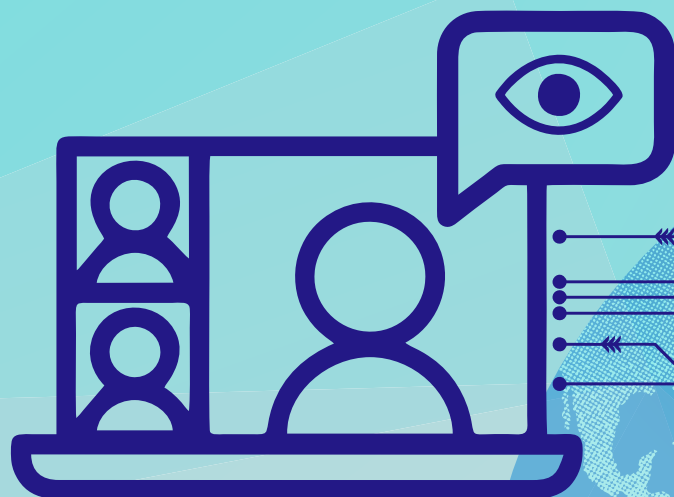
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