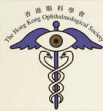


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# The 16<sup>th</sup> APVRS

## CONGRESS OF THE ASIA-PACIFIC VITREO-RETINA SOCIETY

held in conjunction with

The 3<sup>rd</sup> Asia-Pacific Ocular Imaging Society Congress

The Asia-Pacific Society of Eye Genetics 2023 Annual Meeting

The 35<sup>th</sup> Annual Scientific Meeting

Hong Kong Ophthalmological Symposium

### December 8-10, 2023

Hong Kong Convention and Exhibition Centre



# ABSTRACT BOOK





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## FREE PAPERS

## Cataract and Refractive Surgery

**A Prospective Study of Vivity and Vivity Toric IOLs in Taiwan: Preliminary Results and Analysis***First Author: Tzu-te HU**Co-Author(s): Chao-kai CHANG, Chencheng CHAO*

**Purpose:** Vivity is the first non-diffractive wavefront shaping designed extended depth of focus (EDOF) IOL in the world. The aim of our study is to evaluate the quality of vision after bilateral Vivity or Vivity toric EDOF IOL implantation in Taiwan. This is the first large-scale prospective study on the outcomes of Chinese individuals using Vivity.

**Methods:** Our study was a prospective, single arm study. The inclusion criteria for this study were the presence of cataracts in both eyes who received bilateral Vivity IOL implantation, targeting emmetropia or mini-monovision (-0.50 D) in both eyes. Methods of measuring outcomes included binocular uncorrected and corrected far, intermediate (66 cm), and near (40 cm) visual acuity. Visual quality measurement including intermediate reading speed test using International Reading Speed Test, Questionnaire for Visual Disturbances, and Intraocular Lens Satisfaction questionnaire were performed before and after surgery for 3 months.

**Results:** There were 37 patients and 74 eyes were included in our study, with 26 patients targeting emmetropia and 11 patients targeting mini-monovision (-0.50 D). For visual acuity outcomes, the uncorrected binocular far, intermediate, and near visual acuity were  $0.04 \pm 0.05$ ,  $0.23 \pm 0.15$ , and  $0.33 \pm 0.19$  logMAR, respectively. Corrected binocular far visual acuity was  $0.00 \pm 0.01$  logMAR, while intermediate and near visual acuity were  $0.16 \pm 0.22$  and  $0.20 \pm 0.19$  logMAR. For intermediate reading speed outcomes, the mean reading time was  $44.5 \pm 9.8$  seconds, and the mean

reading speed was  $209.5 \pm 46.4$  words per minutes.

**Conclusions:** Vivity IOL could achieve good far and intermediate vision, with acceptable near visual acuity. For possible photopic problems, halo and glare were complained of less.

**Clinical Outcome of Phacoemulsification Combined with Intraocular Lens Implantation for Primary Angle Closure/Glaucoma with Cataract***First Author: Yuan HE**Co-Author(s): Ruixue ZHANG*

**Purpose:** To evaluate the efficacy of phaco combined with intraocular lens implantation for treatment of primary angle closure/glaucoma (PAC/PACG) patients with cataract.

**Methods:** A total of 62 patients treated in our hospital meeting the inclusion criteria were included, including 62 eyes (26 PAC eyes and 36 PACG eyes). PACG patients were divided into early, middle, and advanced stages based on the HPA visual field staging system. The subjects were also grouped according to the extent of PAS. Patients received topical medical treatment preoperatively. The visual acuity, IOP, ACD, medication used, visual field, and RNFL were observed before and 6-24 months after surgery.

**Results:** The mean age of the patients was  $68 \pm 8.91$  years old, and postoperative follow-up was  $13.1 \pm 5.5$  months. Postoperative visual acuity was improved in all patients. Postoperatively, the IOP decreased significantly, the number of medications was reduced, and the ACD was deeper than that before operation. There was no significant difference in visual field or RNFL after surgery during the follow-up. There was no statistical difference in postoperative changes of various indexes between PAC and PACG patients. The decrease of IOP in patients with early stage PACG was significantly higher than that in patients in the middle and advanced stages, and the number of medications used in

## FREE PAPERS

early-stage PACG patients was also significantly lower than that of advanced patients.

**Conclusions:** In PAC/PACG patients, phaco can significantly control IOP and prevent visual field defect and progressive loss of RNFL, indicating that the procedure has a protective effect on the optic nerve.

### Comparative Evaluation of the Techniques of Sutureless Scleral Fixation of Posterior Chamber Intraocular Lenses with and without Fibrin Glue

*First Author: Shachi SRIVASTAVA*

**Purpose:** Clinical comparison between the techniques of sutureless scleral fixation of intraocular lenses (SF-IOLs) with and without fibrin glue in patients with deficient/absent capsular support.

**Methods:** 40 patients were randomly divided into 2 groups: Group A had sutureless SF-IOL using fibrin glue; group B had sutureless SF-IOL without fibrin glue. Patients were evaluated in terms of surgical time, intraoperative difficulties, and postoperative complications, i.e., healing of scleral flap, corneal clarity, anterior chamber reaction, postoperative visual recovery, induced astigmatism, pupillary abnormalities, IOP changes, and centration of IOL. Patients were followed up for minimum of 6 months. Unpaired T test and 2 factor repeated measures ANOVA were used for statistical analysis.

**Results:** The mean surgical time was greater in glued IOLs ( $48.50 \pm 0.05$  min) than in the sutureless IOL group ( $43.75 \pm 13.06$  mins) ( $p = 0.361$ ). Postoperative best-corrected visual acuity was comparable in the 2 groups. In both the groups, the scleral flaps were well apposed and healthy. Cornea cleared in 2-3 weeks postoperatively in both groups. Two patients in each group had mild IOL decentration which did not affect their vision. A significant rise in postoperative IOP was seen only in the glued IOL group ( $p = 0.049$ ).

**Conclusions:** Sutureless SF-IOL without glue not only avoids the cost of fibrin glue but is also equally efficacious. The glued IOL group

was associated with increased incidence of secondary glaucoma which may be due to multiple surgeries.

## Cornea and External Eye Disease

### Lycium barbarum Polysaccharide Promotes Corneal Re-epithelialization After Alkaline Injury

*First Author: Ho Lam WONG*

*Co-Author(s): Yashan BU, Joseph Yau Kei CHAN, Kendrick SHIH*

**Purpose:** Chemical injury of the cornea results in epithelial defect and subsequent stromal scarring and infection. Our study aims to evaluate the effectiveness of pre-treatment with Lycium barbarum polysaccharide (LBP) in promoting corneal re-epithelialization after alkaline burn.

**Methods:** The corneas of C57BL/6J mice were pre-treated with topical phosphate-buffered saline or LBP (0.2/2/20 mg/mL) for 7 days, following by 0.1 M sodium hydroxide injury for 30 s and washing with distilled water for another 30 s. Area of epithelial defect and thickness of cornea were evaluated. Inflammatory cytokines and water channel expression levels were assessed using immunohistochemistry and Western blot.

**Results:** Compared to the injury group, mice with 2 mg/mL LBP pre-treatment revealed a significant decrease in fluorescein stained area after injury ( $p = 0.025$ ), with increased epithelial layer thickness ( $p = 0.004$ ). The corneal opacity was significantly reduced in the group with 2 mg/mL LBP pre-treatment followed by injury ( $p = 0.02$ ). The expression of matrix metalloproteinase 12 ( $p = 0.033$ ), platelet derived growth factor-BB ( $p = 0.031$ ), and aquaporin 5 ( $p = 0.022$ ) resulted in a decrease in expression level in the group with 2 mg/mL LBP pre-treatment.

**Conclusions:** Our results showed that 2 mg/mL LBP, with no apoptotic effect on corneal cells, promoted corneal epithelial growth and minimized disruption of the collagen architecture after injury in vivo. We suggest that

LBP, as a natural traditional Chinese medicine, may potentially be a novel topical pre-treatment option for patients highly susceptible to ocular injury.

### Ocular Surface Changes After Periocular Steroid Injection to the Levator Palpebrae Superioris: Superior Rectus Complex and Lacrimal Gland for Eyelid Retraction, Swelling, and Lateral Flare

First Author: Yan Tung Abbie **TANG**

**Purpose:** Periocular steroid (POS) injection to the levator palpebrae superioris-superior rectus complex (LPS-SR) and lacrimal gland (LG) can reduce the size and the inflammation of LPS-SR and LG. This study aims to evaluate the outcomes of POS injection to LPS-SR, and POS injection to LPS-SR and LG for dry eye disease.

**Methods:** A prospective cohort study of patients who received triamcinolone (TA) injection for thyroid eye disease-related upper eyelid retraction, eyelid swelling, and lateral flare between January 2018 and December 2022. The present study comprised 2 groups: eyes that received TA injection to LPS-SR (group 1); eyes that received TA injection to LPS-SR and LG (group 2). The data from Keratograph 5M, LipiView, and slit lamp examinations before and after injections were compared.

**Results:** A total of 46 eyes were evaluated. The tear break-up time for group 2 before and after injection showed clinical improvement (N = 18 eyes,  $p = 0.048$ ). Oxford grading also significantly improved in group 2 (N = 22 eyes,  $p = 0.004$ ). Significant improvement for meibomian gland dysfunction grading in group 2 is also noted (N = 11 eyes,  $p = 0.0150$ ). Other parameters, including tear meniscus height and lipid layer thickness, did not show significant differences between pre- and post-injection for group 2 (all  $P > 0.005$ ). There were no significant improvements in all dry eye parameters in group 1 ( $P > 0.005$ ).

**Conclusions:** This study shows POS injections to LG can lengthen the tear break-up time and improve corneal damage and meibomian gland function. These findings suggest the potential

use of POS injection to the LG in managing dry eye disease.

### Probiotic Pretreatment Attenuates Impaired Corneal Re-epithelialization in Diabetic Mice Through Amelioration of T Cell Immunity and Remodulation of the Intestinal Microbiome

First Author: Kendrick **SHIH**

Co-Author(s): Yashan **BU**, Joseph Yau Kei **CHAN**, Ho Lam **WONG**

**Purpose:** We aim to investigate the effect of probiotic pretreatment on delayed corneal epithelial wound healing, the ocular surface and systemic T cell immunity, and microbiome indices in diabetic mice after alkaline chemical injury of the cornea.

**Methods:** Heterozygous Ins2Akita mice were used as a mouse model of type I diabetes, with WT C57Bl6/J mice serving as controls. Probiotics IRT5 or PBS was administered to the mice by oral gavage continuously for 14 days before the corneal alkaline burn injury. At day 15, alkaline burn injury was induced on the right eye of mice under general anesthesia. The cornea was examined with slit lamp with fluorescein stain under cobalt blue light. T cell profiles on the ocular surface and in the peripheral blood were analyzed by flow cytometry. Intestinal microbiome diversity pattern was characterized using shotgun metagenomics sequencing.

**Results:** Probiotic pretreatment restored the delayed corneal wound healing in diabetic mice. In the peripheral blood and on the ocular surface, significantly elevated levels of CD4+ T cells were seen in PBS-pretreated WT mice and probiotic-pretreated WT and diabetic mice but were not seen in PBS-pretreated diabetic mice. Our analysis of the gut microbiome in response to corneal alkaline burn injury and probiotic pretreatment revealed significant differences in gut microbiome composition and diversity. Specifically, the relative abundance of *Prevotella* sp PINT, *Helicobacter ganmani* was found to be altered following the injury and probiotic pretreatment.



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**Conclusions:** Probiotics are promising in the management of diabetic keratopathy.

### Eye Trauma, Emergencies & Infections

Dec 10, 2023 (Sun) 08:30 - 10:00  
Venue: S422

**Effect of Intravitreal Bevacizumab on the Sequelae of Posterior Segment Open Globe Injuries: A Prospective Randomized Pilot Trial**  
First Author: Vivek **DAVE**

**Purpose:** To assess the effect of intravitreal bevacizumab during primary globe repair on the sequelae of posterior segment open globe injuries.

**Methods:** A prospective randomized study conducted at a tertiary eye care center in south India. Cases of posterior segment open globe injuries (involving zone II and/or zone III) were enrolled. All demographic and clinical data were recorded. Patients were randomized into bevacizumab (B) and no-bevacizumab (NB) groups. The bevacizumab group received intravitreal bevacizumab 1.25 mg/0.05 mL at the end of the primary globe repair. Patients were followed up for the outcome measures of vitreous hemorrhage (VH) and retinal detachment (RD) in the follow-up period.

**Results:** Total enrolment was 26 eyes in the B and 28 eyes in the NB group. All demographic factors including type of injury, zone of injury, time between injury and management, and presenting visual acuity were comparable. At 1 week follow-up, VH was significantly lesser in the B group (21.4% versus 78.6%,  $p = 0.003$ , 95% CI 20.2% to 76.78%). At 1 month RD was significantly lower in the B group (12.5% versus 58.3%,  $p = 0.01$ , 95% CI 10.46% to 69.9%). Mean follow-up was  $5.7 \pm 2.3$  months.

**Conclusions:** Intravitreal bevacizumab may reduce the sequelae of vitreous hemorrhage and retinal detachment following posterior segment open globe injuries.

Dec 10, 2023 (Sun) 08:30 - 10:00  
Venue: S422

**Parasitic Eye Diseases: Nuances of Rapid Detection, Management Approach, and Outcome in a Tertiary Eye Care Center**  
First Author: Manabjyoti **BARMAN**  
Co-Author(s): Harsha **BHATTACHARJEE**, Dipankar **DAS**

**Purpose:** To study the pattern of parasitic eye diseases, management approach, and long-term outcome in a tertiary eye care center in India.

**Methods:** Case sheets of ocular parasitic diseases reported to the institution during the last 15 years were reviewed retrospectively. Profile of patients, ocular findings, investigation profile, and available serological test reports and management approach were analyzed. Details of microscopic findings, as done in selected cases, were analyzed.

**Results:** Total 158 cases were observed over the span of 15 years. Toxoplasmosis ( $n = 92$ , 58.2%), Toxocariasis ( $n = 31$ , 19.6%), Cysticercosis ( $n = 18$ , 11.39%), Hydatidosis ( $n = 5$ , 3.16%), Dirofilaria ( $n = 5$ , 3.13%), Thelazia ( $n = 3$ , 1.89%), Gnathostoma ( $n = 2$ , 1.26%), and suspected diffuse unilateral subacute neuroretinitis (DUSN) ( $n = 2$ , 1.26%). Live parasites were surgically removed with good prognosis. Conservative management was chosen in selective cases.

**Conclusions:** The present study discusses characteristics of ocular parasites and their rapid diagnosis along with techniques of management. When diagnosed and treated early, the outcome of ocular parasitic diseases is favorable.

## General Ophthalmology

### A Clinical Comparative Study Between Foldable Capsular Buckle Pressing and Conventional Scleral Buckling in the Treatment of Rhegmatogenous Retinal Detachment

First Author: Cheng LI

Co-Author(s): Xuemin TIAN

**Purpose:** To compare the clinical efficacy of scleral buckling using foldable capsular buckle (FCB) and conventional scleral buckling (SB) for the treatment of rhegmatogenous retinal detachment (RRD).

**Methods:** Analysis of 32 patients with 32 eyes with RRD treated with FCB and 28 patients with 29 eyes with RRD treated with conventional SB. Preoperative and Postoperative examinations were recorded. The surgical success rate, best-corrected visual acuity (BCVA), intraocular pressure (IOP), and persistent subretinal fluid (SRF) were compared.

**Results:** All the RRD were successfully reattached in both groups at 12 weeks postoperatively. At 12 weeks postoperatively, the BCVA improved from  $1.29 \pm 0.75$  (logMAR) to  $0.36 \pm 0.25$  (logMAR) ( $P \leq 0.05$ ) in the FCB group and  $1.15 \pm 0.69$  (logMAR) to  $0.33 \pm 0.22$  (logMAR),  $P < 0.000$  in the SB group. IOP improved in both groups, from  $12.59 \pm 2.83$  mm Hg to  $15.45 \pm 3.56$  mm Hg,  $P < 0.05$  in the FCB group and from  $12.9 \pm 2.68$  mm Hg to  $15.03 \pm 3.18$  mm Hg,  $P = 0.007$  in the SB group. In the SB group, 9 eyes showed persistent SRF postoperatively, while in the FCB group, 1 eye exhibited persistent SRF. In the FCB group, the average operation time was  $45.26 \pm 11.24$  minutes, and in the SB group, the average operation time was  $97.45 \pm 21.38$  minutes,  $P < 0.0001$ .

**Conclusions:** Both surgeries can effectively reattach the retina and improve patients' BCVA and IOP, but the FCB external compression group has shorter surgical time, controllable complications, and high safety without pulling the extraocular muscles and the risk of oculocardiac reflex.

### Low Clinical Activity Score Thyroid Eye Disease: Review of 1439 Patients from a Tertiary Center in Hong Kong

First Author: Kei Hei LAI

Co-Author(s): Fatema Mohamed Ali Abdulla ALJUFAIRI, Kam Lung CHONG, Kenneth LAI

**Purpose:** To report the clinical-serological features and treatment profiles of 1439 thyroid eye disease (TED) patients from a tertiary center in Hong Kong.

**Methods:** A retrospective cohort study of consecutive TED patients managed at the Thyroid Eye Clinic, The Chinese University of Hong Kong between 2014 and 2023. Clinical documents, treatment profiles, and serological profiles were reviewed.

**Results:** A total of 1439 (70% female, 98% ethnic Han Chinese) TED patients (26% ex/current smokers), average onset age of  $43 \pm 59$  years, were reviewed. Duration from symptom onset to our consultation was  $6 \pm 3$  months. Up to 85% of patients were diagnosed with Graves' disease and 12% were treated with radioactive iodine. There was a positive family history of autoimmune thyroid disease in 35% of patients. Euthyroid Graves' ophthalmopathy (EGO) was diagnosed in 6% of patients and they were associated with asymmetric presentation ( $P < 0.001$ ). The most common presentation was upper eyelid retraction (53%), followed by upper eyelid swelling (36%), redness (34%), and lower eyelid retraction (32%). The clinical activity score (CAS) was  $1.2 \pm 1.4$ . Up to 41% of patients had restrictive myopathy and 17% were diagnosed with dysthyroid optic neuropathy. Thyroid-stimulating hormone receptor antibody, TSI thyroid-stimulating immunoglobulin, and thyroid peroxidase antibody were elevated in 75%, 69%, and 57% of treatment-naive patients. Male and onset age above 39 were associated with higher CAS and NOSPEC scores (both  $P < 0.05$ ). 33% and 16% of patients received intravenous methylprednisolone and surgical decompression.

**Conclusions:** Most TED patients presented clinically inactive with CAS below 3, yet up

to 48% of patients had at least moderate-to-severe disease. Additional MRI could enhance the detection of active TED in Asian patients.

### **Pediatric- Versus Adult-onset Thyroid Eye Disease: Difference in Clinical Presentations**

*First Author: Lok Lam SIU*

*Co-Author(s): Fatema Mohamed Ali Abdulla ALJUFAIRI, Kam Lung, Kelvin CHONG, Ting Hei TSANG, Kenneth Ka Hei LAI*

**Purpose:** Whether pediatric- and adult-onset Grave's disease are one disease with divergent manifestations remain controversial. Similarly, there is insufficient literature comparing patients with pediatric- and adult-onset thyroid eye disease (TED). We evaluated the epidemiological and clinical characteristics between these 2 groups.

**Methods:** A prospective cohort study of Han Chinese TED patients managed at The Chinese University of Hong Kong between 2014 and 2023. Grouped by the age of TED onset (<18 or >35), we compared the presenting clinical activity score (CAS), worst-affected marginal reflex distance 1 (MRD1), exophthalmometry, extraocular motility (EOMy), diplopia or dysthyroid optic neuropathy (DON), and treatment profiles.

**Results:** Thirty-four (3%) patients, 29 (85%) female, among 920 TED patients presented at the age of  $13 \pm 4$  (3 to 17). Compared to adult-onset patients, they were more likely to be associated with of 35% ( $P = 0.027$ ), more likely to present bilaterally ( $P = 0.008$ ), with lower CAS ( $P = 0.001$ ), minimal EOMy restriction ( $P = 0.004$ ), or diplopia ( $P = 0.0001$ ). None developed DON or visual threatening keratopathy. They exhibited exophthalmos (74%), upper eyelid retraction (59%), swelling (29%), and acquired epiblepharon (26%). Thyroid-stimulating immunoglobulin, thyroid-stimulating hormone receptor antibody, and thyroid peroxidase antibody were elevated in 100%, 88%, and 70% of pediatric patients. Three (9%) pediatric versus 80 (9%) adult patients underwent decompression for exophthalmos ( $P = 0.97$ ), while 1 (3%) pediatric versus 301 (34%) adult patients received

intravenous steroid ( $P = 0.0001$ ). One 5-year-old received intravenous immunoglobulin and tocilizumab infusion.

**Conclusions:** Consistent with most published reports, pediatric-onset patients required fewer treatments for milder TED activity and severity. Degrees of exophthalmos and upper eyelid retraction, however, were comparable with adult patients. Studies comparing different ethnicities and their long-term outcomes are warranted.

## Glaucoma

### **Establishment of Primary Angle Closure Glaucoma Screening Models Based on Artificial Intelligence Algorithm**

*First Author: Ziwei FU*

**Purpose:** To analyze primary angle closure suspect (PACS) patients' anatomical characteristics of anterior chamber configuration, and to establish an intelligent medical aided diagnostic system for PACS screening.

**Methods:** A total of 1668 scans of 839 patients were included in this cross-sectional study from 2019 to 2021. According to whether the fellow eye had an attack of PAC or not, the sets were divided into 2 groups: PACS group and normal group. We analyzed anatomical diversity between the 2 groups and extracted the structural features of PACS. Then, we established an intelligent medical aided diagnostic system based algorithm such as classification and regression tree (CART), random forest (RF), logistic regression (LR), and convolutional neural network (CNN).

**Results:** The PACS group had thick cornea, shallow anterior chamber, narrow angle, and prepositive lens. The anterior chamber's parameters were essential for diagnosis. Based on this, we developed 3 machine learning models. RF showed the best diagnosability, CART possessed better diagnosability, LR provided poor diagnosability. In CNN, AlexNet was better than VGG-16. The diagnosability



of 2 CNN was better than 5 junior physicians. Mean value of diagnostic indicators of 2 CNN was similar to ophthalmologists.

**Conclusions:** Different from the normal group, the PACS group had unique anatomical features. It is feasible to screen PACS patients using anatomical features. Based on this, we established several artificial intelligence models that had powerful capability and reached the level of ophthalmologists. An intelligent medical aided diagnostic system will be a reliable tool for PACS screening in the future.

### Macular Ganglion Cell Complex Layer Thickness Measured with Spectral-domain OCT in a Large Population-based Cohort Study

First Author: Hongyi LIU  
Co-Author(s): Caixia LIN, Ningli WANG, Jian WU

**Purpose:** To establish the normal GCC thickness profile in the general population using SD-OCT in different macular sectors. To determine the systemic and ophthalmic factors associated with GCC thickness and also further identify the potential risk factors were the secondary objectives.

**Methods:** The population-based cohort study recruited participants with an age over 30 years. All participants underwent a standard ophthalmic examination. GCC thickness was obtained using SD-OCT. Mixed linear models were adopted to evaluate the correlation of GCC thickness with ocular parameters as well as systemic factors. R V.4.1.1 software was used for statistical analysis.

**Results:** 490 subjects with an average age of  $56.60 \pm 10.39$  years were collected in this analysis. GCC average thickness measured was  $95.57 \pm 7.47 \mu\text{m}$ . GCC thickness of the superior ( $95.46 \pm 7.87 \mu\text{m}$ ) was the thinnest, and the inferior subfield ( $95.68 \pm 7.66 \mu\text{m}$ ) was thickest. In univariate and multivariate regression models, thinner GCC thickness was significantly associated with older age ( $P < 0.001$ ), absence of smoking ( $P = 0.002$ ), higher SBP ( $P < 0.001$ ) and DBP ( $P < 0.001$ ), more diabetes ( $P < 0.001$ ),

higher HbA1c ( $P < 0.001$ ), lower HDL ( $P = 0.001$ ), higher LDL ( $P = 0.011$ ), coronary heart disease ( $P < 0.001$ ), history of coronary heart disease ( $P = 0.007$ ), lower IOP ( $P = 0.198$ ), higher spherical equivalent ( $P = 0.009$ ), and better BCVA ( $P < 0.001$ ).

**Conclusions:** Our findings further emphasize the need to demonstrate ethnic differences in GCC thickness and the specificity of associated ocular and systemic factors, as well as to develop better normative databases worldwide.

### Multimodal Machine Learning Using Visual Fields and Peripapillary Circular OCT Scans in Detection of Glaucomatous Optic Neuropathy

First Author: Deming WANG  
Co-Author(s): Fei LI, Xiulan ZHANG

**Purpose:** To develop and validate a multimodal artificial intelligence algorithm, FusionNet, using the pattern deviation probability plots from visual field (VF) reports and circular peripapillary OCT scans to detect glaucomatous optic neuropathy (GON).

**Methods:** FusionNet based on bimodal input of VF and OCT paired data was developed to detect GON. Visual field data were collected using the Humphrey Field Analyzer (HFA). Two thousand four hundred sixty-three pairs of VF and OCT images were divided into 4 datasets: 1567 for training, 441 for primary validation, 255 for the internal test, and 200 for the external test set. GON was defined as retinal nerve fiber layer thinning with corresponding VF defects.

**Results:** FusionNet achieved an area under the receiver operating characteristic curve (AUC) of 0.950 and outperformed VFNet (AUC, 0.868), OCTNet (AUC, 0.809), and 2 glaucoma specialists (glaucoma specialist 1: AUC, 0.882; glaucoma specialist 2: AUC, 0.883) in the primary validation set. In the internal and external test sets, the performances of FusionNet were also superior to VFNet and OCTNet (FusionNet vs VFNet vs OCTNet: internal test set 0.917 vs 0.854 vs 0.811; external test set 0.873 vs 0.772 vs 0.785).

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No significant difference was found between the 2 glaucoma specialists and FusionNet in the internal and external test sets, except for glaucoma specialist 2 (AUC, 0.858) in the internal test set.

**Conclusions:** FusionNet, developed using paired VF and OCT data, demonstrated superior performance to both VFNet and OCTNet in detecting GON, suggesting that multimodal machine learning models are valuable in detecting GON.

### Intraocular Inflammation, Uveitis & Scleritis

Dec 10, 2023 (Sun) 10:30 - 12:00  
Venue: S422

#### Examination of Galactomannan Levels in the Intraocular Fluid to Assist the Diagnosis of Aspergillus Endophthalmitis

First Author: Ting **YU**  
Co-Author(s): Yong **TAO**, Li **CHEN**

**Purpose:** To evaluate the utility of galactomannan (GM) testing of intraocular fluid to diagnose Aspergillus endophthalmitis (AE).

**Methods:** This retrospective study enrolled 3 groups, including 17 eyes with AE; 20 eyes with intraocular infection of bacteria, viruses, or other fungi; and 19 cataract eyes. Intraocular fluid from all these patients was collected for GM testing. In addition, the receiver operating characteristic (ROC) curves and diagnostic significance were analyzed.

**Results:** The mean optical density index (ODI) of GM was  $5.77 \pm 1.73$  in the AE group, significantly higher than that in non-Aspergillus intraocular infection (NAII) ( $0.19 \pm 0.11$ ,  $p < 0.001$ ) and cataract group ( $0.29 \pm 0.27$ ,  $p < 0.001$ ). The area under the ROC curve was 1.00 (95% confidence interval, 1.00-1.00;  $p < 0.001$ ) in AE and the other 2 groups. At a cut-off ODI of 1.88, the sensitivity and specificity were 100.0% and 100.0%, respectively, and the Youden index reached its highest value of 1.00.

**Conclusions:** GM testing of intraocular fluid indicated good sensitivity and specificity for the

diagnosis of AE, promising a rapid and reliable diagnostic modality for AE.

Dec 10, 2023 (Sun) 10:30 - 12:00  
Venue: S422

#### The Role and Mechanism of M-MDSCs/PMN-MDSCs in Experimental Autoimmune Uveitis

First Author: Caiyun **YOU**  
Co-Author(s): Xiaorui **LIU**, Xiangda **MENG**, Hua **YAN**

**Purpose:** To investigate the role of myeloid-derived suppressor cells (MDSCs) in relieving inflammation in autoimmune uveitis (EAU) and its mechanism.

**Methods:** We established a classic EAU mouse model. Anti Gr-1mAb (RB6-8C5) and PBS were intraperitoneally injected. On the 21st day after immunization, clinical and histopathological scores, retinal inflammatory factor qRT PCR detection, and M-MDSCs/PMN-MDSCs flow cytometry detection were performed on the bone marrow, spleen, and retinal tissues of mice in each group.

**Results:** Compared with the PBS group, the anti Gr-1 group showed no obvious exudative lesions or vasculitis in the fundus of the eyes. HE staining showed clear tissue structures in each layer of the retina, and both clinical and pathological scores were significantly reduced ( $P < 0.05$ ); the anti Gr-1 group with retinal inflammatory factors IL-6 and TNF- $\alpha$ , IFN- $\gamma$ , and IL-1 $\beta$  mRNA expression was significantly decreased (all  $P < 0.05$ ), while IL-10 and Arg-1 mRNA expression were significantly increased (all  $P < 0.05$ ). The ratio of M-MDSCs/PMN-MDSCs in the bone marrow of anti Gr-1mAb group mice significantly increased ( $P < 0.05$ ); There was no significant change in the ratio of M-MDSCs/PMN-MDSCs in the spleen. The ratio of M-MDSCs/PMN-MDSCs in retinal tissue significantly increased ( $P < 0.05$ ). The proportion of Th1 and Th17 cells in the bone marrow and spleen decreased significantly (all  $P < 0.05$ ), while the proportion of Treg cells increased significantly (all  $P < 0.05$ ).

**Conclusions:** The increase in the ratio of M-MDSCs/PMN-MDSCs in EAU mice can promote the regression of retinal inflammatory lesions, and the rebalancing of helper T lymphocyte subsets plays an important role in this process.

Dec 10, 2023 (Sun) 10:30 - 12:00  
Venue: S422

### Vogt-Koyanagi-Harada Disease in Pediatric, Adult, and Elderly: Clinical Characteristics and Visual Outcomes

First Author: Weiting **LIAO**  
Co-Author(s): Peizeng **YANG**

**Purpose:** To depict the whole spectrum of clinical features and visual prognosis among pediatric, adult, and elderly Vogt-Koyanagi-Harada disease (VKH) patients.

**Methods:** A retrospective chart review was conducted in 2571 VKH patients diagnosed from April 2008 to January 2022. Based on age of disease onset, patients were divided into pediatric (age  $\leq$  16 years), adult (16 < age < 65 years), and elderly (age  $\geq$  65 years) VKH groups. Visual outcomes and complications were evaluated using logistic regression models and restricted cubic splines analysis.

**Results:** The median follow-up time was 48 (IQR, 12–60) months. All VKH patients showed similar ocular manifestations in the context of disease phasing. The proportion of neurological and auditory manifestations in pediatric (42.3% and 7.5%) VKH patients was significantly lower than that in adults (66.5% and 47.9%) and the elderly (68.2% and 50%) (both  $p < 0.0001$ ). An increased risk of macular abnormalities was seen in adults (OR, 3.43; 95% CI, 1.62-7.29) compared with elderly VKH. An inverted-U-shaped pattern was observed between disease onset age and a poor visual outcome (visual acuity 6/18 or worse) according to OR value in VKH patients. The highest risk of BCVA  $\leq$  6/18 was observed in 32 years at disease onset (OR, 1.51; 95% CI, 1.18-1.94). A higher risk of visual loss was observed in adults (OR, 9.06; 95% CI, 2.18-37.6) compared with elderly VKH patients.

**Conclusions:** Our study identified, for the first time, a whole spectrum of clinical features of VKH based on a large cohort of Chinese patients. Adult VKH patients have increased risk of poor visual outcomes, possibly due to increased frequency of macular abnormalities.

### Ocular Imaging (APOIS)

Dec 09, 2023 (Sat) 08:30 - 10:00  
Venue: S422

### Automated Machine Learning for Anterior Segment Optical Coherence Tomography Image Quality Control

First Author: Chak Fung **NG**  
Co-Author(s): Hin Yin **CHAN**, Eric Ka Ho **CHOY**, Anni Annie **LING**, Ruyue **SHEN**

**Purpose:** Scleral spur (SS) location has high significance in the assessment of anterior chamber angle using anterior segment optical coherence tomography (ASOCT). We aim to develop an automated quality control system using automated machine learning (AutoML) to assist in interpreting ASOCT images.

**Methods:** An AutoML classification model was developed with Vertex AI (Google) to compare with a custom deep learning (CDL) model. The CDL model was a sequential model with convolutional neural network layers. A retrospective dataset of ASOCT images (Casia SS-1000, Tomey, Japan) in dark conditions was used. Both models were developed in the same data split with 1605 training, 180 validating, and 190 testing images. Scleral spur visibility scores (SSVS), the reference standard for evaluating image quality, were assigned to all images by one annotator. SSVS grades 2 and 1 refer to images with clear and moderately seen SS visibility, while SSVS grade 0 refers to images with undetectable scleral spur. Only grades 2 and 1 will be labelled as "good-quality", otherwise grade 0 will be labelled as "poor-quality".

**Results:** AutoML model performs with 0.974 precision and recall. CDL model performs better than AutoML with 1.000 precision and



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recall. To better reflect the performance of AutoML, its predictions were compared with ground truth labels to receive a  $\kappa$ -score of 0.947 which shows a high agreement with human gradings.

**Conclusions:** Being coding-free and having low hardware requirements makes AutoML an ideal alternative to CDL for source-limited regions and clinicians to perform automated ASOCT image quality control for facilitating image analysis.

**Dec 09, 2023 (Sat) 08:30 - 10:00**  
**Venue: S422**

### Classification of Visual Field Abnormalities in Highly Myopic Eyes without Pathologic Change

*First Author:* Fengbin **LIN**  
*Co-Author(s):* Shida **CHEN**, Xiulan **ZHANG**

**Purpose:** To develop a classification system of visual field (VF) abnormalities in highly myopic eyes with and without glaucoma.

**Methods:** The study included 1893 VF tests from 1302 eyes (825 individuals) who underwent VF testing (Humphrey 24-2 SITA) and a detailed ophthalmic examination. A comprehensive set of VF defect patterns was defined via observation of the 1893 VF reports, literature review, and consensus meetings. The classification system comprised 4 major types of VF patterns, including normal-type, glaucoma-like defects, high myopia-related defects, and combined defects. A subset ( $n = 1000$ ) of the VFs was used to evaluate the interobserver and intraobserver agreement and weighted  $k$  values of the classification system by 2 trained readers. The prevalence of various VF patterns and their associated factors were determined.

**Results:** We found that normal-type, glaucoma-like defects, high myopia-related defects, and combined defects accounted for 74.1%, 10.8%, 15.0%, and 0.1% of all unique VF tests, respectively. The interobserver and intraobserver agreements were  $>89\%$ , and the corresponding  $k$  values were 0.86 or more between readers. Both glaucoma-like and high

myopia-related VF defects were associated with older age ( $P < 0.001$ ) and longer axial length ( $P < 0.05$ ). Longer axial length showed a stronger effect on the prevalence of glaucoma-like VF defects than on the prevalence of high myopia-related VF defects ( $P = 0.036$ ).

**Conclusions:** We propose a new and reproducible classification system of VF abnormalities for nonpathological high myopia. Applying a comprehensive classification system will facilitate communication and comparison of findings among studies.

**Dec 09, 2023 (Sat) 08:30 - 10:00**  
**Venue: S422**

### Deep Learning-based System for Assessing Conjunctival Injection and Subconjunctival Hemorrhage in Red Eye

*First Author:* Pak Wing **CHIU**  
*Co-Author(s):* Edmund Y **LAM**, Allie **LEE**, Yuxing **LI**, Vincent **TAM**, Yanmin **ZHU**

**Purpose:** Conjunctivitis presenting with conjunctival injection (CI) and subconjunctival hemorrhage (SCH) are common conjunctival causes of red eye. Conventional clinical diagnosis is incoherent due to interobserver variability. We proposed an automatic monitoring system utilizing deep learning models to classify between normal eye, CI, and SCH.

**Methods:** External eye images (CI, SCH, and normal) were collected from the public Sclera Blood Vessels, Periocular and Iris (SBVPI) dataset and Hong Kong Lo Fong Shiu Po Eye Centre. Images were pre-processed by resizing, contrast enhancement, and white-balancing adjustment. Images were augmented to increase the dataset's diversity up to a total of 2440 images. The dataset was split as training-validation-test of 8:1:1. The sclera was segmented and trained for prediction by a customized SU-Net model. YOLOv5 and TransUNet models were combined to classify these eye conditions. Differences of SCH-area proportion in SCH and vessels thickness in CI were quantified.

**Results:** SU-Net predicted sclera region with an accuracy score of 0.992, intersection over union of 0.977, and F1 score of 0.982. YOLOv5 model achieved an accuracy of 98.3% in classifying the eye conditions. Accuracy score of quantifying SCH-area proportion was 0.962 when comparing with manually annotated ground truth. It could classify vessel thickness of  $<$  or  $>$  6 pixels. To further characterize SCH by location, there was no significant difference between superior/inferior (52.6% vs 31.6%,  $p = 0.317$ ) and temporal/nasal areas (47.4% vs 52.6%,  $p = 0.819$ ) due to currently limited subjects ( $n = 19$ ).

**Conclusions:** Our deep learning-based system could identify CI and SCH with high accuracy. Changes in SCH-area proportion could be quantified for monitoring recovery.

Dec 09, 2023 (Sat) 08:30 - 10:00  
Venue: S422

### Developing a Privacy-preserving Deep Learning Model for Glaucoma Detection: A Multi-Center Study with Federated Learning

First Author: Emma Anran **RAN**  
Co-Author(s): Carol **CHEUNG**, Pheng Ann **HENG**, Clement **THAM**, Xi **WANG**

**Purpose:** Deep learning (DL) is promising to detect glaucoma. However, patients' privacy and data security are major concerns when pooling all data for model development. We developed a privacy-preserving DL model using the federated learning (FL) paradigm to detect glaucoma from three-dimensional (3D) optical coherence tomography (OCT) images.

**Methods:** This is a multi-center study. The FL paradigm consisted of a "central server" and 7 eye centers in Hong Kong, the United States, and Singapore. Each center first trained a model locally with its own OCT optic disc volumetric dataset and then uploaded its model parameters to the central server. The central server used FedProx algorithm to aggregate all centers' model parameters. Subsequently, the aggregated parameters were redistributed to each center for its local model optimization. We experimented with different networks. Lastly,

we tested the FL model on 2 prospectively collected unseen datasets.

**Results:** We used 9,326 volumetric OCT scans from 2,785 subjects. The FL model performed consistently well with different networks in 7 centers (accuracies 78.3-98.5%, 75.9-97.0%, and 78.3-97.5%, respectively) and stably in the 2 unseen datasets (accuracies 84.8-87.8% and 84.8-87.7%, respectively). The FL model achieved non-inferior performance in classifying glaucoma compared to the traditional model trained by pooling data and significantly outperformed the individual models trained by single dataset.

**Conclusions:** The 3D FL model could leverage all the datasets and achieve generalizable performance, without data exchanges across centers. This study demonstrated an OCT-based FL paradigm for glaucoma identification with ensured patient privacy and data security, charting another course toward the real-world transition of AI in ophthalmology.

Dec 09, 2023 (Sat) 08:30 - 10:00  
Venue: S422

### Early Rate of Change in Circumpapillary Vessel Density is Associated with Normal Tension Glaucoma Progression: An Optical Coherence Tomography Angiography Longitudinal Study

First Author: Ruyue **SHEN**  
Co-Author(s): Poemen **CHAN**, Anni Annie **LING**, Timothy Pak Ho **LIN**, Clement **THAM**

**Purpose:** To prospectively evaluate the early rate of changes in circumpapillary vessel density (cpVD) as measured by optical coherence tomography angiography (OCTA) in normal tension glaucoma (NTG) eyes, and its relationship to the subsequent risk of glaucoma progression.

**Methods:** Two hundred eight-five eyes from 198 NTG patients with a minimum 24-month follow-up were included. A swept-source OCT (Triton DRI-OCT, Topcon, Japan) was used to acquire OCTA images of the 3 mm  $\times$  3 mm peripapillary region. An automated customized

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program was used for measuring cpVD after the removal of retinal arterioles and venules from the OCTA images. The relationship between the early change rate of cpVD, defined as the first-year follow-up, and the subsequent risk of glaucoma progression was evaluated by Cox proportional hazards regression models.

**Results:** Seventy-two eyes (25.3%) developed progression identified by visual field assessment over a mean follow-up period of 5 years. In comparison with NTG eyes without progression, the rate of change of superotemporal cpVD was significantly faster in NTG eyes with progression ( $-2.77 \pm 1.37\%/year$  vs  $-0.14 \pm 0.68\%/year$ ,  $P = 0.045$ ). Multivariable Cox models showed that each 1% of superotemporal cpVD per year decrease during the first year of follow-up increased the hazard of glaucoma progression by 4.8% (hazard ratio [HR] 1.048, 95% confidence interval [CI], 1.012-1.085;  $P = 0.009$ ).

**Conclusions:** This study demonstrated the significant association between an early decrease in cpVD and the subsequent risk of NTG progression, which supported the prognostic value of retinal microvasculature analysis by OCTA.

**Dec 09, 2023 (Sat) 08:30 - 10:00**  
**Venue: S422**

### High Myopia Normative Database of Peripapillary Retinal Nerve Fiber Layer Thickness to Detect Myopic Glaucoma in a Chinese Population

*First Author:* Yunhe **SONG**  
*Co-Author(s):* Carol **CHEUNG**, Rachel **CHONG**, Emma Anran **RAN**

**Purpose:** To develop and validate the performance of a high myopia (HM)-specific normative database of peripapillary retinal nerve fiber layer thickness (pRNFLT) in differentiating HM from highly myopic glaucoma (HMG).

**Methods:** 1367 Chinese participants (2325 eyes) were included from 4 centers. After quality control, 1108 eyes from 694 participants

were included; 459 eyes from 408 participants and 322 eyes from 197 participants were included in the internal and external validation sets. The pRNFLT was measured with swept-source optical coherence tomography (SS-OCT).

**Results:** Four strategies derived from the normative database were examined including global and quadratic pRNFLT below the lowest 5th or the lowest 1st percentile of the normative database. The accuracy (ACC), sensitivity, and specificity of the HM-specific normative database for detecting HMG were examined.

**Conclusions:** HM-specific normative database is more capable of detecting HMG eyes than the SS-OCT built-in database, which may be an effective tool for differential diagnosis for HMG.

**Dec 09, 2023 (Sat) 08:30 - 10:00**  
**Venue: S422**

### Ocular Factors of Fractal Dimension and Blood Vessel Tortuosity Derived from OCTA in a Healthy Chinese Population

*First Author:* Yunhe **SONG**  
*Co-Author(s):* Fei **LI**, Fengbin **LIN**, Peiyuan **WANG**, Xiulan **ZHANG**

**Purpose:** To identify the influential factors on fractal dimension (FD) and blood vessel tortuosity (BVT) of the macula using optical coherence tomography angiography (OCTA) in a healthy Chinese population.

**Methods:** The FD and BVT in superficial (SCP) and deep capillary plexus (DCP) at the macula were obtained from OCTA images. The FD was calculated using box-counting method and the BVT was defined via the ratio on the skeletonized image. Univariate and multivariate regression analyses were performed to identify the ocular factors of FD and BVT, and the results were presented as coefficient and 95% confidence intervals.

**Results:** A total of 2189 healthy individuals (2189 eyes) from Zhongshan Ophthalmic Center were included with a mean age of  $49.9 (\pm 13.2)$  years and 54.4% female. In the multivariate



model, the FD in SCP was significantly associated with higher intraocular pressure (IOP) ( $\beta = 0.204$ , 95% CI: 0.073, 0.335;  $P < 0.001$ ), axial length (AL) ( $\beta = -0.875$ , 95% CI: -1.197, -0.552;  $P < 0.001$ ). The FD in DCP was significantly associated with the best-corrected visual acuity ( $\beta = -6.170$ , 95% CI: -10.175, -2.166;  $P = 0.003$ ) and anterior chamber depth ( $\beta = -0.348$ , 95% CI: -0.673, -0.023;  $P = 0.036$ ). Superficial BVT was independently associated with IOP ( $\beta = -0.044$ , 95% CI: -0.079, -0.009,  $P = 0.012$ ) and AL ( $\beta = 0.097$ , 95% CI: 0.014, 0.181;  $P = 0.022$ ) ( $R^2 = 0.15$ , RMSE = 2.02). Deep BVT was independently associated with IOP ( $\beta = -0.004$ , 95% CI: -0.009, -0.0005,  $P = 0.028$ ) and lens thickness ( $\beta = 0.036$ , 95% CI: 0.003, 0.060;  $P = 0.028$ ).

**Conclusions:** IOP and AL were dependent ocular parameters of FD and BVT in SCP. The FD in DCP was also influenced by visual acuity and anterior chamber depth. These factors should be considered when microvascular geometrics are used.

**Dec 09, 2023 (Sat) 08:30 - 10:00**  
**Venue: S422**

### Postural Changes in Retinal Vascular Parameters and Risk of Diabetic Retinopathy Progression: A Prospective Cohort Study

*First Author: Truong NGUYEN*  
*Co-Author(s): Anni Annie LING, Ho Wa LAI, John LIU, Tang ZIQI*

**Purpose:** To prospectively determine whether postural changes in retinal vasculature are associated with the progression of diabetic retinopathy (DR).

**Methods:** A novel clip-on adapter lens (OphthoLens, RainsOptics Ltd, Hong Kong) over the camera on a smartphone was used to obtain retinal images in sitting and supine positions. Retinal vascular geometric variables (tortuosity, branching, fractal dimension, caliber) were measured from baseline retinal photographs using the Singapore I Vessel Assessment software. DR was graded from baseline and follow-up photographs. DR progression was defined as an increase in

severity of  $\geq 2$  steps at follow-up. Patients with diabetes were recruited and followed up for at least 3 years. Cox proportional-hazard models were used to evaluate the association of the percentage change in retinal vasculature from sitting to supine positions with DR progression.

**Results:** A total of 51 eyes from 48 patients with diabetes were included. Over a median follow-up of 47 (41–50) months, 12 eyes (23.5%) exhibited 2-step DR progression. Greater arteriolar tortuosity in the supine position (hazard ratio [HR], 1.723; 95% CI, [1.023–2.902];  $P = 0.041$ ) at baseline was associated with DR progression. The association was still maintained (HR, 2.033; 95% CI, [1.034–3.998];  $P = 0.040$ ) after adjustment for baseline age, diabetes duration, glycated hemoglobin, blood pressure, estimated glomerular filtration rate, and ocular perfusion pressure. The addition of postural change in arteriolar tortuosity significantly improved discrimination of DR progression over model with only established risk factors (C-statistic of 0.703 versus 0.676;  $P = 0.035$ ).

**Conclusions:** The greater change in arteriolar tortuosity from sitting to supine positions demonstrates independent prognostic value for DR progression.

**Dec 09, 2023 (Sat) 08:30 - 10:00**  
**Venue: S422**

### Translation of Color Fundus Photography into High-resolution Indocyanine Green Angiography Image

*First Author: Danli SHI*  
*Co-Author(s): Minggunag HE*

**Purpose:** To develop and validate a deep-learning model to generate realistic early-, mid-, and late-phase indocyanine green angiography (ICGA) images from color fundus photography (CF).

**Methods:** The generative adversarial networks (GANs) architecture was trained using 99,002 paired images of CF and ICGA from early-phase, mid-phase, and late-phase in a tertiary center. The quality of generated ICGA

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images was evaluated objectively by common image generation metrics, and subjectively by 2 experienced ophthalmologists on 50 sets from internal and external datasets, respectively, graded on a scale of 1-5. Global similarity, the realism of anatomical structures, and fluorescence pathological lesions were considered. Moreover, we validated the clinical utility of the translated ICGA by calculating the area under the ROC curve (AUC) in classifying AMD on Labelme dataset.

**Results:** The structural similarity scores of the translated ICGA images were approximately 0.6, and the subjective quality scores ranged from 1.46-2.74 on a 5-point scale (1 refers to the image quality of the real ICGA image). Both ophthalmologists indicated similar quality scores with substantial agreement (kappas ranged from 0.79–0.84). Adding the generated ICGA on top of CF improved AMD classification in the Labelme dataset, with the AUC increased from 0.94 to 0.97.

**Conclusions:** CF can be realistically translated into ICGA. Moreover, adding the translated ICGA images on top of CF improved the accuracy of AMD screening. These results suggest that CF-to-ICGA translation could be used as an effective add-on for large-scale AMD screening and a supplementary tool for the diagnosis of several chorioretinal diseases.

**Dec 09, 2023 (Sat) 08:30 - 10:00**  
**Venue: S422**

### Using Deep Learning to Assess Image Quality of 3D Macular Scans from Spectral-domain Optical Coherence Tomography

*First Author: Tang ZIQI*

*Co-Author(s): Pheng Ann HENG, An Ran RAN, Xi WANG, Carol CHEUNG*

**Purpose:** To develop and externally test deep learning (DL) models for assessing the image quality of three-dimensional (3D) macular scans from Cirrus and Spectralis optical coherence tomography (OCT) devices.

**Methods:** We retrospectively collected 2 datasets, including 2,277 Cirrus 3D scans and

1,557 Spectralis 3D scans, respectively, for training (70%), fine-tuning (10%), and internal validation (20%) from electronic medical and research records at the Chinese University of Hong Kong Eye Centre and Hong Kong Eye Hospital. Scans with various eye diseases (e.g., diabetic macular edema, age-related macular degeneration, polypoidal choroidal vasculopathy, and pathologic myopia), and scans of normal eyes of adults and children were included. According to standardized criteria, 2 graders labeled each 3D scan as gradable or ungradable. We utilized a 3D version of the residual network (ResNet)-18 for Cirrus 3D scans and multiple-instance learning with ResNet-18 for Spectralis 3D scans. The 2 DL models were further tested via 3 unseen Cirrus datasets from Singapore and 5 unseen Spectralis datasets from India, Australia, and Hong Kong, respectively.

**Results:** In the internal validation, the model achieved area under the curves (AUCs) of 0.930 (0.885–0.976) and 0.906 (0.863–0.948) for assessing the Cirrus 3D scans and Spectralis 3D scans, respectively. In the external testing, the model showed robust performance with AUCs ranging from 0.832 (0.730–0.934) to 0.930 (0.906–0.953) and 0.879 (0.827–0.932) to 0.973 (0.939–1.00), respectively.

**Conclusions:** Our model could be used for filtering out ungradable 3D scans and further incorporated with the disease-detection DL model, allowing a fully automated eye disease detection workflow.

**Dec 09, 2023 (Sat) 08:30 - 10:00**  
**Venue: S422**

### VisionFM: Towards a Generalist AI Foundation Model in Ophthalmology

*First Author: Jian WU*

*Co-Author(s): Jianing QIU, Ningli WANG, Hao WEI, Wu YUAN*

**Purpose:** Foundation models or in other words large artificial intelligence (AI) models, such as ChatGPT, are emerging with generalist intelligence that can solve various tasks with remarkable performance. Here, we aim to

present VisionFM, a generalist AI foundation model pre-trained with multiple model images, which then provides a foundation to foster multiple ophthalmic applications, such as disease diagnosis, disease progression forecasting, lesion/biomarker segmentation and detection, and health indicator prediction.

**Methods:** Our model, which can process 8 different ophthalmic modalities and solve 19 different tasks, was developed by first pre-training with 3.4 million images from 560,457 individuals, and then supervised fine-tuning on multiple ophthalmic tasks. A novel multi-modal alignment module was developed to learn the associations between different modalities to endow VisionFM with the same capability as ophthalmologists, who in clinical practices would use multiple imaging modalities for decision-making.

**Results:** VisionFM demonstrates an overall 94.5% AUC for recognizing/grading 9 different ophthalmic diseases, and an accuracy of 78.6% for predicting diverse health indicators. VisionFM also shows generalist skills of segmenting different biomarkers and lesions from different ophthalmic imaging modalities. Experiments also show that using synthetic images is able to enhance model performance. In addition, we conducted visual Turing tests to examine the quality of synthetic images, and the results revealed that the synthetic images were barely distinguishable from real ones even for trained clinicians.

**Conclusions:** We present the first AI foundation model for ophthalmology, i.e., VisionFM, which is able to process multiple ophthalmic imaging modalities to provide generalist ophthalmic diagnostics, tackling various downstream ophthalmic tasks and challenges.

## Ocular Imaging

Dec 10, 2023 (Sun) 10:30 - 12:00

Venue: S422

### Association of Deep-learning Based Retinal Vessel Caliber Measurements with the Incidence of Cardiovascular Disease

First Author: Yiu Lun **WONG**

Co-Author(s): Truong **NGUYEN**, Ziqi **TANG**, Dawei **YANG**

**Purpose:** To investigate the association of the fully automated measurements of retinal vessel calibers with the incidence of cardiovascular disease (CVD) in a diabetic patient cohort.

**Methods:** In this cohort study, retinal vessel calibers were measured and computed by the Singapore I Vessel Assessment (SIVA-DLS) deep-learning system, which automatically generates the central retinal artery equivalent (CRAE) and central retinal vein equivalent (CRVE) at 0.5-1.0 (zone B) and 0.5-2.0 (zone C) disc diameters away from the optic disc, respectively. All participants were recruited starting in July 2015 and were followed up afterwards. Univariable and multivariable Cox-proportional hazards models were performed to evaluate the association of retinal vessel caliber measurements with incident CVD.

**Results:** A total of 269 participants were included (133 [49.44%] female; mean age, 64.27 [11.41] years), with 22 participants (8.18%) developing CVD over a follow-up period of 52.04 [27.10] months. No significant associations were found between CRAE (hazard ratio [HR], 0.960 [0.910-1.013] for CRAEB and 0.967 [0.916-1.020] for CRAEC) or CRVE (HR, 0.975 [0.942-1.009] for CRVEB and 0.977 [0.944-1.011] for CRVEC) with incident CVD, after adjusting for age, gender, mean arterial blood pressure, body mass index, smoking status, glycated hemoglobin, total cholesterol, high density lipoprotein cholesterol, and diabetic retinopathy status at baseline.

**Conclusions:** Automated retinal vessel caliber measurements were not associated with incident CVD in the present diabetic cohort.



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We aim to further enlarge the sample size of included participants, as well as subgroup the CRAE and CRVE measurement into different quartiles for analysis in the next step.

**Dec 10, 2023 (Sun) 10:30 - 12:00**  
**Venue: S422**

### Characteristics of Geographic Atrophy in Korean Patients with Dry Age-related Macular Degeneration: Incidence, Phenotypes, and Risk Factors for Fast Progression

*First Author: Ye Eun HAN*  
*Co-Author(s): Hoon Il CHOI, Yoon Jeon KIM, Joo Yong LEE, Junyeop LEE, Young Hee YOON*

**Purpose:** To investigate the characteristics of geographic atrophy (GA) in Korean patients with dry age-related macular degeneration (AMD), including its incidence, baseline phenotypes, progression patterns, and risk factors for fast progression.

**Methods:** This retrospective longitudinal cohort study included Korean patients with intermediate or advanced (GA) dry AMD followed for  $\geq 3$  years at Asan medical center in South Korea. The incidence, baseline phenotypes, and progression patterns of GA were assessed using multimodal images, including FdP, SD-OCT, FAF, and IR. Risk factors for fast progression were investigated.

**Results:** A total of 484 eyes from 281 patients (396 eyes from 227 patients with intermediate stage and 88 eyes from 54 patients with advanced stage GA) were evaluated. GA newly developed in 8.3% of eyes with intermediate dry AMD, with a GA to wet-conversion ratio of 1:1.7. Baseline GA exhibited lesion size of  $7.3 \pm 8.1$  mm<sup>2</sup>, bilaterality in 55.6%, banded/diffuse FAF patterns in 83%, extrafoveal location in 53.4%, multifocal lesions in 81.8%, and the presence of drusen in 55.7%. The GA progression rate was  $1.5 \pm 0.1$  mm<sup>2</sup>/year, with centripetal progression in 53.2% and logMAR BCVA deterioration of  $0.6 \pm 0.7$ . Banded/diffuse FAF patterns and multifocal lesions were identified as significant risk factors in multivariable analysis.

**Conclusions:** Korean patients with dry AMD exhibit a potentially higher prevalence and faster progression rate than previous Asian studies, likely due to similarities in baseline GA phenotypes and risk factors for fast progression with non-Asians. This study emphasizes the importance of considering treatment options for Korean GA patients, especially those with risk factors for fast progression.

**Dec 10, 2023 (Sun) 10:30 - 12:00**  
**Venue: S422**

### Factors Affecting Clinical Outcomes in Polypoidal Choroidal Vasculopathy

*First Author: Dominic TING*

**Purpose:** Polypoidal choroidal vasculopathy (PCV) has a high prevalence among Asians, with variable clinical course and visual prognosis, suggesting the existence of clinical subtypes. We evaluated the factors affecting clinical outcomes in PCV.

**Methods:** Study of 107 consecutive patients with PCV presenting over a 24-month period. Patients were imaged using fluorescein angiography (FA) and indocyanine green angiography (ICGA). Color fundus photographs and angiograms were graded independently by 2 ophthalmologists. The diagnosis of PCV was made using standardized diagnostic criteria. Imaging biomarkers were correlated with clinical presentation and visual acuity (VA) for 5 years.

**Results:** The highest rate of moderate visual loss occurred in patients with large branching vascular networks (BVN) and extensive FA leakage compared to those without smaller BVN areas (39.4% vs 12.5% at 5 years). Good visual outcomes ( $\geq 20/40$ ) were highest in those with larger BVN compared to those with smaller areas (84.6% vs 56.2%,  $p < 0.001$ ). Patients with significant FA leakage (57 patients, 53.3%) had significantly worse VA at all time points compared those without leakage (logMAR 1.04 vs 0.32 at 5 years,  $p < 0.001$ ), and experienced higher rates of moderate visual loss (60% vs 0%,  $p < 0.001$ ). Patients without FA leakage

experienced higher rates of good visual acuity ( $\geq 20/40$ ) (74.4% vs 19.6%,  $p < 0.001$ ) at all follow-up visits.

**Conclusions:** We have identified potential biomarkers which affect visual outcomes in PCV, which has potential application in clinical practice and multicenter randomized trials.

**Dec 10, 2023 (Sun) 10:30 - 12:00**  
**Venue: S422**

### Global Ocular Deformation in Pathologic Myopia

*First Author: Shida CHEN*  
*Co-Author(s): Bingqian LIU, Lin LU, Nan LUO*

**Purpose:** To explore the equatorial and posterior ocular deformation in pathologic myopia.

**Methods:** This hospital-based, cross-sectional study included 180 pathologic myopic eyes with atrophic maculopathy grading C2 (diffuse chorioretinal atrophy or more) from 180 participants who underwent comprehensive ophthalmic examination, including high-resolution 3-dimensional magnetic resonance imaging.

**Results:** The mean (SD) age of 180 participants with pathologic myopia was 55.14 (10.74) years, 127 were female (70.6%), and the mean (SD) axial length of studied eyes was 30.22 (2.25) mm. The predominant equatorial shape was pyriform (66 eyes [36.7%]), followed by round (45 eyes [25.0%]). The predominant posterior shape was bulb-shaped (97 eyes [52.2%]), followed by multidistorted (46 eyes [24.7%]). Equatorial circularity and equatorial shapes were correlated ( $r = -0.469$ ; 95% CI,  $-0.584$  to  $-0.346$ ;  $P < 0.001$ ) and ocular sphericity was correlated with posterior shapes ( $r = -0.533$ ; 95% CI,  $-0.627$  to  $-0.427$ ;  $P < 0.001$ ). In eyes with a vertical-elliptical equator, equatorial circularity and ocular sphericity were positively linearly correlated ( $R^2 = 0.246$ ; 95% CI, 0.050 to 0.496;  $P = 0.002$ ) and the prevalence of inferior staphyloma was higher (27.8%;  $P = 0.04$ ). Eyes with a horizontal elliptical equator have the most horizontally oriented axis of corneal

flat keratometry (median, 43.55 [interquartile range, 43.84] degrees;  $P = 0.01$ ) and tended to present with multidistorted posterior shape (21.7%;  $P = 0.04$ ).

**Conclusions:** These findings suggest ocular deformation is common in pathologic myopia and can affect the entire eye, including the equatorial and posterior regions.

**Dec 10, 2023 (Sun) 10:30 - 12:00**  
**Venue: S422**

### Performance of Artificial Intelligence in Detecting Diabetic Macular Edema from Optical Coherence Tomography and Fundus Photography Images: A Systematic Review and Meta-Analysis

*First Author: Ching LAM*  
*Co-Author(s): Emma Anran RAN, Simon SZETO, Ziqi TANG, Yiu Lun WONG*

**Purpose:** To evaluate the performance of artificial intelligence (AI) in detecting diabetic macular edema (DME) from fundus photography (FP) or optical coherence tomography (OCT) images, and identify possible factors affecting model performances.

**Methods:** We searched PubMed (MEDLINE), Embase (Ovid), Web of Science, Google Scholar, Scopus, Cochrane Library, and CINAHL from 1 January 1991 to 12 February 2023 for studies utilizing AI algorithms to detect DME from FP or OCT images, and manually searched reference lists. Meta-analyses were performed using bivariate random-effects model in R for summary estimates of the area under the receiver operating characteristic curve (AUROC), sensitivity, specificity, and subgroup analyses for factors affecting model performances. PROSPERO registration number: CRD42021276009.

**Results:** Of 3,438 studies identified, 53 were included in the meta-analyses. FP-based AI algorithms (25 studies) yielded pooled AUROC of 0.964 (95% confidence interval: 0.964-0.964) with sensitivity of 92.6% (90.2%-94.4%) and specificity of 91.1% (88.0%-93.4%). OCT-based AI algorithms (28 studies) yielded pooled

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AUROC of 0.985 (0.985-0.985) with sensitivity of 95.9% (94.1%-97.2%) and specificity of 97.9% (96.6%-98.6%). The pooled ARUOC of deep learning (DL) was 0.979 compared to other machine learning methods of 0.966 ( $p < 0.001$ ), and that of the larger developmental dataset was 0.981 compared to the smaller dataset of 0.975 ( $p < 0.001$ ). Only 13 studies performed external validation, and pooled AUROC upon internal and external validation were 0.985 and 0.967, respectively ( $p < 0.001$ ).

**Conclusions:** The meta-analysis results demonstrate satisfactory performance of AI in detecting DME from FP or OCT images. Potential factors that may affect model performance included AI methods, sample size, and data diversity in the developmental dataset.

**Dec 10, 2023 (Sun) 10:30 - 12:00**  
**Venue: S422**

### **Predicting Response to Anti-vascular Endothelial Growth Factor Therapy in Eyes with Diabetic Macular Edema Using Deep-Learning Based OCT Image Analysis: A Multicenter Study**

*First Author: Dawei YANG*  
*Co-Author(s): Carmen Km CHAN, Sui Chun CHU, Mary HO, Simon SZETO*

**Purpose:** To develop a deep-learning (DL) system to predict the therapeutic response in patients with center-involved diabetic macular edema (CI-DME) after 3 doses of anti-vascular endothelial growth factor (anti-VEGF) injections.

**Methods:** A total of 705 Spetralis OCT volumes, representing 457 DME eyes from 366 patients, were retrospectively drawn from 3 hospitals in Hong Kong for model training, validation, and testing. Good response was defined as  $\geq 1$ -line gain on the Snellen visual acuity chart or  $>10\%$  reduction in central subfield thickness after 3 months of treatment. The DL system consists of 3 networks: 1) a segmentation network based on a DeepLabv3+ architecture to segment 4 major features (i.e., intraretinal cysts, subretinal fluid, DRIL, and outer-retinal defects); 2) a classification network

modified from DenseNet121 to detect the presence of the aforementioned 4 features; and 3) a multi-modal network with ResNet-18 as the backbone to learn discriminative features from the stacked raw B-scans, and concatenate the lesion presence features and the clinical variable features. External testing was further performed using 3 independent datasets from Australia and India.

**Results:** The DL system achieved an AUROC of 0.731 (95% CI 0.619-0.844), sensitivity of 70.0% (95% CI 55.6-87.4), specificity of 70.2% (95% CI 50.5-79.3), and accuracy of 69.5% (95% CI 62.4-77.3) in internal validation, and achieved AUROCs above 0.677 and accuracies above 76.3% in external testing.

**Conclusions:** Our proposed algorithm may be used as a clinical decision support to predict "good-response" vs "poor-response" of anti-VEGF therapy in eyes with DME for assessing therapeutic management decision.

**Dec 10, 2023 (Sun) 10:30 - 12:00**  
**Venue: S422**

### **Three-dimensional Choroidal Characteristics in 4 Subtypes of Central Serous Chorioretinopathy Using Swept-source Optical Coherence Tomography Angiography**

*First Author: Yue ZHANG*  
*Co-Author(s): Xiaobing YU*

**Purpose:** The distinction of different clinical subtypes of central serous chorioretinopathy (CSC) is still ambiguous, and it remains controversial regarding different pathophysiological features. The purpose of our study was to explore the choroid vascular characteristics in normal subjects, acute, non-resolving, recurrent, and chronic CSC patients with SS-OCTA.

**Methods:** This was a prospective observational study. We recruited patients diagnosed with CSC as well as age-matched healthy controls. Using SS-OCTA, we calculated choroidal thickness (CT), vascular density of choriocapillaris (CCVD), 3-dimensional choroidal vascularity index (CVI), and choroidal



vessel volume (CVV) of each eye. The ANOVA test and the Kruskal-Wallis H test were conducted to compare the mean difference of demographic and ophthalmic characteristics. SNK-q test was conducted for further pairwise comparisons when there was significant difference among 5 groups. Multiple linear regression model was used to explore the association between CVI and other factors.

**Results:** Central CVI and CCVD of chronic CSC eyes were significantly smaller than the other 3 groups. Central CT and CVV of acute and recurrent CSC eyes were significantly larger than non-resolving CSC eyes, and CT and CVV of non-resolving CSC eyes were significantly larger than chronic CSC eyes. Multiple regressions revealed that CVI was significantly correlated with the subgroup of chronic CSC (negative correlation), CT (positive correlation), and CVV (positive correlation) ( $P < 0.05$ ).

**Conclusions:** This is the first study to evaluate choroidal characteristics in 4 subtypes of CSC eyes in detail. It seems more reasonable to define chronic CSC with morphological changes rather than the duration of disease.

**Dec 10, 2023 (Sun) 10:30 - 12:00**  
**Venue: S422**

### Using 3D Deep Learning for Classification of Multiple Retinal Diseases on Optical Coherence Tomography Images

*First Author: Tang ZIQI*  
*Co-Author(s): Mary HO, An Ran RAN, Simon SZETO, Yu Han ZHANG*

**Purpose:** To design a deep learning (DL) model to detect common retinal diseases on optical coherence tomography (OCT) 3D scans with an unsupervised approach to identify 3D scans from a second type of device.

**Methods:** This retrospective multicenter study adopted OCT scans from Spectralis (Heidelberg Engineering) and Cirrus (Carl Zeiss). Fifteen retinal diseases and normal images were sorted into 11 classes of labels, whereas an additional class of "others" was added during external testing to accommodate unseen diseases.

We trained a DL model using 3D residual network-101 with 6,756 Spectralis 3D scans and designed the model with 2 architectures for comparison: multiple binary-outcome models (architecture 1) and one multi-outcome model (architecture 2). Test entropy, an unsupervised domain adaptation, addressed the problem of the "Spectralis-to-Cirrus domain shift" during testing. Finally, a disease-driven "Triage Module" classified the triage urgency based on the model prediction. The model was tested by 2,625 Spectralis 3D scans (External 1-4), 2,083 Cirrus 3D scans (External 5-6), and 5,460 Spectralis B-scans (External 7).

**Results:** The DL model distinguished between 11 retinal conditions, showing architecture 2 achieved significantly better results in the area under the curves (AUCs) between 0.849 and 0.997 in internal validation. The performance achieved AUCs between 0.827 and 0.999 in External 1-4, 0.745 and 0.989 in External 5-6, and 0.801 and 0.950 in External 7. The "others" demonstrated high specificity across all testing.

**Conclusions:** This multi-disease detection model can identify 3D scans across 2 OCT devices, thereby greatly expanding the applicability of the DL model.

**Dec 10, 2023 (Sun) 10:30 - 12:00**  
**Venue: S422**

### Using 3D-MRI Imaging to Quantitatively Analyze the Shape of Eyeballs with High Myopia and to Investigate Relationships Between Myopic Traction Maculopathy and Posterior Staphyloma

*First Author: Xi CHEN*

**Purpose:** To quantitatively analyze the shape of eyes with high myopia using high-resolution three-dimensional (3D) magnetic resonance imaging (MRI) and investigate relationships between myopic traction maculopathy (MTM) and the morphological changes of posterior staphyloma (PS).

**Methods:** This prospective study enrolled 105 patients with high myopia at Beijing Friendship Hospital. All participants underwent

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a comprehensive ophthalmic examination. MTM was divided into different types by optical coherence tomography, and ocular shapes were categorized by 3D-MRI.

**Results:** A total of 105 patients (105 eyes) were studied, with a mean age of  $60.4 \pm 13.3$  years and mean axial length of  $28.71 \pm 2.78$  mm. Spheroidal shape was observed in 35 eyes (33.3%), ellipsoidal shape in 11 eyes (10.5%), conical shape in 17 eyes (16.2%), nasally distorted shaped in 18 eyes (17.1%), temporally distorted shape in 16 eyes (15.2%), and barrel shape in 8 eyes (7.7%). PS was identified in 84 eyes (80%), and the proportions for the elliptical, conical, nasal torsion, temporal torsion, and barrel shapes were 27.9%, 23.1%, 12.9%, 9.5%, 17.1%, and 9.5%, respectively. In eyes without PS, MTM accounted for 23.8%, while with PS the proportion increased to 53.8%. The proportion of MTM in spheroidal was lowest, and nasal and temporal torsion shapes were highest. 45.5% of the nasal torsion shapes were with MTM, and for nasal torsion shape were 83.3%.

**Conclusions:** Not all highly myopic eyes are deformed. Spheroid was the predominant ocular shape. Eyes with PS display more severe myopic maculopathy. Moreover, nasally and temporally distorted eyes present a significantly high percentage of MTM.

### Ocular Oncology & Pathology

Dec 09, 2023 (Sat) 10:30 - 12:00  
Venue: S422

#### Comprehensive Multifactor System of Uveal Melanoma Metastatic Risk Prognosis

First Author: Iliya **LEVASHOV**  
Co-Author(s): Aiza **GALBATSOVA**, Vera **YAROVAYA**, Andrey **YAROVVOY**

**Purpose:** To develop a prognostic system which is easy to use in clinical practice with consideration of clinical, morphological, and genetic factors in metastatic risk evaluation.

**Methods:** 202 patients treated with brachytherapy, stereotactic radiosurgery, and

enucleation with completed prognostic tests were included in this study. In eye-sparing methods tumor material was obtained with fine-needle aspiration biopsy. Mutations in EIF1AX, SF3B1, MYC, PPARG genes were assessed along with cell type determination using binary approach (epithelioid and spindle types).

**Results:** There were 78 cases of metastatic melanoma. Median follow-up was 42 months. It was shown that mutations in MYC and PPARG genes and binary approach in cell type determination are associated with patient survival ( $p < 0.01$ ). Multifactor prognostic system was developed by combining different statistical methods such as Cox regression, Kaplan-Meier, and ROC analysis in score system fashion. It is proposed that patients with UM may be divided into 3 prognostic categories considering overall score from 0 to 12.5: low risk (0-3), intermediate risk (4-6), and high risk (7-12.5) of metastasis. Multifactor prognostic system of metastatic risk using 3 categories was statistically proved ( $p < 0.01$ ).

**Conclusions:** Multifactor prognostic system implies complex evaluation of key prognostic factors (clinical, morphological, and genetic ones) and it is easy to use in clinical practice due to score system fashion. Further validation of this multifactor prognostic system is required.

Dec 10, 2023 (Sun) 08:30 - 10:00  
Venue: S422

#### Clinicopathological Study of the Polypoidal Lesions of Polypoidal Choroidal Vasculopathy

First Author: Liu **GUANGFENG**  
Co-Author(s): Zhi Zhong **MA**

**Purpose:** To investigate the pathogenic features of the polypoidal lesions from the specimens of polypoidal choroidal vasculopathy extracted from human subjects.

**Methods:** Seven specimens of polypoidal lesions extracted from the eyes of 6 patients (mean age,  $60.16 \pm 10.41$  years) with polypoidal choroidal vasculopathy were examined. The polypoidal lesions were obtained by surgical

excision. Thereafter, a histopathological analysis of the specimens was performed.

**Results:** The polypoidal lesions were oval nodules located underneath the retinal pigment epithelium. A pathological study of the lesions revealed that Bruch's membrane schisis was observed in all specimens and they were all located in the Bruch's membrane. The Bruch's membrane schisis and serosanguineous materials constituted the main structure of the lesions in 5 of the 7 specimens, with small vessels being observed in 2 specimens. One specimen was composed of 2 polypoidal lesions of different characteristics, and 1 specimen had a neovessel membrane complex with several polypoidal lesions. Inflammatory cells and blood vessels were observed in the polypoidal lesion of the specimen with neovessel membrane complex.

**Conclusions:** Polypoidal lesions of polypoidal choroidal vasculopathy are abnormalities of the Bruch's membrane. The lesions are characterized by Bruch's membrane schisis, which is filled with serosanguineous materials. The lesions are progressive and may contain inflammatory cells and blood vessels.

Dec 10, 2023 (Sun) 08:30 - 10:00  
Venue: S422

### Combined Ruthenium-106 Plaque Brachytherapy and Transpupillary Thermotherapy in Thick Choroidal Melanoma

First Author: Neiwete **LOMI**  
Co-Author(s): Rohan **CHAWLA**, Sandton J S **RAJ**, Sushmita **PATHY**, Radhika **TANDON**

**Purpose:** To study the outcomes of combined Ru-106 episcleral plaque brachytherapy and transpupillary thermotherapy (TTT) in thick choroidal melanoma.

**Methods:** Out of 10 patients, 6 were females and 4 were males. The mean age was 49 years (SD = 8.39) in males and 41.40 years (SD = 9.25) in females. The mean tumor apical thickness and mean largest basal diameter (LBD) at presentation were 6.39 mm (range, 4.83-8.1 mm) and 11.5 mm (range, 7.4-14.1

mm), respectively. Mean radiation dose at the tumor apex was 78.5 Gy (range, 70-80Gy). The mean scleral dose was 518 Gy (range, 329-914 Gy). The patients were followed up for a mean duration of 18.6 months (SD = 5.25).

**Results:** At 12 months follow up, the mean apical thickness was 3.4 mm (SD = 2.31), with a statistically significant reduction ( $p = 0.018$ ). Largest basal diameter was reduced to 6.671 mm at 12 months ( $p = 0.0180$ ). There were no significant changes in the IOP, specular count, TBUT, and Schirmer test at 12 months ( $p = 0.2704$ ,  $p = 0.2027$ ,  $p = 0.1205$ ,  $p = 0.3057$ , respectively). No significant changes in the visual acuity were noted at 6 months and 12 months ( $p = 0.7582$  and  $p = 0.3429$ , respectively). At 16 months, 1 patient ( $n = 1/7$ ) developed distant metastasis in the liver and vertebra. Overall tumor control rate and globe salvage rate was 100% at 12 months. The only complication noted was radiation retinopathy ( $n = 3$ ). Metastasis-free survival was 0.8571 at 1 year (95% confidence interval).

**Conclusions:** With careful case selections, combined Ru-106 plaque brachytherapy and TTT is a safe and effective treatment modality for thick choroidal melanomas.

Dec 10, 2023 (Sun) 08:30 - 10:00  
Venue: S422

### Efficacy of Epithelial Growth Factor Receptor Tyrosine Kinase Inhibitor in Treating Choroidal Metastasis from EGFR Mutated Non-small-cell Lung Cancer

First Author: Arnold **CHEE**  
Co-Author(s): Mary **HO**, Chun Yue, Andrew **MAK**, Wilson **YIP**, Alvin **YOUNG**

**Purpose:** To describe treatment outcomes of choroidal metastasis in epithelial growth factor receptor (EGFR) mutated non-small-cell lung cancer (NSCLC) patients receiving EGFR tyrosine kinase inhibitor (TKI).

**Methods:** This was a territory based retrospective case series conducted in 2 hospitals from the New Territory East cluster in Hong Kong from 2013 to 2023. Primary

endpoint was change in visual acuity (VA) after EGFR TKI treatment and the change in size of choroidal metastasis mass.

**Results:** Ten (12 eyes) out of 15 patients with NSCLC related choroidal metastasis tested positive for EGFR mutation. Follow up period ranged from 8 months to 7 years. Two patients received TKI monotherapy while 6 received a combination of TKI, orbital radiotherapy, and/or chemotherapy. 75% of patients received first generation TKI while 25% received third generation TKI as first line therapy. The presenting VA ranged from 20/20 to 20/250 with a mean logMAR VA of  $0.411 \pm 0.308$ . 75% of eyes had macula involvement and exudative retinal detachment on presentation, with a mean tumor size of 3.78 disc diameters. Clinical response was observed by a median of 2 months post initiation of TKI therapy [range of 2-3.5 months]. Five patients attained final median VA gain of 3.8 [2.5-5.25] lines and 3 had stable VA all along. The median ocular progression free period of our cohort was 14.5 months.

**Conclusions:** EGFR TKI improves VA and may achieve durable disease control in EGFR mutation positive NSCLC patients with choroidal metastases. Its promising potential for disease control and visual improvement may be a good alternative to conventional orbital radiotherapy or chemotherapy, especially in EGFR mutation positive cases.

**Dec 10, 2023 (Sun) 08:30 - 10:00**  
**Venue: S422**

### Role of Combined Systemic Chemotherapy and Periocular Topotecan in Advanced Intraocular Retinoblastoma

*First Author:* Antriksh **WAHI**  
*Co-Author(s):* Neiwete **LOMI**, Rachna **MEEL**, Rachna **SETH**, Radhika **TANDON**

**Purpose:** To assess the early response of periocular topotecan and standard systemic chemotherapy in advanced IORB.

**Methods:** A prospective interventional study was conducted in patients with group D/

E retinoblastoma. They received 6 cycles of standard intravenous chemotherapy comprising vincristine, etoposide, and carboplatin every 4 weeks, along with 3 subtenon injections of topotecan (0.09-0.27 mg/kg) administered at 3 weekly intervals. Vision testing, IOP, tumor dimensions on ultrasound, and Retcam fundus images were recorded in each visit.

**Results:** In our study involving 12 patients with advanced intraocular retinoblastoma (group D/E), median age at presentation was 1.9 years (range, 8 months to 4.7 years). Among the 12 eyes, 8 (66.7%) were classified as group D, while 4 (33.3%) were group E. At baseline, 7 eyes (58.3%) had retinal detachment. After a minimum 6 months of follow-up, the following parameters were assessed using repeated measures ANOVA: The mean tumor size decreased from 12.32 to 7.35 mm<sup>2</sup> ( $p = 0.12$ ); mean visual acuity improved from 2.72 (logMAR) to 2.15 ( $p = 0.62$ ); IOP increased from 12.00 to 13.91 mm Hg ( $p = 0.4$ ). Complete tumor regression occurred in 5 eyes, partial regression in 2 eyes, and progression in 5 eyes (Stuart Maxwell:  $X^2$  test = 9.00;  $p = 0.011$ ). The globe salvage rate was 50% (6 eyes), 3 eyes underwent enucleation, and 3 eyes received adjuvant intra-arterial chemotherapy.

**Conclusions:** With the proper case selection, adjuvant periocular topotecan in combination with the standard systemic chemotherapy has been found to be a safe and effective approach for management of advanced intraocular retinoblastoma.

**Dec 10, 2023 (Sun) 08:30 - 10:00**  
**Venue: S422**

### Ruthenium-106 Plaque Brachytherapy for 1-eyed Retinoblastoma Recalcitrant to Chemotherapy

*First Author:* Neiwete **LOMI**  
*Co-Author(s):* Bhavna **CHAWLA**, Sushmita **PATHY**, V **SUBRAMANI**, Radhika **TANDON**

**Purpose:** To study the early outcomes of episcleral plaque brachytherapy for recalcitrant retinoblastoma.



**Methods:** Ruthenium-106 episcleral plaque brachytherapy was used to treat 10 eyes in 10 children with recalcitrant retinoblastoma, unifocal active lesion devoid of any active vitreous or subretinal seeds, following failure to regress after standard systemic chemotherapy regime. All 10 children had bilateral retinoblastoma where the other eye had undergone enucleation due to advanced stage.

**Results:** The group comprised 5 boys and 5 girls. The median age was 55 months (range, 12-180 months). The vision (logMAR) (mean  $\pm$  SD) pre-application and post-application at 18 months was  $1.25 \pm 0.60$  and  $1.14 \pm 0.74$ , IOP (mmHg) was  $11.2 \pm 0.97$  and  $10.7 \pm 1.18$ , tumor apical thickness (mm) was  $3.65 \pm 0.99$  and  $1.86 \pm 0.55$ , and largest basal diameter (mm) was  $10.15 \pm 3.02$  and  $3.36 \pm 1.01$ . There were no radiation related complications at 16 months follow-up. Two patients had tumor recurrence at 8 and 12 months, respectively, and were recommended for enucleation. The overall eye preservation rate in our series was 80% (8/10) at median 16 months follow-up.

**Conclusions:** Ruthenium-106 plaque brachytherapy is a safe and effective adjuvant treatment for localized unifocal retinoblastoma without any active vitreous or subretinal seeds that failed to respond with standard systemic chemotherapy.

### Ophthalmic Epidemiology

Dec 10, 2023 (Sun) 13:45 - 15:15  
Venue: S422

#### Spatial Technology Assessment of Green Space Exposure and Myopia

First Author: Yahan **YANG**  
Co-Author(s): Wenben **CHEN**, Xiaohu **DING**,  
Haotian **LIN**, Andi **XU**, Lanqin **ZHAO**

**Purpose:** Our study aimed to evaluate the association between green space exposure using novel quantitative data, derived from satellite imaging spatial technology, and myopia.

**Methods:** A large-scale population-based cohort was performed and recruited a total of 142,865 schoolchildren from 113 primary schools in Shenzhen, China. Green space was measured using high-resolution Gaofen-2 images to calculate the normalized difference vegetation index (NDVI) within each school area. Eye refraction data were collected annually from 2016 to 2019. The association between green space exposure and the change in the school-specific myopia prevalence was analyzed at the school level using linear regression. At the student level, the association between green space exposure and the incidence and progression of the refractive error was investigated using mixed-effects regression models.

**Results:** At the school level, a 0.1 increase in green space exposure was associated with a 3.6% decrease in the change in the myopia prevalence ( $p = 0.0001$ ). At the individual level, a 0.1 increase in green space exposure was associated with a 19.8% ( $p < 0.0001$ ) reduction in the risk of incident myopia. After adjusting for average outdoor activity time per day, average screen time per day, average reading time per day, and parental myopia, a higher level of green space exposure was still significantly associated with a relatively lower risk of incident myopia ( $p < 0.0001$ ).

**Conclusions:** These findings provide robust evidence at the geographical level that green space exposure is important for eye health and can reduce the risk and burden of myopia.

### Orbital & Oculoplastic Surgery

#### 3D Printing Patient-specific Implant for Orbital Fracture Reconstruction

First Author: Ka Hei Catherine **LAM**  
Co-Author(s): Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kelvin Kam-lung **CHONG**, Kenneth **LAI**, Calvin **PANG**

**Purpose:** Three-dimensional (3D) printing technology was applied in making orbital models, sets of negative molds, and patient-specific surgical instruments. Given the

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challenges of traditional manual free-hand shaping, this study evaluates the use of individualized semiautomated 3D printing technology in unilateral orbital wall reconstruction.

**Methods:** A pilot study was conducted at the Chinese University of Hong Kong. CT scan images of the contralateral, uninjured orbit were segmented and converted into a three-dimensional model. 3D model simulating the pre-injured orbit was manufactured by mirror image overlay technique. The commercially available implants were manually shaped using the three-dimensionally printed pair of negative molds.

**Results:** A total of 10 consecutive patients (4 females, aged  $40 \pm 12$ ) were included, and all suffered from more than 50% orbital fracture of the inferior orbital wall. Preoperative time on image segmentation by software engineer significantly decreased. The manual segmentation process, which usually took 4-6 hours, was replaced by a much faster semiautomatic process that only took 4-6 minutes. Intraoperative time reduced from 20-30 minutes to just 2-3 minutes. Improvements in ophthalmologic outcomes, such as enophthalmos and extraocular motility, were akin to that of standard orbital fracture repair.

**Conclusions:** Our pilot data suggests that 3D printing technology is both feasible and safe in the application of orbital fracture repair.

### Correlations of Magnetic Resonance Imaging Parameters with Clinical Activity Score in Thyroid Eye Disease: A Systematic Review and Meta-analysis

First Author: Sin Ki **YEUNG**

Co-Author(s): Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kelvin Kam-lung **CHONG**, Kenneth **LAI**, Calvin Cp **PANG**

**Purpose:** Clinical Activity Score (CAS) was first described in 1989 to assess activity among Caucasian patients. It was reported that clinical characteristics of thyroid eye disease (TED) vary among different ethnic groups. This study aims to evaluate the correlations between magnetic

resonance imaging (MRI) parameters and CAS in TED.

**Methods:** Literature search was conducted on 30 August 2023 using PubMed, MEDLINE, and Cochrane Library advanced search engines without restrictions on date of publication and language with keywords 'TED and CAS and MRI' for comparative studies with assessment of CAS and any MRI parameters. We extracted patient ethnicity and outcomes including correlation coefficient (rs) of CAS and MRI parameters including signal intensity ratio (SIR)/ apparent diffusion coefficient (ADC).

**Results:** We identified 203 references, of which 59 studies met the inclusion criteria after duplication removal for full review. Of which, 28 were Asian studies, 21 Caucasian. Major MRI parameters used to quantify activity include SIR, T2-relaxation time, ADC, fractional anisotropy, and structural parameters such as volume of extraocular muscles. Meta-analysis was performed to evaluate the correlation between CAS and SIR, and found a weak correlation in Asian patients ( $rs = 0.262-0.59$ ,  $p < 0.05$ ) when compared to Caucasians ( $rs = 0.37-0.73$ ,  $p < 0.05$ ). Although SIR is significantly higher in active than inactive TED patients, the difference is minor (0.01-1). Two Asian studies reported no significant difference of SIR between the 2 groups.

**Conclusions:** The correlation between CAS and SIR varies among different ethnic groups, and is weaker in Asian patients. MRI parameters should be incorporated into evaluation of TED activity to screen for clinically silent but treatment-responsive patients.

### Radiological Outcomes of Periocular Steroid Injection to the Levator Palpabrae Superioris: Superior Rectus Complex and Lacrimal Gland

First Author: Ting Hei **TSANG**

Co-Author(s): Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kelvin Kam-lung **CHONG**, Ka Hei **LAI**, Jake **SEBASTIAN**

**Purpose:** To evaluate the radiological outcome of transconjunctival triamcinolone acetonide (TA) injection to the levator palpabrae

superioris-superior rectus complex and lacrimal gland in the management of lid retraction, lacrimal gland swelling, and lateral flare in thyroid eye disease.

**Methods:** A prospective cohort study of patients who underwent triamcinolone injection for thyroid eye disease-related upper eyelid retraction, eyelid swelling, and lateral flare between January 2018 and December 2022. The study included 15 eyes in which the injections were administered to the LPS-SR and LG. To evaluate the treatment outcomes, all enrolled patients underwent contrast orbital MRI scans before and after the injections.

**Results:** A total of 15 patients with thyroid eye disease underwent periocular steroid injections into the LPS-SR and LG, and their progress was assessed using pre- and post-treatment contrast MRI scans. The radiological evidence revealed a significant improvement in the size of both the LPS-SR and LG ( $P < 0.001$ ). Furthermore, there were statistically significant improvements in the mean and maximum signal intensities of the LG pre- and post-treatment, with  $P$  values of 0.028 and 0.029, respectively. Similarly, the mean and maximum signal intensities of the LPS-SR muscles showed significant improvements pre- and post-treatment, with  $P$  values of 0.003 and  $<0.001$ , respectively.

**Conclusions:** This research is the first to utilize radiological evidence, demonstrating that a POS injection administered to LPS-SR and LG resulted in a decrease in their size and inflammation. These findings strongly support the correlations between pre- and post-treatment clinical soft-tissue manifestations.

### Testing Color Vision in Dyshyroid Optic Neuropathy: A Prospective Comparative Study

*First Author:* Siu Yan **CHAN**  
*Co-Author(s):* Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Chong **KAM LUNG**, Kenneth **LAI**, Jake Uy **SEBASTIAN**

**Purpose:** We reported the prevalence of 4 validated color tests: (1) Ishihara pseudoisochromatic plate (IPP), (2) Hardy-Rand-

Rittler plate (HRR), (3) Farnsworth dichotomous D-15 panel (F-D15), and (4) Lanthony desaturated D-15 panel (L-D15) in patients with definite DON.

**Methods:** A prospective, comparative cross sectional study.

**Results:** A total of 347 eyes were classified as having definite DON. 167 eyes had impaired color vision. 142 eyes (85.3%) were detected by D-15 desaturated, and 125 eyes (74.85%) by F-D15. Both tests demonstrated tritanopia as the most frequent dyschromatopsia. Significant associations were found between impaired color vision and radiologic evidence of apical crowding in orbital imaging ( $P < 0.0001$ ), diminished best-corrected visual acuity (BCVA) ( $P = 0.04$ ), and relative afferent pupillary defect (RAPD) ( $P = 0.04$ ).

**Conclusions:** D15 desaturated and F-D15 are useful for screening of acquired dyschromatopsia in DON. There was a high prevalence of tritan deficiency and significant associations between impaired color vision and radiologic evidence of optic nerve compression, diminished vision, and the presence of a RAPD.

### Thyroid Eye Disease: A Territory-wide Epidemiological Study from 2000-2017 in Hong Kong with 123,889 Autoimmune Thyroid Disease Patients

*First Author:* Wai Chak **CHOY**  
*Co-Author(s):* Carmen Km **CHAN**, Kam Lung, Kelvin **CHONG**, Calvin **PANG**, Wilson **YIP**

**Purpose:** Thyroid eye disease (TED) is the most prevalent inflammatory orbital disease. We aimed to characterize the disease incidence and prevalence and understand the relevant demographical, clinical, and social risk factors for developing moderate-to-severe TED.

**Methods:** We accessed the territory-wide electronic health record from 2000 to 2017. Autoimmune thyroid disease (AITD) patients and those with moderate-to-severe TED were identified using diagnosis codes, laboratory features, and treatments. Name-entity-recognition pipeline was used to process clinical notes. We estimated the incidence

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and prevalence trends of TED and evaluated the associations between laboratory findings, social behaviors, clinical features and drugs, and disease progression via multivariable cox-proportional hazard model.

**Results:** We identified 123,889 AITD patients among which 6,178 developed moderate-to-severe TED. Age-adjusted prevalence and incidence of moderate-to-severe TED in 2017 were 2.83% and 0.38 cases per 1000 PY, respectively. An increasing prevalence with decreasing incidence rate was observed. 1.00% of patients initially presented with corneal involvement or vision loss, which increased to 1.23% at the end of follow-ups. Autoimmune antibodies for AITD, including TRAb (HR = 1.385, P = 0.0044) and anti-TPO (HR = 1.498, P < 0.0001), were associated with onset of moderate-to-severe TED. Smoking (HR = 1.149, P = <0.0001), drinking (HR = 1.078, P = 0.0241), and high low-density cholesterol level (HR = 1.644, P < 0.0001) were also risk factors together with history of autoimmune diseases. Thirty-three drugs from 22 classes, excluding immunosuppressants, showed hazard reduction after multiple testing adjustment.

**Conclusions:** This is the largest and longest big data study providing epidemiological estimates of moderate-to-severe TED specifically among Asian AITD patients. The findings offer a new approach to management and potential drug candidates for repurposing.

### Other (General Ophthalmology)

Dec 10, 2023 (Sun) 08:30 - 10:00  
Venue: S422

#### Comparison of Flanged Intrascleral Intraocular Lens Fixation Versus Iris Claw Intraocular Lens Fixation: A Retrospective Study

First Author: Harsh **JAIN**  
Co-Author(s): Mounika **BOLISSETTY**, Jai **KELKAR**, Akshay **KOTHARI**

**Purpose:** To compare the visual outcome and complications of retropupillary fixated iris claw

intraocular lens (IOL) and sutureless intrascleral IOL fixation using the flanged fixation technique at 1 year.

**Methods:** In this retrospective study, eyes that underwent either iris claw or flanged SFIOL from January 2016 to July 2017 with a minimum of 1 year follow up were enrolled. Improvement in visual acuity, intraocular pressure measurements, endothelial cell count, central macular thickness, and complications were compared between and within groups at 6 weeks, 3 months, and 1 year postoperatively.

**Results:** 150 eyes were analyzed (n = 90 in the iris claw group and n = 60 in the flanged SFIOL group). Posterior capsular rent was the most common indication for IOL implantation (n = 51). The iris claw and SFIOL groups were comparable in terms of demographics and baseline characteristics. There was significant improvement in uncorrected distance visual acuity (UCDVA) at 6 weeks in both groups (P = 0.77), and at 1 year, the UCDVA was comparable between groups ( $0.36 \pm 0.32$  in the iris claw group and  $0.30 \pm 0.28$  in the SFIOL, P = 0.75). Transient elevation of intraocular pressure was seen slightly more in eyes with SFIOL (17%), while ovalization of the pupil was the main sequelae seen in the iris claw group (20%).

**Conclusions:** Both iris claw IOL fixation and SFIOL using flange are viable options for surgical correction of aphakia. Visual outcomes are excellent at 6 weeks and are maintained till 1 year follow up, with low complication rates.

Dec 10, 2023 (Sun) 08:30 - 10:00  
Venue: S422

#### Conbercept Versus Laser Therapy for the Treatment of Infants with Zone II Retinopathy of Prematurity

First Author: Yong **CHENG**  
Co-Author(s): Jianhong **LIANG**

**Purpose:** To compare intravitreal conbercept versus laser photocoagulation in infants with zone II treatment requiring ROP.



**Methods:** This randomized, open-label, non-inferiority trial was conducted in 3 ophthalmic centers. Overall, 202 eligible infants with zone II stage 2+ or 3+ were enrolled between June 1, 2018, and June 31, 2021. Infants were randomly 1:1 assigned to receive a 0.25 mg conbercept intravitreal injection or laser photocoagulation at baseline. Additional treatment was allowed if disease recurrence occurred. The primary outcome was the proportion of infants without active ROP and unfavorable structural outcomes at 24 weeks after baseline treatment. The principal secondary outcome was the proportion of reactivation rate of disease after baseline treatment. Other secondary outcomes were the ocular and systemic safety of the treatments and systemic exposure to free conbercept in serum.

**Results:** Among 202 eligible infants, 195 received baseline treatment and 170 completed the 24-week study (mean gestational age, 29.2 [SD, 2.1] weeks; mean birth weight, 1204.9 g [SD, 335.9 g]; 77 [45.3%] were female; 31.2% had zone II stage 2+ ROP and 68.8% had zone II stage 3+ ROP). Treatment success occurred in 82 (98.8%) of 83 infants who received laser therapy and in 86 (98.8%) of 87 infants who received conbercept 0.25 mg ( $p = 0.740$ ). The reactivation of disease occurred in 4 (4.8%) infants in the laser group and in 7 (8.0%) infants in the conbercept group (OR compared with laser therapy 1.73, 95% CI 0.49-6.14,  $p = 0.393$ ). All the infants with disease reactivation were of zone II stage 3+ and received repeat treatment. Serious and non-serious systemic adverse events and ocular adverse events were evenly distributed between the 2 groups.

**Conclusions:** In zone II treatment requiring ROP, intravitreal conbercept and laser therapy had comparative efficacy and both were well tolerated at week 24.

## Paediatric and Neuro Ophthalmology

### Early Initiation of Systemic Immunosuppressants for Non-infective Anterior Uveitis in Pediatric Patients

First Author: Hiu Ching Kristy **YIM**  
Co-Author(s): Carmen **CHAN**, Emily **WONG**

**Purpose:** To analyze the outcomes of pediatric non-infective anterior uveitis presenting to a tertiary referral center, and to determine whether earlier initiation or more aggressive step up of systemic immunosuppression improves outcome.

**Methods:** Retrospective study of non-infective anterior uveitis patients who presented under age 18 to Hong Kong Eye Hospital between 2005 and 2021. Primary outcomes included final visual acuity, presence of visual complications, and achieving steroid-free remission. Relationships between outcomes and the timing and type of systemic immunosuppressants used were analyzed.

**Results:** A total of 49 patients (83 eyes) were evaluated in the study. Among those requiring systemic treatment, earlier initiation of systemic immunosuppressants within 30 days of disease onset resulted in significantly better final visual acuity ( $P = 0.010$ ) and fewer visual complications ( $P = 0.023$ ). For patients requiring the use of steroid-sparing agents, those who received adalimumab had fewer complications ( $P = 0.044$ ) and a higher rate of achieving steroid-free remission ( $P = 0.037$ ). There was no difference in outcomes between patients receiving monotherapy steroid sparing agent vs multi-drug therapy ( $P = 1.067$ ).

**Conclusions:** Earlier and more aggressive step up of immunosuppression including the use of biologics show a benefit in terms of disease outcomes for pediatric non-infectious anterior uveitis patients.

### Pediatric Trans-scleral Intraocular Lens Fixation: Retrospective Single Center Outcomes

*First Author:* Kiran **KEDARISSETTI**  
*Co-Author(s):* Ankit **BHOPALKA**, Ritesh **NARULA**

**Purpose:** To study the demographic profile and long-term outcomes of pediatric trans-scleral fixated intraocular lens (TSIOL).

**Methods:** A retrospective review of medical records of all pediatric patients who underwent TSIOL from January 2016 till December 2021 was done and analyzed for surgical success and long-term outcomes.

**Results:** 331 eyes of 244 patients were analyzed, of which 87 were bilateral. The mean age at presentation was 10.43 years. The preoperative logMAR visual acuity (BCVA) was  $0.77 \pm 0.56$ . The most common indication for surgery was congenital lens dislocation (48.3%) followed by surgical aphakia secondary to trauma (26.8%). 65.2% of patients underwent XNIT technique of TSIOL while the rest had conventional forceps extraction of haptics. 94.8% of patients underwent a successful procedure with intraoperative complications noted only in 19 out of 331 eyes. 214 eyes of these patients had a follow-up duration of more than 4 months with a range of follow-up from 4 months to 7 years. Postoperative BCVA at 1 month was  $0.48 \pm 0.38$  and at final follow-up was  $0.40 \pm 0.42$ . The mean change in BCVA from preoperative values to last follow-up was  $-0.37 \pm 0.59$  (0.36, CI 0.28-0.45) and from 4 weeks to last follow-up was  $0.009 \pm 0.39$ , suggesting that the visual acuity remained stable in most patients over a period of time.

**Conclusions:** The trans-scleral fixated IOL implantation in pediatric patients without sulcus support has a significant success rate with minimal complications. The visual acuity significantly improved after the procedure and remained stable during the follow-up.

### Randomized Controlled Trial Comparing the Efficacy and Safety of Mydriatic Microdrops over Standard Dose Mydriatics for Pupil Dilation in Retinopathy of Prematurity Examination

*First Author:* Evelyn **LU**  
*Co-Author(s):* Khair **JALAL**, Connie **LAI**, Ka Yin **LEUNG**, Wilfred Hing Sang **WONG**

**Purpose:** 1. To determine if Mydrin-P microdrops can dilate pupils sufficiently enough for successful retinopathy of prematurity (ROP) examination compared to standard dose Mydrin-P. 2. To assess whether the cardiovascular, respiratory, and gastrointestinal adverse effects differ between microdrops and standard dose Mydrin-P.

**Methods:** A prospective, randomized controlled study was conducted from August 2022 to March 2023 in the neonatal intensive care unit at Queen Mary Hospital, Hong Kong. Preterm infants were randomized to receive either the standard Mydrin-P eyedrops or the mydriatic microdrops which contained around one-third of the standard Mydrin-P dosage. The primary outcome measured whether a successful ROP examination was conducted. Secondary outcomes included pupil diameter at baseline, 30 minutes, 60 minutes, 120 minutes after eyedrops instillation, and at the time of ROP exam as well as adverse effects following mydriatics administration.

**Results:** Eighteen patients were enrolled in this study with total 46 episodes of ROP recorded. All episodes with microdrops instillation led to successful ROP exams. There was no statistically significant difference between standard eyedrops and microdrops in determining the success of ROP exam ( $p = 0.233$ ). Mean pupil diameter did not differ between the microdrops and standard eyedrops group. At the time of ROP exam, the mean pupil diameter was 5.47 mm in the standard eyedrops group and 5.73 mm in the microdrops group.

**Conclusions:** Microdrops have similar efficacy and safety profile compared to standard Mydrin-P eyedrops.

## Pediatric Retina

Dec 10, 2023 (Sun) 13:45 - 15:15  
Venue: S422

**2-year Outcomes from FIREFLEYE Next, a Prospective Follow-up Study to Evaluate Long-term Efficacy and Safety of Patients Treated with Intravitreal Aflibercept or Laser Photocoagulation for Retinopathy of Prematurity in the FIREFLEYE Study**

First Author: Wei-chi **WU**  
Co-Author(s): Noriyuki **AZUMA**, Alistair **FIELDER**, Domenico **LEPORE**, Hidehiko **NAKANISHI**, Andreas **STAHL**

**Purpose:** FIREFLEYE Next (NCT04015180) assesses long-term ocular outcomes (overall clinical and neurodevelopmental outcomes) through to age 5 years following treatment of acute-phase retinopathy of prematurity (ROP) with aflibercept 0.4 mg intravitreal injection or laser photocoagulation (2:1 randomization) in the 6-month phase 3 FIREFLEYE study.

**Methods:** Efficacy and safety outcomes at age 2 years are reported. Children will be monitored until age 5 years when the primary endpoint (binocular best-corrected visual acuity) will be assessed.

**Results:** The FAS comprised 100 children (aflibercept, 66; laser, 34). At FIREFLEYE Next entry, mean  $\pm$  SD age was  $9.0 \pm 1.6$  months, and 83.0% (aflibercept) vs 92.3% (laser) of children had no ROP. At age 2 years, 96.8% (aflibercept) vs 93.8% (laser) of children had no ROP. There were no new cases of retinal detachment. Four children in the aflibercept arm (6.1%) were treated for ROP complications; 2 for pre-existing end-stage disease, and 2 for reactivated disease in both eyes. Mean  $\pm$  SD refractive spherical equivalent was  $-0.6 \pm 3.1$  diopters (aflibercept) vs  $-1.4 \pm 3.4$  diopters (laser). At age 2 years, 1.6% (2 eyes; aflibercept) vs 1.6% (1 eye; laser) showed no ability to fix and follow a 5-cm toy. No relevant differences in growth and neurodevelopment tests (e.g., Bayley Scales of Infant and Toddler Development-III and Vineland Adaptive

Behavior Scales-II) at age 2 years between arms were identified.

**Conclusions:** After aflibercept treatment, through age 2 years, ROP absence was well sustained, and visual function was appropriate. There was no evidence of unfavorable effects on growth and neurodevelopmental outcomes at age 2 years.

Dec 10, 2023 (Sun) 13:45 - 15:15  
Venue: S422

**A Retrospective Analysis of Ultra-Widefield Photograph Documentation of Retinopathy of Prematurity at a Tertiary Eye Care Outpatient Setup**

First Author: Sushma **JAYANNA**  
Co-Author(s): Virangi **DOSHI**

**Purpose:** To demonstrate the usefulness of ultra-widefield fundus photography (UWF) (Optos) for documentation in retinopathy of prematurity (ROP).

**Methods:** This was a retrospective study of infants with ROP who underwent at least 1 sitting of UWF fundus photography in addition to binocular indirect ophthalmoscopy (BIO) between a study period of April 2018 and September 2020. BIO was conducted by a trained ROP specialist. All fundus photographs were captured on Optos UWF camera (Dunfermline, UK) in a flying baby position. Demographic details and fundus findings on BIO and fundus photographs were analyzed.

**Results:** Among 247 infants imaged, 60 were excluded as they did not meet the inclusion criteria. 187 infants were included. 22 (11.7%) babies had findings which were discordant with BIO. Among infants with successful imaging, no posterior disease was missed. Four infants who required treatment would have been missed had UWF photography been used alone. Final diagnosis and treatment were solely based on BIO findings. Among 60 excluded babies whose images did not meet the inclusion criteria, 20 had aggressive posterior ROP, 5 zone 1 disease (4 plus), 16 zone 2 disease (3 plus), 5 zone 3 disease, 11 stage 4 (5 stage IVA,

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6 IVB), 3 stage V. Forty-one babies out of these 60 required intervention.

**Conclusions:** UWF photography can be a useful tool in documenting the initial and follow-up findings of preterm babies with ROP in a high-volume outpatient department of a tertiary care unit.

**Dec 10, 2023 (Sun) 13:45 - 15:15**  
**Venue: S422**

### Downregulation of Tear Fluid Apolipoprotein A4 as a Potential Biomarker for Retinopathy of Prematurity

*First Author: Alicia LIU*

*Co-Author(s): Chung Yin, Benjamin CHU, Connie LAI, Thomas Chuen LAM, Wai-ching LAM, Ying Hon SZE*

**Purpose:** Retinopathy of prematurity (ROP) is the leading cause of preventable childhood blindness. Proper identification of premature babies at risk is vital. Protein biomarkers in tear fluid may offer an accessible, noninvasive option.

**Methods:** An expansion of our previous study in identifying dysregulated tear proteins in ROP infants. Infants with birth weight  $\leq 1500$  g or gestational age  $\leq 30$  weeks in NICUs were recruited. Examination began at 4 weeks chronologic age or 31 weeks postmenstrual age. ROP was diagnosed according to the International Classification for Retinopathy of Prematurity. Tear fluids from ROP ( $n = 3$ ) and non-ROP ( $n = 15$ ) infants (ROP:  $34.8 \pm 2.6$  postmenstrual age in weeks, non-ROP:  $35.2 \pm 0.7$ ,  $p = 0.78$ ) were collected with Schirmer's strips. Tear proteins were quantified by SWATH-acquisition in ZenoTOF 7600 mass spectrometer and analyzed in PeakView (Sciex).

**Results:** 876 unique protein groups (1% FDR) were quantified, with 52 significantly differentiated proteins ( $FC \geq 1.5$  or  $\leq 0.67$ ,  $p < 0.05$ ). Among them, 17 (33%) were involved in protein-protein interaction with vascular endothelial growth factor A (VEGFA), a therapeutic hallmark of ROP treatment. This includes the significantly downregulated

apolipoprotein A4 (APOA4,  $FC = 0.29$ ,  $p = 0.03$ ).

**Conclusions:** The downregulation of APOA4 is consistent with our previously reported findings with another mass spectrometry system (TripleTOF 6600, Sciex). These reproducible results on multiple platforms with independent samples signify the potential application of an APOA4 biomarker in ROP. APOA4 has been reported to regulate platelet aggregation and thrombosis, and its association with vascular disruption may lead to the development of incompletely vascularized retina in ROP. Hence, our study highlights the potential of tear protein biomarkers for noninvasive ROP screening.

**Dec 10, 2023 (Sun) 13:45 - 15:15**  
**Venue: S422**

### Dry Lensectomy-assisted Lensectomy in the Management of End-stage Pediatric Vitreoretinopathy Complicated with Severe Anterior Segment Abnormalities

*First Author: Jie PENG*

*Co-Author(s): Peiquan ZHAO*

**Purpose:** To report a novel modified technique of dry lensectomy in the management of stage 5C retinopathy of prematurity (ROP) or similar pediatric vitreoretinopathy complicated with capsule-endothelial, iris-endothelial adhesion, and secondary glaucoma.

**Methods:** Twenty-nine eyes of 19 patients with severe complications of advanced pediatric total retinal detachment who received limbus-based dry lensectomy were studied retrospectively. Preoperative and postoperative clinical information was collected and reviewed.

**Results:** Among the 29 eyes, 3 eyes (10.34%) underwent lensectomy combined with vitrectomy and membrane peeling simultaneously. Twenty-six (89.66%) eyes underwent staged lensectomy due to severe corneal opacity or retinal vascular activity, of which 10 underwent another vitrectomy combined with membrane peeling. At the last visit (mean:  $8.70 \pm 5.16$  months of follow-up), all eyes had a reconstructed anterior



chamber with normal depth. Among 23 eyes having preoperative corneal opacity, 16 (69.57%) had a clearer cornea with reduced opacity and 6 (26.09%) showed similar corneal opacification without deterioration. Among 13 eyes that underwent retrolental fibroplasia peeling, 9 (69.23%) eyes showed partial retinal reattachment in open-funnel type.

**Conclusions:** Dry lensectomy offered a simple way to lower the IOP and simplified the surgery, which helped to solve the severe anterior segment complications and offer a chance for following retrolental fibroplasia peeling and potential visual gain for end-stage pediatric vitreoretinopathy patients.

Dec 10, 2023 (Sun) 13:45 - 15:15  
Venue: S422

#### Efficacy of Intravitreal Bevacizumab as Monotherapy for Treatment of Aggressive Retinopathy of Prematurity

First Author: Bhavik **PANCHAL**  
Co-Author(s): Yogitha **CHARISHMA**, Megha **GULATI**, Harshitha **KANISSETTY**, Tapas **PADHI**, Anamika **PATEL**

**Purpose:** To describe the efficacy of intravitreal bevacizumab as monotherapy for the treatment of aggressive retinopathy of prematurity (ROP).

**Methods:** Preterm infants with aggressive ROP (any stage with plus disease, hybrid ROP) were enrolled in this retrospective study. Intravitreal bevacizumab (0.625 mg/0.025 ml) was injected under topical anesthesia. Patients were followed as per ICROP guidelines. Study period was from January 2018 to December 2021.

**Results:** Two hundred twenty eyes of 112 infants with aggressive ROP were enrolled. Mean gestational age was 31.2 weeks ( $\pm 2.3$  weeks). Mean birth weight was 1453.5 g ( $\pm 389$  g). Mean PMA at injection was 36 weeks. Neonatal jaundice and respiratory dysfunction were the top 2 systemic risk factors (75.8%). Mean NICU stay was 27.2 days, median 20 days. 18.6% of eyes showed recurrence, 8 eyes received a repeat injection, and eventually all eyes with recurrence were lasered. Mean

regression of the disease was noted at 19 days. Average visits were 10 (3.7 until regression of ROP and 7.3 until retina was mature). Mean first follow up after bevacizumab treatment was 11.4 days. 12% of infants were in half zone, 19% in zone 1, and 48% in zone 2. There were no major complications such as endophthalmitis, cataract, or vitreous hemorrhage after injection.

**Conclusions:** Intravitreal bevacizumab injection is an effective method for the management of infants with aggressive ROP. However, some cases may show recurrence and require laser PHC. Close monitoring for recurrence or progression is necessary. Eyes with half zone or posterior zone 1 ROP have a higher chance of recurrence.

Dec 10, 2023 (Sun) 08:30 - 10:00  
Venue: S422

#### Non-contact Ultra-widefield Swept Source Optical Coherence Tomography Biomarkers Could Predict Treatment Response to Intravitreal Anti-vascular Endothelial Growth Factor in Aggressive Retinopathy of Prematurity

First Author: Akash **BELENJE**  
Co-Author(s): Deepika C **PARAMESWARAPPA**, Subhadra **JALALI**, Tapas **PADHI**

**Purpose:** To illustrate the role of non-contact ultra-widefield swept source optical coherence tomography biomarkers in predicting treatment response to intravitreal injection of the anti-vascular endothelial growth factor (anti-VEGF) bevacizumab in aggressive retinopathy of prematurity (A-ROP).

**Methods:** Non-contact ultra-widefield (NC-UWF) fundus imaging with integrated UWF guided swept source optical coherence tomography (SS-OCT) was performed prospectively in preterm babies before and after intravitreal anti-VEGF (bevacizumab) monotherapy. OCT biomarkers were analyzed in eyes that reached complete vascularization versus others.

**Results:** Eyes with retinal vessels reaching near the ora serrata were labelled as regressed

ROP and vascularized retina (group 1). Eyes with reactivation of ROP needing laser or vitreoretinal surgery or eyes with peripheral avascular retina (PAR) at 16 weeks post-injection were considered as group 2. Pre-injection baseline OCT showed a hyperreflectivity of inner retinal layers in 12 out of 46 eyes in group 1 versus 30 out of 34 eyes in group 2 (p value 0.002). None of the eyes in group 1 showed choroidal thinning at the posterior pole as compared to 14 out of 34 eyes in group 2 (p value 0.001). Intraretinal hyporeflexive cystic changes at the fovea were seen in 16 out of 46 eyes in group 1 and 2 out of 34 eyes in group 2 (p value 0.012).

**Conclusions:** Pre-injection swept source OCT biomarkers could predict the treatment outcomes of anti-VEGF (bevacizumab) monotherapy in A-ROP eyes. Hyperreflectivity of inner retinal layers and choroidal thinning had poorer and unpredictable response to anti-VEGF injection, whereas cystic changes at the fovea predicted favorable response.

**Dec 10, 2023 (Sun) 13:45 - 15:15**  
**Venue: S422**

### Surgical Treatment for Familial Exudative Vitreoretinopathy in Children Complicated with Tractional Epiretinal Membrane

*First Author: Jing MA*  
*Co-Author(s): Jinghua LIU, Hai LU*

**Purpose:** To describe the clinical features and surgical outcomes of familial exudative vitreoretinopathy (FEVR) in children complicated with tractional epiretinal membrane.

**Methods:** A retrospective case series in a tertiary referral center. The medical records of 11 children with FEVR (11 eyes) were reviewed.

**Results:** There were 7 males and 4 females. The median age at operation was 6.29 years (range, 9 months to 12 years). Mean follow-up was 19 months (range, 1-40 months). All the eyes had epiretinal membrane with macular traction and received 23G or 25G vitrectomy with epiretinal membrane peeling. Six eyes were given intraoperative intravitreal injection of

anti-VEGF drug. BCVA was improved in all eyes after the surgery. The logarithm of the minimum angle of resolution (logMAR) BCVA before and after surgery were  $1.12 \pm 0.80$  and  $0.67 \pm 0.51$ , respectively, with a significant difference ( $t = 0.788$ ,  $p = 0.012$ ). Postoperative BCVA was significantly correlated with preoperative BCVA ( $r = 0.788$ ,  $p = 0.012$ ). Preoperative and postoperative FFA were performed in 2 eyes, showing a reduced fluorescence leakage after the surgery. Preoperative and postoperative OCT were performed in 6 eyes, showing a significant improvement of the macular morphology. Preoperative FFA and postoperative OCTA were performed in 7 eyes, showing an improvement of the structure of the foveal avascular zone. The temporal vascular arcade angle was widened in 8 eyes after the surgery and stable in 3. No severe complications occurred.

**Conclusions:** Vitrectomy is a safe and effective treatment for children with FEVR complicated with tractional epiretinal membrane. Good anatomical and functional results can be achieved in carefully selected cases.

**Dec 10, 2023 (Sun) 13:45 - 15:15**  
**Venue: S422**

### Temporal Retinal Vessel Angle as a Novel Clinical Marker in FEVR

*First Author: Christopher GO*  
*Co-Author(s): Gem CHEW, Wei-chi WU*

**Purpose:** To investigate the relationship between temporal retinal vessel angles with visual acuity and foveal hypoplasia in patients with FEVR.

**Methods:** A single center retrospective review of patients with FEVR managed between 2006 and 2021 at Linkou Chang Gung Memorial Hospital. Patients with stage 4/5 disease on presentation were excluded. Temporal retinal artery (TAA) and vein (TVA) angles were determined using a semi-manual method using computer software by 2 reviewers.

**Results:** 117 eyes from 65 patients were included in the analysis. There were 32 males

and 33 females. The mean age of presentation was 6.0 years and the mean presenting visual acuity (VA) was 0.74 logMAR. The mean TAA and TVA were  $63.7 \pm 29.5^\circ$  and  $78.6 \pm 33.9^\circ$  with a moderate inverse correlation with VA, central macular thickness, foveal hypoplasia, and FEVR stage ( $p < 0.001$ ). The predictive power of TAA and TVA were analyzed using ROC curve, and the AUCs of poor VA (logMAR  $\geq 1.0$ ) and foveal hypoplasia were 0.80 and 0.83, and 0.86 and 0.82 for artery and vein, respectively. Furthermore, the odds ratio of poor VA was 13.62 in patients with TAA  $\leq 65^\circ$  compared to those with TAA  $> 65^\circ$  ( $p < 0.0001$ ) and 22 in patients with TVA  $\leq 73^\circ$  ( $p < 0.0001$ ).

**Conclusions:** Temporal retinal vessel angle may serve as a novel marker of visual prognosis in FEVR, showing correlation to visual acuity, FEVR stage, central macular thickness, and presence of foveal hypoplasia. Further studies are required to create a more standardized and clinically relevant method given there is a significant inter-observer variability despite the use of semi-manual method with assistance of computer software.

**Dec 10, 2023 (Sun) 13:45 - 15:15**  
**Venue: S422**

### The Clinical Effect of Conbercept and Ranibizumab Treatment of Familial Exudative Vitreoretinopathy of Stage 2

*First Author: Li NAN*

**Purpose:** To observe the clinical efficacy and safety of intravitreal injection of conbercept or ranibizumab in the treatment of familial exudative vitreoretinopathy (FEVR) of stage 2.

**Methods:** From January 2021 to July 2022, patients who were diagnosed as FEVR of stage 2 in Weifang Eye Hospital were analyzed retrospectively; 0.025 mL (10 mg) of ranibizumab or conbercept were injected into the vitreous cavity. The effective rate, recurrence rate, injection times, maturation rate of optic reticulum, ocular, and systemic complications were compared between the 2 groups.

**Results:** A total of 59 eyes (34 cases) were included, including 20 males and 14 females, 32 eyes (20 cases) in the conbercept group and 27 eyes (14 cases) in the ranibizumab group. The mean gestational age, birth weight, corrected gestational age, and follow-up time of the conbercept group were  $38.86 \pm 1.28$  weeks,  $3.35 \pm 0.63$  kg,  $41.67 \pm 2.99$  weeks, and  $62.41 \pm 7.86$  weeks, respectively. The mean gestational age, birth weight, corrected gestational age, and follow-up time of the ranibizumab group were  $39.37 \pm 0.94$  weeks,  $3.33 \pm 0.31$  kg,  $41.34 \pm 1.45$  weeks, and  $62.31 \pm 6.20$  weeks, respectively. The difference was statistically significant ( $P < 0.05$ ).

**Conclusions:** Two anti-VEGF drugs, conbercept and ranibizumab, are effective in FEVR of stage 2, but the effective rate of conbercept is high, and there is no laser supplementary treatment, which provides a new choice for FEVR of stage 2.

**Dec 10, 2023 (Sun) 13:45 - 15:15**  
**Venue: S422**

### Utility of 3D-display Surgical Videos for Better Educational Effects in Pediatric Persistent Fetal Vasculature for Ophthalmologists

*First Author: Jinghua LIU*

*Co-Author(s): Hai LU*

**Purpose:** To compare the educational benefits of 3D-display surgical videos compared with 2D-display surgical videos as a training tool in pediatric persistent fetal vasculature (PFV).

**Methods:** Doctors watched 3D-display and 2D-display surgical videos of pediatric PFV in a randomized order and completed a questionnaire immediately to give educational scores.

**Results:** Twelve doctors watched 18 surgical videos (9 3D videos and 9 2D videos); 216 questionnaires were obtained. Doctors watching 3D-display videos had a higher accuracy rate for discrimination of the depth of anterior chamber (85.8% vs 91.2%,  $p = 0.041$ ) and the exact layer of lens opacity (80.6%

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vs 89.1%,  $p=0.032$ ) of the pediatric PFV cases. Doctors considered that compared with 2D-display videos, 3D-display videos made it easier to discriminate shallow anterior chamber (8.9 vs 9.5,  $p = 0.045$ ), location of lens opacity (7.8 vs 8.7,  $p = 0.029$ ), vitreous strips (8.5 vs 9.7,  $p = 0.045$ ), complicated tractional retinal detachment (6.4 vs 8.2,  $p = 0.020$ ), or macular involvement (6.1 vs 7.8,  $p = 0.037$ ) in pediatric PFV cases. For learning pediatric PFV, doctors considered that 3D-display videos had better magnification (6.2 vs 9.7,  $p = 0.015$ ), image clarity (6.5 vs 8.9,  $p = 0.033$ ), and stereopsis (6.1 vs 9.3,  $p = 0.019$ ), compared with those of 2D-display videos.

**Conclusions:** 3D-display surgical videos can provide better educational benefits for ophthalmologists in learning pediatric PFV vitrectomy surgery when compared to 2D videos.

Dec 10, 2023 (Sun) 13:45 - 15:15  
Venue: S422

### Vascular Development Analysis: A Study of Tertiary Anti-vascular Endothelial Growth Factor Therapy After Second Reactivation of Retinopathy of Prematurity

First Author: Xuerui **ZHANG**  
Co-Author(s): Jie **PENG**, Peiquan **ZHAO**

**Purpose:** To observe the vascular development results of tertiary anti-VEGF therapy following spontaneous second reactivation of ROP.

**Methods:** This retrospective study included type 1 or aggressive ROP infants (AROP) who received 3 anti-VEGF drug treatments for ROP. The vascular growth and possible associated risk factors were analyzed.

**Results:** A total of 22 type 1 ROP infants (42 eyes) were included in this study. Among them, 23 eyes were categorized as AROP or in zone I. After the third intravitreal injection, 7 eyes showed complete vascularization (group 1), while the remaining 35 eyes demonstrated persistent avascular retina (PAR) (group 2). In group 2, 17 eyes maintained a stable state and were classified in the regression subgroup. The

other 18 eyes developed a third reactivation (reactivation subgroup) and were treated with laser photocoagulation (LPC). BW was significantly lower in group 2 than in group 1 ( $p < 0.001$ ). The decision tree shows that only infants weighing more than 1250 g (17.5%) had a chance to achieve complete retinal vascularization. In addition, most infants with BW more than 1290 g and initial ROP disease in zone I or posterior zone II developed PAR rather than complete vascularization (12.5% vs 2.5%).

**Conclusions:** Tertiary IVR can be used to treat a second ROP reactivation and improve peripheral retinal vascularization. BW is the factor most closely related to complete retinal vascularization. Our decision tree model may be helpful in predicting the prognosis of anti-VEGF drugs in the event of a second ROP reactivation.

## Retina (Medical)

Dec 08, 2023 (Fri) 08:30 - 10:00  
Venue: S422

### 6-month Outcomes of Switching from Aflibercept to Faricimab in Refractory Cases of Neovascular Age-related Macular Degeneration

First Author: Keiko **KATAOKA**  
Co-Author(s): Japan Amd Research Consortium (**JARC**), Nozomu **HASHIYA**, Kanako **ITAGAKI**, Annabelle **OKADA**, Sorako **WAKUGAWA**

**Purpose:** To assess 6-month outcomes of switching from aflibercept to faricimab in eyes with refractory neovascular age-related macular degeneration (nAMD) previously requiring monthly injections.

**Methods:** This multicenter retrospective study examined nAMD eyes receiving monthly aflibercept injections switched to faricimab administered monthly up to 4 injections followed by injections at a minimum of 2-month intervals as per drug labeling. Data regarding age, sex, number of previous injections, treatment intervals, and best-corrected visual



acuity (BCVA) were collected. Central retinal thickness (CRT), subfoveal choroidal thickness (SFCT), and maximal pigment epithelial detachment (PED) height were measured by optical coherence tomography.

**Results:** The study included 130 eyes of 124 patients. At 6 months, 53 eyes (40.8%) continued on faricimab treatment (group 1), while 77 eyes (59.2%) discontinued faricimab for various reasons (group 2), the most common being worse exudation. There were no significant differences between the 2 groups at baseline. In group 1, CRT and SFCT significantly decreased at 1 month ( $P = 0.013$  and  $0.008$ ), although statistical significance was lost at 6 months ( $P = 0.689$  and  $0.052$ ). BCVA and maximal PED height showed no significant changes, however mean treatment intervals were extended from  $4.4 \pm 0.5$  weeks at baseline to  $8.7 \pm 1.7$  weeks at 6 months ( $P < 0.001$ ) in group 1. No clear predictors of response were identified.

**Conclusions:** Switching from aflibercept to faricimab allowed for extension of treatment intervals from monthly to bimonthly in roughly 40% of eyes, suggesting that faricimab may be considered in refractory nAMD cases.

**Dec 08, 2023 (Fri) 08:30 - 10:00**  
**Venue: S422**

### Association Between Choroidal Thickness and Age-related Macular Degeneration Severity: Meta-analysis from the Asian Eye Epidemiology Consortium

First Author: Kai Xiong **CHEONG**  
Co-Author(s): Ching-yu **CHENG**, Mariko **SASAKI**, Anna **TAN**, Yih Chung **THAM**, Yasuo **YANAGI**

**Purpose:** To compare the choroidal thickness (CT) of participants with various stages of age-related macular degeneration (AMD) versus normal controls through a meta-analysis of studies conducted within the Asian Eye Epidemiology Consortium.

**Methods:** Eight population-based studies from China, Iran, Japan, and Singapore were

included. Axial length (AL) and spherical equivalent (SE) measurements and imaging with color fundus photography and spectral-domain optical coherence tomography were performed. Random-effects meta-analysis was performed to examine the association between AMD and its stages [early AMD, intermediate AMD (iAMD), neovascular AMD (nAMD), and geographic atrophy (GA)] with CT, while adjusting for age, gender, current smoking status, and AL/SE.

**Results:** Of 17,916 participants, 13,116 participants (mean age:  $62.15 \pm 9.66$  years) were included into the study. The mean unadjusted CT was  $245.01 \pm 84.04 \mu\text{m}$  [mean CT:  $255.4 \mu\text{m}$  (no AMD),  $263.59 \mu\text{m}$  (early AMD),  $270.64 \mu\text{m}$  (iAMD),  $273.32 \mu\text{m}$  (nAMD), and  $156.50 \mu\text{m}$  (GA)]. The presence of AMD was associated with a thicker choroid ( $\beta = 11.51$ , 95% CI = 4.10 to 18.92). AMD severity was also positively associated with CT. Early AMD ( $\beta = 8.75$ , 95% CI = 0.03 to 17.47), iAMD ( $\beta = 19.68$ , 95% CI = 13.20 to 26.16), and nAMD ( $\beta = 34.15$ , 95% CI = 6.84 to 61.46) were each positively associated with thicker CT after adjusting for age, gender, smoking, and SE. GA was not significantly associated with CT.

**Conclusions:** In a large Asian cohort, AMD is associated with a thicker choroid in early AMD, iAMD, and nAMD, but not in GA. Studying CT will help better characterize Asian AMD phenotypes, which may show differences compared with AMD phenotypes in Western populations.

**Dec 08, 2023 (Fri) 08:30 - 10:00**  
**Venue: S422**

### Concurrent Autoimmune Retinopathy and Myasthenia Gravis with/without Thymoma

First Author: Ping **FEI**  
Co-Author(s): Peiquan **ZHAO**

**Purpose:** To report autoimmune retinopathy (AIR) in patients of myasthenia gravis with/without thymoma.

**Methods:** Autoimmune retinopathy cases complicated with myasthenia gravis were

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reviewed and analyzed. Examinations were performed, including visual field test, electroretinogram (ERG), fundus photography, fundus autofluorescence, exome sequencing detection, and autoantibodies detection.

**Results:** Both cases were middle-aged women with a history of myasthenia gravis. They complained of vision loss accompanied by visual field defect for years, which had worsened recently. Fundus examinations showed diffuse retinal atrophy and abnormal autofluorescence in both eyes. Optical coherence tomography (OCT) examinations revealed atrophy of the outer retina around the macula. Visual field test showed severe binocular visual field defect and tubular visual field; ERG suggested the disappearance of cone rod response. Further genetic testing and autoantibodies detection confirmed the diagnosis of AIR in both patients. Case 1 was paraneoplastic AIR with positive anti-recoverin IgG and anti-CV2 IgG, and case 2 was non-paraneoplastic AIR with positive anti-ENO1 antibody, respectively. Immunosuppressant therapy combined with intravenous gamma globulin were recommended to control the progression of the disease.

**Conclusions:** AIR can be divided into paraneoplastic and non-paraneoplastic, which can cause serious damage to visual function without early intervention. Timely and regular fundus examination are recommended for patients with myasthenia gravis, especially when vision defects occur.

**Dec 08, 2023 (Fri) 08:30 - 10:00**  
**Venue: S422**

### Cord Lining Induced Pluripotent Stem Cell-derived Retinal Pigment Epithelium: A Novel Source for Cell Therapy for Age-related Macular Degeneration

*First Author:* Mayuri **BHARGAVA**  
*Co-Author(s):* Paul **BLAKELEY**, Regha **KAKKAD**, Zengping **LIU**, Bhav **PARIKH**, Xinyi **SU**

**Purpose:** Replacing dysfunctional RPE with healthy tissue is a promising treatment for age-

related macular degeneration (AMD). Since oxidative stress leads to RPE mitochondrial dysfunction causing bioenergetic crisis, it is imperative that cell source can withstand stress. Current RPE cell products in pre-clinical trials from human embryonic stem cells (hESCs) and skin-derived human induced pluripotent stem cells (skin-hiPSCs) are associated with immunogenicity, mutagenicity, ethical concerns, and lack data on bioenergetics. A novel source of cord lining stem cells can be obtained noninvasively, without ethical concerns, are somatically pristine, and have robust bioenergetics. Our purpose was to assess cord lining induced pluripotent stem cell-derived retinal pigment epithelium (CLiPS-RPE) characterization and bioenergetics in vitro and evaluate immune response after transplantation into wild-type rabbit eyes, without immunosuppression.

**Methods:** Characterization of stem cell RPE (SC-RPE: CLiPS, skin-hiPSCs, and hESCs) was studied using gene expression and protein localization. Bioenergetics in basal and stressed conditions was measured by Seahorse assay. All RPE lines were xenografted in rabbit eyes.

**Results:** CLiPS-RPE displayed pigmented cobblestone-like morphology, expressed key RPE genes and protein, demonstrated functional barrier activity, active phagocytosis, and showcased polarized functions, comparable to other RPE lines. Bioenergetically, CLiPS-RPE had higher oxidative potential than skin-hiPSC/hESC-RPE. This was corroborated by oxidative stress test, where CLiPS-RPE demonstrated higher resistance, outperforming other RPE lines. Upon xenotransplantation, only rabbits with CLiPS-RPE displayed better host-graft response with absence of severe immune rejection.

**Conclusions:** CLiPS-RPE is functionally similar to established sources of RPE from skin-iPSCs/hESCs. However, only CLiPS-RPE shows higher bioenergetics and demonstrates increased resistance to stress. Thus, CLiPS-RPE is functional with a robust metabolic profile, making it a potential alternative for cell therapy.

Dec 08, 2023 (Fri) 08:30 - 10:00  
Venue: S422

### Effects of Physical Activity and Inactivity on Retinal Vessel Caliber of Children: The Hong Kong Children Eye Study

First Author: Vincent **YUEN**  
Co-Author(s): Carol **CHEUNG**, Jason **YAM**,  
Xiujuan **ZHANG**, Yuzhou **ZHANG**

**Purpose:** Previous studies often separately investigated the effects of physical activity and inactivity on retinal vessel caliber. In this study, we devised the ratio between physical activity and inactivity (PAIR) to investigate their combined effects on the retinal vessel caliber of children in Hong Kong.

**Methods:** All participants were children aged 6 to 8 years from the Hong Kong Children Eye Study and received retinal photography. Additional data were obtained from a validated questionnaire. A validated deep-learning system was used to automatically estimate central retinal artery equivalent (CRAE), central retinal vein equivalent (CRVE), and arteriovenous ratio (AVR) from retinal photographs.

**Results:** 11,959 subjects were included in the study. Increased PAIR was associated with narrower CRVE ( $\beta = -2.079$ ; 95% CI: -3.141, -1.017;  $P = 0.001$ ), wider CRAE ( $\beta = 1.033$ ; 95% CI: 0.288, 1.778;  $P = 0.007$ ), and increased AVR ( $\beta = 0.006$ ; 95% CI: 0.003, 0.010;  $P = 0.001$ ). Subgroup analysis of boys showed increased PAIR was associated with narrower CRVE ( $\beta = -2.563$ ; 95% CI: -4.099, -1.027;  $P = 0.001$ ), wider CRAE ( $\beta = 1.364$ ; 95% CI: 0.288, 2.440;  $P = 0.013$ ), and increased AVR ( $\beta = 0.008$ ; 95% CI: 0.003, 0.013;  $P = 0.002$ ). Subgroup analysis of girls showed PAIR was associated with narrower CRVE ( $\beta = -1.759$ ; 95% CI: -3.237, -0.282;  $P = 0.020$ ) and increased AVR ( $\beta = 0.005$ ; 95% CI: 0.000, 0.010;  $P = 0.039$ ) but not CRAE.

**Conclusions:** Increase in PAIR was associated with narrower CRVE, wider CRAE, and increased AVR, especially in boys.

Dec 08, 2023 (Fri) 08:30 - 10:00  
Venue: S422

### Efficacy, Durability, and Safety of Faricimab in DME: 1-year Results from Chinese Subpopulation of Phase 3 RHINE Trial

First Author: Xiaodong **SUN**  
Co-Author(s): Oluwatobi **IDOWU**, Qin **JIANG**,  
Xiao-rong **LI**, Ruyuan **LIU**, Yannan **TANG**

**Purpose:** This RHINE (NCT03622593) subpopulation analysis compared faricimab, every 8 weeks (Q8W) or a personalized treat-and-extend-based regimen (T&E), with aflibercept Q8W, in patients with DME (diabetic macular edema) from mainland China, Hong Kong, and Taiwan.

**Methods:** Patients were randomized 1:1:1 to faricimab 6.0 mg Q8W after 6 initial Q4W doses ( $n = 51$ ), faricimab 6.0 mg T&E after 4 initial Q4W doses ( $n = 49$ ), or aflibercept 2.0 mg Q8W after 5 initial Q4W doses ( $n = 52$ ). The T&E regimen (Q4W up to Q16W) used prespecified best-corrected visual acuity (BCVA)/central subfield thickness (CST) criteria to adjust dosing. Primary endpoint: BCVA change from baseline at 1 year, averaged over weeks 48/52/56. Other endpoints were assessed through week 56.

**Results:** Adjusted mean BCVA gains from baseline at 1 year were 13.2, 11.5, and 9.2 Early Treatment of Diabetic Retinopathy Study letters for faricimab Q8W, T&E, and aflibercept Q8W, respectively. Adjusted mean letter differences (95% CI) were 4.0 (0.7, 7.2) and 2.3 (-0.9, 5.6) for faricimab Q8W and faricimab T&E vs aflibercept, respectively. Adjusted mean CST change from baseline was -266, 257, and 217  $\mu\text{m}$  at 1 year for faricimab Q8W, faricimab T&E, and aflibercept Q8W, respectively. Adjusted mean differences (95% CI) were -49 (-82, 16) and -40  $\mu\text{m}$  (-72, -7) for faricimab Q8W and T&E vs aflibercept, respectively. Proportion of faricimab T&E-arm patients on  $\geq$ Q12W or Q16W dosing at week 52: 75% and 50%, respectively. Faricimab was well tolerated, with an acceptable safety profile.

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**Conclusions:** Efficacy, durability, and safety of faricimab in a Chinese subpopulation were consistent with global RHINE results.

**Dec 08, 2023 (Fri) 08:30 - 10:00**  
**Venue: S422**

### Efficacy, Durability, and Safety of Faricimab in nAMD: 48-week Results from the Chinese Subpopulation of Phase 3 LUCERNE

*First Author: Youxin CHEN*  
*Co-Author(s): Sijing LI, Ruyuan LIU, Shriji PATEL, Dawei SUN, Ming ZHANG*

**Purpose:** This LUCERNE (NCT03823300) subpopulation analysis evaluated faricimab in patients with nAMD (neovascular age-related macular degeneration) from mainland China, Hong Kong, and Taiwan.

**Methods:** Patients were randomized 1:1 to faricimab (n = 59) or aflibercept (n = 60). After 4 initial doses Q4W (every 4 weeks), faricimab-treated patients were dosed Q8W, Q12W, or Q16W based on protocol-defined CST (central subfield thickness) and BCVA (best-corrected visual acuity) at weeks 20 or 24. These criteria were designed to reflect clinical practice. Aflibercept-treated patients received 2.0 mg Q8W after 3 initial Q4W doses. Primary endpoint: mean change from baseline in BCVA averaged over weeks 40/44/48. Other efficacy/safety outcomes were assessed through week 48.

**Results:** Baseline characteristics were well balanced across arms in the Chinese subpopulation. Adjusted mean (95% CI) BCVA gains from baseline at week 40/44/48 were 9.7 (7.3, 12.0) and 9.8 (7.5, 12.1) Early Treatment of Diabetic Retinopathy Study letters for faricimab (up to Q16W) and aflibercept Q8W, respectively. This corresponded to an adjusted mean difference (95% CI) of -0.1 (-3.4, 3.2) letters. Adjusted mean CST change from baseline was -145.4 (-156.2, -134.6) and -156.5 (-167.3, -145.7)  $\mu\text{m}$  at week 40/44/48 in the faricimab and aflibercept arms, respectively. This corresponded to an adjusted mean difference (95% CI) of 11.1 (-4.3, 26.4)  $\mu\text{m}$ . The proportions of patients on faricimab  $\geq$ Q12W

or Q16W dosing at week 48 were 87.3% and 67.3%, respectively. Faricimab was well tolerated with a safety profile comparable to aflibercept.

**Conclusions:** The efficacy, durability, and safety of faricimab in the Chinese subpopulation were consistent with global LUCERNE population results.

**Dec 08, 2023 (Fri) 08:30 - 10:00**  
**Venue: S422**

### Electrophysiological and Visual Parameter Changes in Retinitis Pigmentosa Patients Undergoing Autologous Platelet-rich Plasma Therapy

*First Author: Perwez KHAN*  
*Co-Author(s): Lubna KHAN*

**Purpose:** Retinitis pigmentosa is a genetic disease with no treatment. It leads to gradual loss of vision. An institutional prospective interventional study was conducted to assess the efficacy of autologous platelet-rich plasma (PRP) injections in the suprachoroidal space and sub-tenon space in cases of retinitis pigmentosa.

**Methods:** Seventy-eight eyes of 39 patients with retinitis pigmentosa having visual acuity ranging from reading of ETDRS (Early Treatment Diabetic Retinopathy Study) chart from 1 meter onwards to patients who were not able to read ETDRS chart but whose visual acuity ranged from counting fingers close to face to less than 1 meter were included in the study. The left and right eye of each patient was randomized as the intervention eye and control eye. 0.2 mL of autologous PRP was injected in the suprachoroidal space and 0.5 mL of PRP was injected in the sub-tenon space taking aseptic precautions. Injections were repeated at 15-day intervals up to 3 injections. Sham injections were given in the control eye.

**Results:** Intervention eyes showed statistically significant improvement in visual acuity and multifocal electroretinography (mfERG). Improvement was noted in amplitude density latency and ring ratio of multifocal ERG.



However, no improvement was observed in the control group.

**Conclusions:** Although gene therapy is the ultimate cure for RP it is unaffordable due to its high cost. PRP can prove to be a modality to improve vision and stop further deterioration. Negligible treatment costs and affordability will benefit economically disadvantaged patients.

**Dec 08, 2023 (Fri) 08:30 - 10:00**

**Venue: S422**

### Exudative Age-related Macular Degeneration Events in the OAKS and DERBY Clinical Trials and the GALE Open-label Extension of Pegcetacoplan in Geographic Atrophy

*First Author:* Andrew **CHANG**  
*Co-Author(s):* Caroline **BAUMAL**, Mark **BURCH**, Roger **GOLDBERG**, Roy **SCHWARTZ**, Min **TSUBOI**

**Purpose:** To characterize exudative age-related macular degeneration (eAMD) in OAKS (NCT03525600) and DERBY (NCT03525613) and report eAMD rates from the GALE (NCT04770545) open-label extension 6-month data set.

**Methods:** The 24-month OAKS and DERBY trials randomized patients to intravitreal pegcetacoplan monthly (PM) or every other month (PEOM) or sham treatment. PM and PEOM groups entering GALE continued treatment; sham-treated patients crossed over to PM or PEOM. Patients with suspected eAMD underwent prespecified imaging; on-label anti-vascular endothelial growth factor (VEGF) was administered per investigator's discretion.

**Results:** OAKS/DERBY enrolled 1258 patients; 782 continued in GALE (83% of those who completed 24 months). Twenty-four month eAMD rates were 12.2%, 6.7%, and 3.1% (PM, PEOM, sham; study eye) and 4.2%, 4.1%, and 4.5% (PM, PEOM, sham; fellow eye). Thirty-month rates were 16.6% and 8.6% (PM, PEOM; study eye) and 5.2% and 4.6% (PM, PEOM; fellow eye). eAMD rates per 100 patient-years at 24 months were 7.5 and 3.9 (PM, PEOM; study eye) and 2.5 and 2.4 (PM, PEOM; fellow

eye). Thirty-month rates per 100 patient-years were 7.2 and 3.6 (PM, PEOM; study eye) and 2.1 and 1.9 (PM, PEOM; fellow eye). Average days to eAMD onset were 372, 282, and 223 (PM, PEOM, sham). No eAMD-related serious adverse events or study discontinuations occurred in pegcetacoplan-treated patients. 98%, 96%, and 85% of patients (PM, PEOM, sham) who developed eAMD received anti-VEGF.

**Conclusions:** New-onset eAMD increased at a consistent rate over 30 months, and rates per 100 patient-years remained stable. Patients safely continued pegcetacoplan with anti-VEGF treatment.

**Dec 08, 2023 (Fri) 08:30 - 10:00**

**Venue: S422**

### Faricimab Treatment Outcomes with Extended Dosing and Potential for Q20W Intervals in DME: A Post Hoc Analysis of the Phase 3 YOSEMITE/RHINE Trials

*First Author:* Yi-ting **HSIEH**  
*Co-Author(s):* Kara **GIBSON**, Lauren **HILL**, Oluwatobi **IDOWU**, Jennifer **LIM**, Michael **SINGER**

**Purpose:** A post hoc analysis of the YOSEMITE/RHINE (NCT03622580/NCT03622593) DME trials to assess the efficacy of extended faricimab dosing ( $\geq$ Q12W; every-12-weeks) and evaluate how many patients potentially could have extended to Q20W dosing.

**Methods:** Patients received faricimab 6.0 mg T&E (treat-and-extend), faricimab 6.0 mg Q8W, or aflibercept 2.0 mg Q8W through week 100 (N = 1891). For T&E, treatment intervals were adjusted (Q4W–Q16W) based on prespecified CST (central subfield thickness) and best-corrected visual acuity (BCVA) criteria. Efficacy outcomes were evaluated for T&E patients ending the study on Q12W and Q16W. In addition, extension criteria were applied to T&E patients on Q16W to assess if they met criteria for Q20W extension.

**Results:** Among patients in the T&E arm at week 96 (N = 557), 62% achieved Q16W and

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78% achieved  $\geq$ Q12W. Mean (SE) BCVA at week 96 for T&E patients ending the study on Q12W and Q16W was 73.6 (1.1) and 75.4 (0.6) letters, respectively, and 73.3 (0.5) letters for T&E arm overall. Mean (SE) CST at week 96 for T&E patients ending on Q12W, Q16W, and for T&E arm overall was 278.1  $\mu$ m (8.6), 258.3  $\mu$ m (2.1), and 275.7  $\mu$ m (3.3), respectively. Among T&E patients with dosing interval data up to week 48 (N = 598), 56% met extension criteria and potentially could have extended to Q20W.

**Conclusions:** Patients extended to faricimab Q12W and Q16W dosing demonstrated robust and stable improvements in vision and anatomic outcomes through year 2. Among T&E patients, >50% potentially could have achieved Q20W, supporting faricimab as a novel therapeutic approach leading to durable efficacy.

**Dec 08, 2023 (Fri) 08:30 - 10:00**  
**Venue: S422**

### **Influence of Carotid Endarterectomy on Choroidal and Choriocapillaris Perfusion Study**

*First Author: Sandy Wenting ZHOU*  
*Co-Author(s): Philip J. ROSENFELD, Omer TRIVIZKI, Ruikang WANG, Yi ZHANG*

**Purpose:** The impact of carotid endarterectomy (CEA) on choroidal and choriocapillaris (CC) perfusion was investigated using swept-source optical coherence tomography angiography (SS-OCTA) imaging before and after surgery in patients with clinically significant carotid artery stenoses (CAS).

**Methods:** In this prospective observational study, patients with clinically significant CAS undergoing unilateral CEA had SS-OCTA imaging performed in both eyes before and within 1 week after surgery. The mean choroidal thickness (MCT), choroidal vascular index (CVI), percentage of choriocapillaris flow deficits (CC FD%), and choriocapillaris (CC) thickness were assessed using previously validated semi-automated algorithms.

**Results:** A total of 112 eyes from 56 patients with an average age of  $72.6 \pm 6.9$  years were enrolled. At baseline, MCT were significantly thinner on the surgical side compared to the nonsurgical side ( $p = 0.02$ ). Additionally, significantly higher CC FD% measurements accompanied by significantly thinner CC thickness measurements were observed on the surgical versus the nonsurgical sides ( $p = 0.001$  and  $p = 0.03$ , respectively). After CEA, there were significant increases in the MCT on the surgical in contrast to the nonsurgical side ( $p < 0.001$ ). Correspondingly, a significant reduction in CC FD% measurements and a substantial increase in CC thickness measurements were evident on the surgical as compared with the nonsurgical side ( $p = 0.008$  and  $p = 0.01$ , respectively).

**Conclusions:** An immediate and significant improvement in choroidal and CC perfusion was observed after unilateral CEA in patients with significant CAS. Exploring this line of research may uncover valuable information regarding the effectiveness of upstream vascular interventions as an option for treating retinal disorders characterized by compromised choroidal and CC function.

**Dec 08, 2023 (Fri) 08:30 - 10:00**  
**Venue: S422**

### **Preliminary Results of an AAV Gene Therapy Trial on X-linked Retinitis Pigmentosa Caused by Mutations in Retinitis Pigmentosa GTPase Regulator**

*First Author: Ruifang SUI*  
*Co-Author(s): Jihong WU, Gezhi XU*

**Purpose:** FT-002 is a first-in-class recombinant adeno-associated virus vector 5 (AVV5-RPGR) with the GRK1 promoter and the codon-optimized human retinitis pigmentosa GTPase regulator (RPGR) open reading frame (hRPGRORF15), intending to treat X-linked retinitis pigmentosa (XLRP). Pre-clinical studies show that subretinal delivery of FT-002 in Rpggr-KO mice significantly preserved retinal structure and rescued the function of retinal photoreceptor cells in a dose-dependent

manner. Here we report the initial safety and efficacy results from a first-in-human dose-escalation clinical trial in male patients with RPGR mutation-associated XLRP (<https://clinicaltrials.gov/>: NCT05874310).

**Methods:** Open label, dose-escalation study with outcomes to evaluate the safety and efficacy of FT-002.

**Results:** So far, 9 patients have been enrolled from 2 investigational sites in China and received single intraocular administration of FT-002, with data collected and analyzed from a follow up period up to 12 weeks. Six patients received  $5.0 \times 10E10$  vg of FT-002 per eye (low dose level) while 3 patients received FT-002  $1.0 \times 10E11$  vg per eye (intermediate dose level). FT-002 was found tolerated well in these patients, with no DLT observed at any dose level; no FT-002 related SAE was reported. Two patients in the low dose level already showed significant improvement in central retinal sensitivity measured by microperimetry and all 6 patients demonstrated improvement in visual perception assessed by full-field stimulus thresholds (FST).

**Conclusions:** The novel AVV-based gene therapy drug FT-002 shows favorable therapeutic effects with good safety profile in XLRP male patients; it can potentially bring clinical benefit to these patients, where urgent unmet medical needs exist.

**Dec 08, 2023 (Fri) 08:30 - 10:00**  
Venue: S422

### Real-world Efficacy, Durability, and Safety of Faricimab in Diabetic Macular Edema: The TAHOE Study

First Author: Michael **SINGER**  
Co-Author(s): Aamir **AZIZ**, Hannah **KHAN**, Arshad M. **KHANANI**

**Purpose:** Faricimab was approved by the FDA in late January 2022 for the sustained treatment of diabetic macular edema (DME). Current anti-VEGF agents drastically improved patient outcomes but real-world patients show decline in visual acuity due to frequent injections

and high treatment burden. This real-world multicenter retrospective study collects and analyzes efficacy, safety, and durability of the bispecific faricimab in patients diagnosed with DME.

**Methods:** Retrospective chart review of patients treated with faricimab for DME was conducted. Demographics, treatment history, visual acuity (VA), and changes in central subfield thickness (CST) were collected. If applicable, faricimab treatment interval was compared to previous anti-VEGF treatment intervals to investigate durability. VA and CST improvements were evaluated as averages and presence of retinal fluid was reported as binary. Adverse events were collected and reported.

**Results:** A total of 141 eyes of 108 patients are available. The data collection is ongoing from 20 sites across the US. Average age was 69.95 years and 50.0% were female. All eyes after 1 injection of faricimab (n = 75 eyes) demonstrated a BCVA increase of +1.34 letters ( $p = 0.4336$ ) and a CST decrease of  $-13.92 \mu\text{m}$  ( $p = 0.4713$ ). No cases of faricimab-related inflammation or vasculitis have been reported.

**Conclusions:** Maintenance of VA and anatomy after treatment with faricimab has been noted after just 1 injection. This study will look at long-term efficacy, safety, and durability of faricimab. Updated data from several hundred patients will be available at time of the presentation of the TAHOE study results at APVRS 2023.

**Dec 09, 2023 (Sat) 10:30 - 12:00**  
Venue: S422

### Aflibercept 8 mg in Patients with Neovascular Age-related Macular Degeneration: Phase 3 PULSAR Trial 96-week Results

First Author: Tien-yin **WONG**  
Co-Author(s): Jean-francois **KOROBELNIK**

**Purpose:** To evaluate aflibercept 8 mg vs aflibercept 2 mg in patients with treatment-naïve nAMD.

**Methods:** PULSAR (NCT04423718) is a double-masked, 96-week (wk), phase 3 trial: patients were randomized 1:1:1 to receive aflibercept 8

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mg every 12 or 16 wks (8q12 [n = 335] or 8q16 [n = 338]) or aflibercept 2 mg every 8 wks (2q8 [n = 336]), each after 3 monthly injections. The dosing intervals for patients in the 8q12 and 8q16 groups could be shortened from wk 16 and extended from wk 52 based on protocol criteria.

**Results:** LS mean (SE) BCVA change from baseline at wk 96 (exploratory endpoint) was +6.6 (0.73), +5.6 (0.77), and +5.5 (0.75) ETDRS letters with aflibercept 2q8, 8q12, and 8q16, respectively (non-inferiority at 4-letter margin 8q12 vs 2q8:  $p = 0.0006$ ; 8q16 vs 2q8:  $p = 0.0007$  [p values are nominal]). Through wk 96, 75% (8q12) and 70% (8q16) of patients maintained  $\geq 12$ - and  $\geq 16$ -wk dosing intervals. Among all patients receiving aflibercept 8 mg (8q12 and 8q16 combined), 47% had planned dosing intervals of  $\geq 20$  wks at wk 96; 28% had planned 24-wk dosing interval at wk 96. No new safety signals were identified.

**Conclusions:** Aflibercept 8 mg maintained comparable BCVA gains vs aflibercept 2 mg and had similar safety through wk 96.

**Dec 09, 2023 (Sat) 10:30 - 12:00**  
**Venue: S422**

### Biomarkers for Vascular Stability Demonstrate the Benefit of Dual Ang-2/VEGF-A Inhibition with Faricimab in Phase 3 Trials in DME

*First Author:* Colin **TAN**  
*Co-Author(s):* Andreas **MAUNZ**, Katie **PATEL**, Tracey **WANG**, Jeffrey R. **WILLIS**, Esther **VON SCHULTHESS**

**Purpose:** In diabetic macular edema (DME), hyperreflective foci (HRF) and epiretinal membrane (ERM) formation are potential biomarkers for vascular stability. In post hoc analyses, we evaluated whether dual angiopoietin-2 (Ang-2)/vascular endothelial growth factor-A (VEGF-A) inhibition with faricimab reduced HRF volume and ERM formation over VEGF inhibition alone with aflibercept.

**Methods:** In YOSEMITE/RHINE (NCT03622580/NCT03622593), patients with DME received

faricimab 6.0 mg every 8 weeks (Q8W), faricimab 6.0 mg treat-and-extend (T&E), or aflibercept 2.0 mg Q8W. HRF volume and ERM frequencies are reported.

**Results:** HRF volume reductions (week 0-48) were greater for faricimab Q8W and faricimab T&E vs aflibercept in both the inner and outer retina. For the inner retina, reductions in 1-mm diameter were faricimab Q8W (-118.29  $\mu\text{L}$ ) and faricimab T&E (-130.05  $\mu\text{L}$ ) vs aflibercept (-58.67  $\mu\text{L}$ ; nominal  $P = 0.0006$  and  $P < 0.0001$ , respectively); and reduction in 3-mm diameter were faricimab Q8W (-406.76  $\mu\text{L}$ ) and faricimab T&E (-533.01  $\mu\text{L}$ ) vs aflibercept (-397.67  $\mu\text{L}$ ; nominal  $P = 0.0142$  and  $P = 0.0034$ , respectively). Over 2 years, ERMs developed in 23/602 (3.8%), 31/608 (5.1%), and 45/590 (7.6%) of faricimab Q8W, faricimab T&E, and aflibercept eyes, respectively. At week 100, ERM formation risk was lower for faricimab Q8W vs aflibercept (OR 0.48; 95% CI 0.29, 0.81; nominal  $P = 0.0055$ ), and for T&E patients vs aflibercept (OR 0.65; 95% CI 0.41, 1.05; nominal  $P = 0.0783$ ).

**Conclusions:** Greater reductions in HRF volume and frequency of ERM formation were achieved with faricimab compared with aflibercept in patients with DME.

**Dec 09, 2023 (Sat) 10:30 - 12:00**  
**Venue: S422**

### Choroidal Vascularity Index as Biomarker to Predict the Response to Anti-vascular Endothelial Growth Factor of Pachychoroid and Nonpachychoroid Polypoidal Choroidal Vasculopathy

*First Author:* Yue **ZHANG**  
*Co-Author(s):* Jing **LIU**, Jianing **WANG**, Xiaobing **YU**, Jinrong **ZHANG**

**Purpose:** To explore choroidal predictors of anti-VEGF treatment response in pachychoroid and nonpachychoroid PCV.

**Methods:** A retrospective observational study. We recruited patients diagnosed with PCV who underwent standard anti-VEGF therapy. We recorded various clinical features before



and after 3 monthly anti-VEGF treatments in 78 PCV patients. Choroidal features including subfoveal choroidal thickness (CT), choroidal vessel volume (CVV), 3-dimensional choroidal vascularity index (CVI), and the vascular density of choriocapillaris (CCVD) were measured automatically using built-in software. Multiple linear regression model was used to explore the predictors associated with the change of BCVA and central retinal thickness (CRT). Receiver operating characteristic (ROC) curve was used for the predicting ability of choroidal biomarkers on the treatment effect. We used the Youden index to investigate the best cut-off value to distinguish pachychoroid and nonpachychoroid PCV groups as a predictor of treatment effect.

**Results:** Higher vision improvements were associated with thinner subfoveal CT, lower CVI, and smaller PCV lesion area at baseline ( $P < 0.05$ ). Higher CRT reduction was associated with thinner subfoveal CT, lower CVI, as well as higher CRT at baseline ( $P < 0.05$ ). After comparison, CVI was the best biomarker to differentiate PCV patients into pachychoroid and nonpachychoroid groups with AUC of 0.842, and the best cut-off value was 0.576.

**Conclusions:** CVI was a promising biomarker to predict the response to anti-VEGF treatment in PCV patients. PCV could be subclassified into pachychoroid and nonpachychoroid PCV based on CVI, and pachychoroid PCV was less sensitive to anti-VEGF treatment.

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Venue: S422

### Extended Treatment Outcomes and the Potential for Q20W Dosing with Faricimab in Neovascular Age-related Macular Degeneration: A Post Hoc Analysis of the Pivotal TENAYA/LUCERNE Trials

First Author: Adrian KOH

Co-Author(s): Lauren HILL, Aachal KOTECHA, Philippe MARGARON, Michael SINGER

**Purpose:** A post hoc analysis to assess the impact of maintaining extended (>Q12W; every-12-weeks) faricimab dosing and evaluate

how many patients potentially could have extended to Q20W dosing in the TENAYA/LUCERNE (NCT03823287/NCT03823300) nAMD trials.

**Methods:** Patients received faricimab 6.0 mg up to Q16W after 4 Q4W doses or aflibercept 2.0 mg Q8W after 3 Q4W doses. Following disease activity assessments at weeks 20/24, faricimab-treated patients received fixed dosing until week 60 then T&E (treat-and-extend)-based regimen. We evaluated efficacy outcomes at year 2 (averaged over weeks 104-112) of faricimab-treated patients always on >Q12W and always on Q16W, and applied T&E criteria to patients who received  $\geq 1$  dose during the T&E phase to assess if they met criteria for Q20W extension.

**Results:** Faricimab-treated patients always on  $\geq$ Q12W and always on Q16W maintained best-corrected visual acuity gains through year 2 compared with the overall faricimab arm (mean [SD]; always  $\geq$ Q12W, +6.6 [12.9] letters; always Q16W, +7.5 [11.8] letters; overall faricimab arm, +4.7 [14.9] letters). Faricimab-treated patients always on extended dosing had reduced central subfield thickness from baseline through year 2 (always  $\geq$ Q12W, -142.8 [112.7]  $\mu\text{m}$ ; always Q16W, -145.3 [110.8]  $\mu\text{m}$ ; overall faricimab arm, -147.1 [125.7]  $\mu\text{m}$ ). 56% of faricimab-treated patients who received  $\geq 1$  dose during the T&E phase potentially could have extended to Q20W.

**Conclusions:** Patients always on extended faricimab dosing maintained vision and anatomic outcomes throughout 2 years. Additionally, >50% of faricimab-treated patients potentially could have extended to Q20W, supporting dual angiopoietin-2/VEGF-A inhibition with faricimab as a novel therapeutic approach leading to durable efficacy.

Dec 09, 2023 (Sat) 10:30 - 12:00  
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**Genotype and Phenotype Correlation in Leber Congenital Amaurosis Patients from a Tertiary Eye Care Center**

*First Author:* Abhishek **UPADHYAYA**  
*Co-Author(s):* Deepika C **PARAMESWARAPPA**, Venkatesh **POCHABOINA**, Nithin **TEJA**

**Purpose:** To describe the genes and mutations associated with Leber congenital amaurosis (LCA) in a subset of the Indian population and to correlate genotype to phenotypical features in LCA.

**Methods:** This is a retrospective study that included patients with a clinical diagnosis of LCA who underwent genetic testing by targeted next generation sequencing based gene panel for inherited retinal diseases covering 260+ genes. The objective of the study was to assess phenotype genotype correlation in an Indian population and to discuss the need for targeted interventional therapy.

**Results:** Thirty-five patients with genotypically proven LCA cases were included. All the patients had onset of symptoms at <1 year of age. Family history was positive in 28.5% (10/35) of the patients. The mean best-corrected visual acuity (BCVA) noted at the time of presentation in this cohort was  $2.49 \pm 0.60$  SD logMar. At presentation, retinal pigment epithelium abnormalities and macular changes were seen in 77.14% (54/70) eyes and 17.14% (12/70) eyes, respectively. The most common associated genes for LCA were GUCY2D (20%, 7/35), CRB1 (14.3%, 5/35), RPGRIP1 (11.4%, 4/35), RPE65 (11.4%, 4/35), and LCA5 (8.6%, 3/35).

**Conclusions:** Majority of the eyes showed severe vision loss with predominant phenotypical features of RPE abnormalities. Mutations in GUCY2D and CRB1 were most common. With the newer promising clinical trials, genetic testing and identifying the mutations in LCA for a particular geographic location is of paramount importance.

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**Greater Reduction in Pigment Epithelial Detachment Size with Faricimab vs Aflibercept During Head-to-head Dosing in Patients with Neovascular Age-related Macular Degeneration**

*First Author:* Timothy **LAI**  
*Co-Author(s):* Arshad M. **KHANANI**, Philippe **MARGARON**, Shriji **PATEL**, Audrey **SOUVERAIN**

**Purpose:** The purpose of this post hoc analysis was to assess whether faricimab improves pigment epithelial detachment (PED) vs aflibercept in patients with neovascular age-related macular degeneration during the initial head-to-head dosing period.

**Methods:** In TENAYA/LUCERNE (NCT03823287/NCT03823300), treatment-naive patients (pooled N = 1329) were randomized 1:1 to receive faricimab 6.0 mg up to every 16 weeks (Q16W; n = 665) after 4 initial Q4W doses or aflibercept 2.0 mg Q8W (n = 664) after 3 initial Q4W doses. We performed a post hoc analysis evaluating baseline PED characteristics and anatomic changes during the initial head-to-head dosing period through week 12. PED was defined as retinal pigment epithelium elevation with a width of  $\geq 350 \mu\text{m}$ . PED was graded as predominantly serous or purely serous (serous PED) or predominantly fibrovascular or fibrovascular only (fibrovascular PED).

**Results:** Baseline PED characteristics were similar between treatment arms. At week 4, there was a rapid decrease from baseline in maximum PED thickness for both arms. The decrease from baseline in maximum PED thickness at week 12 was greater with faricimab vs aflibercept (all PED,  $-87.9$  vs  $-74.5 \mu\text{m}$  [nominal P = 0.0067]; serous,  $-136.1$  vs  $-108.2 \mu\text{m}$  [nominal P = 0.0147]). In eyes with baseline serous PED, a smaller proportion of faricimab-treated patients had presence of serous PED vs aflibercept (3.9% vs 12.3%; nominal P = 0.0258).

**Conclusions:** Dual angiopoietin-2/vascular endothelial growth factor inhibition with faricimab was associated with greater improvements in PED outcomes vs aflibercept in the head-to-head dosing period of TENAYA/LUCERNE and was consistent with the greater drying of retinal fluid seen with faricimab during the head-to-head dosing period.

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### Long-term Efficacy and Safety of the Port Delivery System with Ranibizumab in Patients with Neovascular Age-related Macular Degeneration: Results from the Portal 5-year Subgroup Analysis

First Author: Gemmy **CHEUNG CHUI MING**  
Co-Author(s): Melina **CAVICHINI CORDEIRO**, Shamika **GUNE**, Natasha **SINGH**, James **HOWARD**, Jared **NIELSEN**

**Purpose:** To present the long-term efficacy and safety data of the port delivery system (PDS) for the subgroup of Portal (NCT03683251) patients from Ladder (NCT02510794) treated with PDS for  $\geq 5$  years.

**Methods:** Patients in the phase 2 Ladder trial received the PDS (10, 40, or 100 mg/mL refills as needed) or monthly intravitreal ranibizumab 0.5 mg injections. Once rolled over to the phase 3 Portal trial, patients received PDS 100 mg/mL with fixed refill-exchanges every 24 weeks from day 1. Efficacy outcomes were assessed for Ladder-to-Portal patients treated with PDS 100 mg/mL for  $\geq 5$  years. Long-term safety data were pooled to include any patient in the 10, 40, and 100 mg/mL groups of Ladder who had the PDS for  $\geq 5$  years.

**Results:** In Ladder-to-Portal patients, best-corrected visual acuity remained stable for 60 months from the Ladder baseline visit in the prior PDS 100 mg/mL as-needed treatment arm ( $n = 46$ ; patients received a mean of 2.9 intravitreal injections before randomization in Ladder); mean (95% confidence interval [CI]) change from baseline at month 60 was  $-1.8$  ( $-8.1, 4.4$ ;  $n = 17$ ) Early Treatment Diabetic Retinopathy Study letters. Center point

thickness and central subfield thickness were also stable overall, with mean (95% CI) changes from baseline of  $-17.5 \mu\text{m}$  ( $-52.1, 17.0$ ) and  $-7.8 \mu\text{m}$  ( $-32.9, 17.3$ ), respectively, at month 60.

**Conclusions:** Results from Portal suggest that vision and anatomical outcomes with PDS 100 mg/mL are generally stable over 60 months. The PDS was generally well tolerated  $\geq 5$  years.

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### Plasma Apolipoproteins and Their Ratios as Novel Biomarkers for Type 2 Diabetes Mellitus and Diabetic Retinopathy

First Author: Xinyuan **ZHANG**  
Co-Author(s): Yao **NIE**, Bingjie **QIU**

**Purpose:** To investigate the effects of dysregulated apolipoprotein (apo) profiles and their associations with type 2 diabetes and diabetic retinopathy (DR).

**Methods:** A total of 157 patients with type 2 diabetes, including diabetes without DR, non-proliferative DR (NPDR), and proliferative DR (PDR), were included in this cross-sectional study. Fifty-eight age-, sex- matched subjects without DM were enrolled as controls. Blood biochemistry profiles including plasma levels of glucose, HbA1c, and lipid profile were assessed. Circulating levels of apolipoprotein profiles were evaluated by protein chips. Arteriosclerosis-associated plasma indices TC-(HDL-C)/HDL-C,  $\log(\text{TG}/\text{HDL-C})$ , LDL-C/HDL-C, and apolipoprotein ratios (apoC-II/ApoC-III, apoB/non-HDL-C, apoA-II/apoA-I, apoB/apoA-I) were calculated.

**Results:** Plasma level of apoA-I was negatively correlated with TC-(HDL-C)/HDL-C ( $r = -0.39$ ,  $p < 0.001$ ), fasting glucose ( $r = -0.36$ ,  $p < 0.001$ ), HbA1c ( $r = -0.29$ ,  $p < 0.001$ ), and LDL-C/HDL-C ( $r = -0.36$ ,  $p < 0.001$ ), while apoE, apoC-II/apoC-III, and apoA-II/apoA-I were positively correlated with the above traditional biomarkers ( $p < 0.001$ ). BMI, DM duration, apoE, apoB/non-HDL, apoC-II/apoC-III, apoE/apoC-II, TC-(HDL-C)/HDL-C, fasting glucose, hemoglobin, LPA, and LDL-C/HDL-C were independent risk

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factors for the occurrence and severity of DR. Multivariate logistic regression showed that after controlling the DM duration, hemoglobin, and fasting glucose, apoC-II/apoC-III (OR = 2.09,  $p < 0.001$ ), apoE/apoC-II (OR = 2.10,  $p = 0.001$ ), and LPA (OR = 1.02,  $p = 0.001$ ) were the risk factors for the occurrence and severity of DR, while apoA-II resulted as a protective factor for type 2 diabetes and DR.

**Conclusions:** apoE, apoC-II/apoC-III, apoE/apoC-II, and apoB/non-HDL could be used as novel biomarkers for type 2 diabetes and the occurrence and severity of DR, while apoA-I and apoA-II resulted as protective factors for type 2 diabetes and DR.

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### Port Delivery System with Ranibizumab in Diabetic Macular Edema: Primary Analysis and Patient Preference Results of the Phase 3 Pagoda Trial

*First Author: Timothy LAI*  
*Co-Author(s): Peter CAMPOCHIARO, Jordan M GRAFF, Michael A KLUFAS, Kailin TIAN*

**Purpose:** To evaluate the efficacy and safety of continuous delivery of ranibizumab 100 mg/mL via the port delivery system (PDS) with fixed refill-exchanges every 24 weeks (PDS Q24W) in patients with center-involved diabetic macular edema (DME).

**Methods:** Pagoda (NCT04108156) is an ongoing phase 3, multicenter, randomized, visual assessor-masked trial comparing PDS Q24W with intravitreal ranibizumab 0.5 mg injections every 4 weeks (RBZ Q4W). PDS patients were assessed for supplemental intravitreal ranibizumab 0.5 mg treatment before each refill-exchange. Primary endpoint: best-corrected visual acuity (BCVA) change from baseline averaged over weeks (W) 60/64 (noninferiority margin -4.5 letters). At W64, treatment preference for PDS vs intravitreal injections was assessed using the PDS Patient Preference Questionnaire.

**Results:** The primary endpoint was met; PDS Q24W ( $n = 381$ ) was noninferior to RBZ Q4W ( $n = 253$ ) for BCVA change from baseline at W60/W64 (mean change [95% CI] in Early Treatment Diabetic Retinopathy Study letters, 9.6 vs 9.4, respectively; difference [95% CI], 0.2 [-1.2, 1.6]). Central subfield thickness reductions through W64 were comparable between arms. Through 2 refill-exchange intervals, 95.9% and 97.4% of PDS patients assessed did not receive supplemental treatment, respectively. PDS was generally well tolerated. No endophthalmitis cases were reported with PDS after implantation through W64. At W64, 80.1% (241/301) of PDS Q24W patients preferred PDS treatment, with fewer treatments cited as the main reason. Intraretinal/subretinal fluid absence in the central 1 mm subfield was comparable between arms at W64.

**Conclusions:** Pagoda met its primary endpoint of PDS Q24W noninferiority. PDS Q24W resulted in vision and anatomic outcomes comparable to RBZ Q4W with ~80% of patients preferring PDS treatment.

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### Predicting the Need for Diabetic Macular Edema Treatment from Photographic Screening in the Singapore Integrated Diabetic Retinopathy Programme

*First Author: Stanley POH*  
*Co-Author(s): Gavin TAN, Kelvin TEO*

**Purpose:** To identify diabetic maculopathy features of maculopathy suspects that are predictive of treatment within 1 year of referral to a tertiary care center.

**Methods:** Retrospective review of participants who underwent screening by the Singapore Integrated Diabetic Retinopathy Program (SiDRP) from 2015 to 2019. Participants underwent visual acuity (VA) test and non-stereoscopic retinal photographs. Inner and outer zone were defined as 1 and 1-2 disc diameters from the fovea, respectively. Maculopathy features were categorized into 3



severities based on referral urgency. The most severe group was defined by hard exudates (HE) within the inner zone and hemorrhages within the inner zone with VA  $\leq$  6/12. The least severe group was defined by hemorrhages within the inner or outer zone with VA  $>$  6/12. DME treatment was defined as intravitreal injection or macular photocoagulation within 360 days.

**Results:** 71,030 participants were screened and 3,518 were found to be maculopathy suspects. 279 (7.93%) of these maculopathy suspects received diabetic macular edema (DME) treatment within 360 days (sensitivity 96.2%; specificity 66.9%; negative predictive value 99.8%). Those treated for DME had shorter duration of diabetes (6.9 vs 9.1 years) and higher LDL cholesterol (2.58 vs 2.37 mmol/L), both  $p < 0.05$ . The likelihood of DME treatment is associated with higher LDL cholesterol (HR 1.21, 95% CI 1.04-1.41). Most severe maculopathy feature is much more likely to be treated when compared to least severe maculopathy feature (HR 11.20, 95% CI 6.06-20.70).

**Conclusions:** Our maculopathy suspect referral programme achieved a high sensitivity and negative predictive value. HE and hemorrhages within the inner zone are important photographic features predictive of DME treatment.

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### Preliminary Results of the Longitudinal, Non-interventional Study of Real-world Outcomes for Brolocizumab in Wet Age-related Macular Degeneration in Malaysia

*First Author:* Mae-lynn **BASTION**  
*Co-Author(s):* Ayesha **MOHD ZAIN**, Siti **NURSYAZANIE**, Shelina **OLI MOHD**, Danny **WONG**

**Purpose:** To evaluate the real-world evidence of brolocizumab for wet AMD (nAMD) treatment, including refractory nAMD, on visual acuity (VA), central subfield thickness (CST), and fluid compartments on OCT.

**Methods:** Medical records of nAMD patients attending 9 Malaysian centers from 01/10/2020 to 13/07/2023 were retrospectively reviewed. nAMD eyes receiving at least 1 brolocizumab injection during the study period were included. VA, OCT fluid compartments, CST, and safety outcomes were evaluated at baseline, months 1, 3, 6, 9, and 12. Changes in VA and CST across time were explored using mixed effect linear regression, while the changes in fluid compartments were explored using mixed effect logistic regression.

**Results:** 125 eyes were analyzed. Mean VA improved significantly at month 3 (logMAR 0.46,  $p = 0.026$ ) and 6 (logMAR 0.46,  $p = 0.012$ ). Mean CST decreased at month 1 ( $262.69 \pm 115.86 \mu\text{m}$ ), 3 ( $231.26 \pm 88.85 \mu\text{m}$ ), 9 ( $239.68 \pm 91.25 \mu\text{m}$ ), and 12 ( $237.56 \pm 76.68 \mu\text{m}$ ) and significantly increased in month 6 ( $242.89 \pm 96.45 \mu\text{m}$ ) (all  $p < 0.001$ ). For intraretinal fluid (IRF), there was a significant decrease at months 6 ( $p = 0.044$ ) and month 9 ( $p = 0.039$ ). For subretinal fluid (SRF) and pigment epithelial detachment (PED), significant decreases occurred at all time points. For safety outcomes, 6 (4.8%) intraocular inflammation (IOI) and 4 (3.2%) vasculitis cases were reported.

**Conclusions:** Brolocizumab caused significant VA gain at 3 and 6 months, largely due to loading dose/patient selection, and had significant drying effect on fluid compartments up to 1 year in real-world Malaysian patients with nAMD. IOI and vasculitis rates are similar to those reported elsewhere.

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### Real-world Efficacy and Safety of Faricimab in Neovascular Age-related Macular Degeneration: The TRUCKEE Study

*First Author:* Michael **SINGER**  
*Co-Author(s):* Aamir **AZIZ**, Hannah **KHAN**, Arshad M. **KHANANI**

**Purpose:** This multicenter, prospective study evaluated the safety and efficacy of faricimab in real-world patients diagnosed with nAMD

in both treatment-naive patients and switch patients.

**Methods:** Data collected included demographics, treatment history, best-corrected visual acuity (BCVA), OCT CST and IRF, and fluid volumes. Improvements in visual acuity and CST were evaluated as averages. Improvements in retinal fluid were evaluated as a proportion. Safety was summarized.

**Results:** 1,537 eyes across 1,222 patients were recorded. Average age was 80.49 years and 58.8% were female. Of the 1,265 eyes with follow-up, 55.1% had switched from aflibercept. All eyes post 1 injection of faricimab ( $n = 1,077$ ) had a BCVA increase of +0.84 letters ( $p = 0.119$ ) and a CST decrease of  $-64.7 \mu\text{m}$  ( $p < 0.001$ ). Eyes switched from aflibercept post 1 injection of faricimab ( $n = 696$ ) had a BCVA increase of +0.66 letters ( $p = 0.262$ ), a CST decrease of  $-20.55 \mu\text{m}$  ( $p < 0.001$ ), and SRF/IRF resolution rates 53.4% and 55.2%, respectively. Eyes switched from any anti-VEGF post 6 injections of faricimab ( $n = 108$ ) had a BCVA increase of +2.87 letters ( $p = 0.023$ ) and a CST decrease of  $-63.58 \mu\text{m}$  ( $p < 0.001$ ). Eyes switched from aflibercept post 6 injections of faricimab ( $n = 77$ ) had a BCVA increase of +2.79 letters ( $p = 0.094$ ) and a CST decrease of  $-66.50 \mu\text{m}$  ( $p < 0.001$ ). Of the 5,941 injections, no cases of faricimab-related vasculitis or retinal artery occlusion have been reported.

**Conclusions:** Faricimab has demonstrated efficacy via anatomic and visual parameters, in both treatment-naive and previously treated patients. Safety is comparable to current agents. One-year results will be presented at APVRS 2023.

### Differential Genetic Associations of Chronic Central Serous Chorioretinopathy, Neovascular Age-related Macular Degeneration, and Polypoidal Choroidal Vasculopathy

First Author: Zhen Ji **CHEN**

Co-Author(s): Marten **BRELEN**, Li Jia **CHEN**, Mary **HO**, Danny **NG**, Calvin **PANG**

**Purpose:** To investigate and compare the genetic associations of chronic central serous chorioretinopathy (cCSCR) subtypes, neovascular age-related macular degeneration (nAMD), and polypoidal choroidal vasculopathy (PCV).

**Methods:** This study enrolled 217 CSCR, 341 nAMD, 288 PCV patients, and 1380 controls. The CSCR patients were classified into those with focal or diffuse leakage, with or without pigment epithelial detachment (PED), and with or without macular neovascularization (MNV). Associations between 11 single-nucleotide polymorphisms (SNPs) from 8 genes, ADAMTS9, ANGPT2, ARMS2, CFH, NR3C2, PGF, TNFRSF10A, and VIPR2, and diseases/subtypes were analyzed by logistic regression analysis adjusted for age and sex, and inter-phenotype comparison by heterogeneity test.

**Results:** The minor allele A of CFH rs800292 conferred a protective effect for CSCR with MNV (odds ratio [OR] = 0.4,  $P < 0.005$ ) and risk effect for CSCR without MNV (OR = 1.3,  $P < 0.05$ ). CSCR patients carrying the wild-type allele G of rs800292 had a 3.23-fold of increased risk towards developing secondary MNV ( $P < 0.001$ ). CFH rs3753394, rs800292, and rs1329428 showed similar effects among CSCR with MNV, nAMD, and PCV, but opposite effects on CSCR without MNV. TNFRSF10A rs13278062-T was associated with overall CSCR, CSCR without MNV (OR = 1.6,  $P < 0.001$ ), CSCR with PED (OR = 1.9,  $P < 0.001$ ), and focal leakage (OR = 1.7,  $P < 0.001$ ), but not with other CSCR subtypes, nAMD, or PCV. Moreover, CFH and ARMS2 SNPs showed heterogeneous effects in CSCR without MNV against CSCR with MNV, nAMD, and PCV.

**Conclusions:** Genetic associations of CSCR with MNV resembled nAMD and PCV more than CSCR without MNV, indicating differential genetic effects on neovascularization and choroidopathy.

### Evaluating the Effect of Tinalrebant in Subjects with Stargardt Disease in a Global Phase 3 Study Following Promising Results from the Phase 1b/2 Study

First Author: Ruifang **SUI**  
Co-Author(s): John **GRIGG**, Robyn **JAMIESON**, Webber **LIAO**, Michel **MICHAELIDES**, Quan Dong **NGUYEN**

**Purpose:** Twenty-four month (end of phase 2) treatment data from a phase 1b/2 study in adolescent STGD1 patients treated with tinalrebant, an orally available RBP4 antagonist, is presented. Status of the global phase 3 study in STGD1 patients is also presented.

**Methods:** Safety and efficacy data for subjects aged 12-18 years receiving daily doses over 2 years are evaluated and compared to natural history study. A phase 3 randomized, double-masked, placebo-controlled study (DRAGON Study) in STGD1 patients treated with tinalrebant has completed patient recruitment.

**Results:** A slower annual DDAF growth rate by FAF and a slower retinal thinning by SD-OCT compared to a natural history study was observed after 18 months of treatment in the phase 2 study. The study observed annual DDAF growth rates of 0.3 and 0.4 mm<sup>2</sup>/year (OS and OD), compared to 0.9 mm<sup>2</sup>/year (OU) in a natural history study. Analysis of SD-OCT data showed retinal thinning of 13 and 15 μm (OS and OD), slower than compared to 22 and 18 μm (OS and OD) in the natural history study. Ten of 12 subjects showed maintenance of BCVA. All treatment related AEs were graded mild. These promising data help refine the study design of the ongoing phase 3 study (the DRAGON Study).

**Conclusions:** Tinalrebant is safe and well tolerated and trends of slower expansion of atrophic lesions and reduced retinal thinning

are reported. Maintenance of vision in the majority of subjects is also reported.

### Retina (Surgical)

Dec 08, 2023 (Fri) 10:30 - 12:00  
Venue: S422

### Clinical Settings and Outcomes of Silicone Oil Removal: A Big Data Study of 11,934 Eyes

First Author: Vivek **DAVE**  
Co-Author(s): Anthony Vipin **DAS**

**Purpose:** To describe the clinical settings and outcomes of silicone oil removal (SOR) in a big dataset of 11,934 eyes.

**Methods:** Retrospective, consecutive, electronic medical record driven study conducted at a tertiary eye care set up. Cases undergoing SOR from January 2014 till June 2023 were included.

**Results:** In all 11,934 eyes underwent SOR. Males accounted for 75.1%. Mean age at presentation was 45.29 ± 17.61 years. Rhegmatogenous retinal detachment (RD) was the commonest primary etiology for oil injection (55.6%) followed by diabetic retinal detachments (24.7%) and trauma (7.6%). Presenting vision was 1.53 ± 0.97 logMAR (20/600) with silicone oil in situ. Presenting IOP was 16.55 ± 7.96 (median, 15). A third of eyes each were phakic, pseudophakic, and cataractous. At presentation for the primary surgery, proliferative vitreoretinopathy and extensive membranes were seen in 8%, concurrent choroidal detachment in 5.6%, and encirclage belt was passed in 34.9%. 5000 Cs oil was used in 5.6%. Interval between the primary surgery and SOR was 7.08 ± 8.14 months (median, 4.4). Overall redetachment rate was 9.1% (1082 eyes) and was highest in the rhegmatogenous retinal detachment group (661/5972, 11.06%). 78% of eyes with recurrence had multiple breaks. The mean interval between SOR and recurrent detachment was 93.67 ± 228.22 (median, 32 days). Total follow up post SOR was 13.69 ± 17.95 months (median, 6). Vision at last follow

up was  $1.32 \pm 1.08$  logMAR (20/400) ( $p < 0.0001$ ).

**Conclusions:** SOR is commonly preceded by rhegmatogenous retinal detachment surgery and proliferative diabetic retinopathy surgery. Overall recurrence rate is low. Multiple breaks in the primary procedure is a risk factor for recurrence.

**Dec 08, 2023 (Fri) 10:30 - 12:00**  
**Venue: S422**

### Efficacy and Safety of Macular Hole Repair by Pars Plana Vitrectomy without Endotamponade

*First Author:* Amy Hiu Ying YU  
*Co-Author(s):* Shaheeda MOHAMED, Simon SZETO, Chi-wai TSANG

**Purpose:** To describe the efficacy and safety of macular hole (MH) repair by pars plana vitrectomy (PPV) without endotamponade.

**Methods:** A retrospective consecutive interventional case series of 22 eyes with macular holes who underwent PPV without intraocular gas as endotamponade. This surgical technique involves the creation of a semi-circular temporal internal limiting membrane flap over the MH, which was stabilized with viscoelastics. The average follow-up duration was 6 months (shortest 1 week, longest 1 year). Postoperative MH closure rate, best-corrected visual acuity, and complication rates were reported.

**Results:** MH closure on optical coherence tomography (OCT) was achieved in 22 eyes (100%), and no patients had persistent macular hole requiring further surgery. Preoperative mean BCVA in logMAR was  $0.95 \pm 0.4$  (standard deviation) and postoperative BCVA was  $0.48 \pm 0.27$ . 81% of patients achieved at least Snellen equivalent 1-line gain in VA at their latest follow-up. A statistically significant improvement in mean BCVA was observed with a  $p$  value  $< 0.05$ . Postoperative nasal ERM proliferation was observed but did not affect final VA outcome.

**Conclusions:** In this pilot study, we provided encouraging results on the efficacy and safety of PPV without gas endotamponade as a novel surgical technique to close MH. The omission of intraocular gas alleviates the need for postoperative positioning without compromising surgical success rate. Our data warrants future studies and registry to determine the long-term efficacy and safety of this novel surgical technique.

**Dec 08, 2023 (Fri) 10:30 - 12:00**  
**Venue: S422**

### Evaluating an Optical Coherence Tomography Test for Retinal Detachment: The PReDiCT (Prediction of Retinal Detachment from retinal Irregularity with OCT) Study

*First Author:* Stewart LAKE  
*Co-Author(s):* Murk BOTTEMA, Tyra LANGE, Karen REYNOLDS, Keryn WILLIAMS

**Purpose:** There are established differences in retinal contour between eyes with a retinal detachment (RD) and those with a posterior vitreous detachment (PVD). These were used to train a classifier, tested on eyes post hoc, to identify eyes at future risk of RD.

**Methods:** Patients were recruited after a PVD ( $N = 88$ ), after vitrectomy for RD ( $N = 67$ ), and with eyes without a PVD but that had experienced retinal tear or RD in the fellow eye (FE,  $N = 102$ ). Mid-peripheral retina was imaged in 4 quadrants (superior, inferior, temporal, nasal) with swept-source OCT. The peripheral retinal irregularities of RD and PVD eyes were analyzed in the frequency domain, and features from this used to train then test a discriminant analysis classifier. The classifier was then used to identify risk of RD in the FE group.

**Results:** Mean total irregularity differed significantly between RD and PVD eyes in the superior retina (6.61 mm vs 5.53 mm,  $p = 0.02$ ). Although RD eyes were significantly longer than PVD eyes (axial length 25.10 mm v 24.41 mm,  $p = 0.001$ ), peripheral retinal irregularity was better than axial length at identifying RD. The classifier achieved an 84% specificity (26/31 test set PVD eyes labelled true negative) and 48%



sensitivity (12/25 test set RD eyes labelled true positive) in identifying RD eyes. The number of FE determined to be at risk of RD (21.6%), when corrected for test sensitivity, corresponds with prior reported risk of rhegmatogenous complications in this population (45%).

**Conclusions:** Mid-peripheral retinal irregularity can identify eyes that have experienced a RD.

Dec 08, 2023 (Fri) 10:30 - 12:00

Venue: S422

### Long-term Mortality of Patients Requiring Pars Plana Vitrectomy for Diabetic Tractional Retinal Detachment: A 10-year Study from Hong Kong

First Author: Yee Yan **CHAN**

Co-Author(s): Jennifer **HUNG**, Kenneth Kai Wang **LI**, Hoi Yau **TANG**, Jacinta **TSE**, Daniel Ho Tak **WONG**

**Purpose:** To look into the long-term mortality rate of patients with diabetic tractional retinal detachment (TRD) requiring pars plana vitrectomy (PPV) and to identify the risk factors for early mortality.

**Methods:** A retrospective study of consecutive cases of diabetic TRD receiving PPV in a tertiary eye center in Hong Kong over a 10-year period (1 January 2007 to 31 December 2016). Kaplan-Meier survival curve was used to predict survival rates. Subgroup analysis and Cox regression analyses were performed to identify associated risk factors for mortality. Visual outcomes were also compared as secondary outcomes.

**Results:** Seventy-nine eyes from 79 patients were included in the review. The mean survival after vitrectomy was  $127.64 \pm 6.99$  months (95% confidence interval (CI), 113.94-141.35). Kaplan-Meier survival curve analysis revealed 91.1%, 81.3%, and 55.6% survival rates at 3, 5 and 10 years after surgery, respectively. Multivariate logistic regression showed older age (odds ratio (OR) 1.05,  $p = 0.02$ ) and higher levels of hemoglobin A1c (OR 1.27,  $p = 0.05$ ) were associated with mortality. Visual acuity significantly improved from logMAR 1.6 preoperatively to logMAR 1.17 postoperatively

( $p = 0.001$ ). During the study period, patients who survived were found to have better mean final visual acuity (logMAR 0.97) than those who passed away (logMAR 1.47) ( $p = 0.04$ ).

**Conclusions:** The 10-year mortality rate post PPV for patients with TRD is 44.4%. Despite the high long-term mortality rate, there is significant improvement of visual acuity post vitrectomy. Tighter diabetic control may improve survival in diabetic patients with TRD.

Dec 08, 2023 (Fri) 10:30 - 12:00

Venue: S422

### Predicting Spontaneous Vitreomacular Traction Release Versus Macular Hole Formation in the Fellow Eyes of Patients Treated for Full-thickness Macular Holes

First Author: Jehwi **JEON**

Co-Author(s): Hyun Goo **KANG**, Sung Soo **KIM**, Christopher **LEE**

**Purpose:** To evaluate outcomes of the fellow eyes of patients with a history of full-thickness macular hole (MH) surgery in one eye and vitreomacular traction (VMT) in the fellow eye, and assess predictive factors for spontaneous VMT release and macular hole formation on optical coherence tomography (OCT).

**Methods:** This study was a retrospective and observational analysis study conducted at Severance Eye Hospital, Yonsei University, of patients who had undergone vitrectomy for MH between 2018-2022. Medical records and images were reviewed for the fellow eyes of these MH-treated patients: 1) visual acuity changes after spontaneous release, 2) OCT features including presence of retinal fluid, retinal pigment epithelial defects, MH occurrence and size, and the asymmetry and size of foveal epiretinal hyperreflective lesions.

**Results:** In 176 patients (mean age  $63.7 \pm 8.2$  years) treated for MH, VMT was present in 72 of the fellow eyes; among these fellow eyes, spontaneous release of VMT was observed in 17 eyes, while MH occurrence was noted in 9 eyes during serial follow-up. In a subgroup analysis comparing the VMT release versus MH

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occurrence groups, VMT attachment on the foveal wall ( $p$  value 0.001) and asymmetry ( $p$  value  $< 0.001$ ) of the hyperreflectivity on OCT were associated with spontaneous release of VMT.

**Conclusions:** The presence and asymmetry of foveal hyperreflectivity in the fellow eyes of patients with contralateral MH can be easily detected and measured using en face OCT imaging, and may serve as a prognostic factor for spontaneous VMT release or MH development, thereby helping surgeons decide on the need and timing for vitrectomy.

**Dec 08, 2023 (Fri) 10:30 - 12:00**  
**Venue: S422**

### Predictive Factors and Visual Outcomes After Immediate Pars Plana Vitrectomy for Posteriorly Dislocated Lens Fragments During Complicated Phacoemulsification Surgery

*First Author: Aditya* **KELKAR**  
*Co-Author(s): Mounika* **BOLISETTY**, *Subhasree* **DUTTA**, *Sukanya* **MONDAL**

**Purpose:** To investigate prognostic factors for visual outcome in patients undergoing immediate pars plana vitrectomy (PPV) for posteriorly dislocated lens fragments during phacoemulsification surgery.

**Methods:** This was a singlecenter, retrospective, crosssectional study of 37 eyes undergoing immediate PPV for posteriorly dislocated lens fragments from 2015 to 2021. The primary outcome measure was changes in the bestcorrected visual acuity (BCVA). Additionally, we analyzed the predictive factors for poor visual outcomes (BCVA  $< 20/40$ ) and perioperative complications.

**Results:** The mean age of the patients was 66.57 years. The median logarithm of the minimum angle of resolution (logMAR) BCVA improved significantly from baseline (1 [0.6–1.48]) to the final visit (0.3 [0.2–0.6]) after a mean followup of 6.35 months. Final BCVA was 20/40 or better in 59.5% of eyes. Poor final BCVA ( $< 20/40$ ) was associated with small

preoperative pupil; presence of preoperative ocular pathology including uveitis, glaucoma, and clinically significant macular edema (CSME); intraoperative displacement of  $> 50\%$  of lens matter into the vitreous; use of irisclaw lens; and postoperative cystoid macular edema. The postoperative complications included CME (13.51%), retinal detachment (10.81%), chronic uveitis (8.11%), glaucoma (8.11%), iritis (2.7%), posterior chamber IOL (PCIOL) dislocation (2.7%), and vitreous hemorrhage (2.7%).

**Conclusions:** For retained lens fragments in complicated phacoemulsification surgery, immediate PPV is a viable approach with the potential for a good visual outcome. Key predictors for poor vision include small pupil, ocular pathology, displacement of significant volume of lens matter ( $> 50\%$ ), use of an irisclaw lens, and CME.

**Dec 08, 2023 (Fri) 10:30 - 12:00**  
**Venue: S422**

### Quantitative Optical Coherence Tomography Angiography Parameter Changes in Post-treatment Endophthalmitis

*First Author: John Philip* **UY**  
*Co-Author(s): Ivan* **OLAIVAR**

**Purpose:** To evaluate the microvascular changes in the macula using optical coherence tomography angiography after successful treatment of endophthalmitis.

**Methods:** This retrospective study included 8 endophthalmitis patients of various etiology, who were successfully treated with sequential intravitreal injection of antibiotics and pars plana vitrectomy. The OCTA data were extracted 1 month or more after vitrectomy. Differences in the foveal avascular zone (FAZ) parameters, vessel density (VD), and perfusion density (PD) in different layers of the macula were compared between the diseased and fellow unaffected eyes.

**Results:** After a mean of  $36.6 \pm 3.9$  postoperative days, there was no difference in the FAZ parameters, such as area ( $p = 0.6620$ ), perimeter ( $p = 0.0517$ ) and circularity ( $p =$

0.0504) between the 2 groups. Significantly lower values of the superficial capillary plexus VD ( $p = 0.0284$ ), deep capillary plexus VD ( $p = 0.0027$ ), outer capillary plexus VD ( $p = 0.0280$ ), outer retina-choriocapillary complex VD ( $p = 0.0208$ ), and choriocapillaris VD ( $p = 0.0150$ ) were observed in the endophthalmitis group. The deep capillary PD ( $p = 0.0003$ ), outer capillary plexus PD ( $p = 0.0315$ ), and choriocapillaris PD ( $p = 0.0380$ ) in the post-treatment group were also lower compared to the fellow eyes.

**Conclusions:** This pilot data showed that the FAZ parameters were preserved; however, microvascular changes were evident on OCTA after treatment of endophthalmitis, with lower VD and PD in the majority of the layers.

**Dec 08, 2023 (Fri) 10:30 - 12:00**  
**Venue: S422**

### Rise in Intraocular Pressure in Elevator Travel After Vitreoretinal Surgery with Gas Tamponade

*First Author: Po Yin WONG*  
*Co-Author(s): Marten BRELEN, Li Jia CHEN, Mary HO, Chun Yue, Andrew MAK, Alvin YOUNG*

**Purpose:** To analyze how riding in an elevator affects intraocular pressure (IOP) following vitreoretinal surgery with gas insertion.

**Methods:** On the first postoperative day, patients undergoing pars plana vitreoretinal surgery with and without gas tamponade were enlisted. The Tono-Pen AIVA (Reichert, USA) was used to measure IOP 3 times on the hospital's fourth floor and following a quick elevator ride up to the hospital's 12th floor. We observed all patients for any pain or vomiting for at least 15 minutes.

**Results:** Fifty-four patients were enrolled in the study. Twenty-seven patients served as controls and 27 patients underwent vitreoretinal procedures with gas tamponade. The average age of the patients was 60.9. Patients who had gas insertion experienced higher mean IOP changes (+1.39 mm Hg) than patients who did

not (-0.43 mm Hg), and these differences were statistically significant (95% CI 1.17- 2.48,  $P < 0.0001$ ).

**Conclusions:** Patients undergoing vitreoretinal surgery with gas injection should not only be cautioned against air travel, but also be advised against climbing quickly to the top floors of buildings during the first few days after surgery. To assess how the IOP changes over a wider range of altitudes and with various gases, more research is required.

**Dec 08, 2023 (Fri) 10:30 - 12:00**  
**Venue: S422**

### Staged Versus Combined Surgical Approach for Patients with Concomitant Cataract and Epiretinal Membrane: A Randomized Controlled Trial

*First Author: Danny CHEUNG*  
*Co-Author(s): Shu Yen LEE, Andrew TSAI, Gavin TAN, Doric WONG, Edmund WONG*

**Purpose:** To compare the efficacy of a staged versus combined surgical approach for patients with concomitant cataract and epiretinal membrane (ERM).

**Methods:** A randomized controlled trial of 93 patients with concomitant cataract and ERM to determine whether a staged surgical approach (cataract surgery alone + vitrectomy surgery for ERM as required) can achieve similar improvement in outcomes as the combined surgical approach (simultaneous cataract and ERM surgery). Inclusion criteria were (1) adults 40 years or older with primary ERM, (2) at least moderate cataract, and (3) best-corrected visual acuity (BCVA) of logMAR 0.4 (Snellen 6/15) or worse. Eligible patients were randomized into either the staged or combined surgical approach. Patients were followed up for 12 months after surgery.

**Results:** Of the 93 included patients, the mean age was 68.5 years, 44% were male, 94% were Chinese, and 46 and 47 patients were randomized to staged and combined surgery groups, respectively. There was no significant difference in baseline characteristics between

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the 2 study groups. The mean BCVA was similar between the staged versus combined surgery groups at baseline (logMAR 0.57 vs 0.62), 1-month (0.25 vs 0.31), 3-month (0.21 vs 0.21), 6-month (0.22 vs 0.18), and 12-month (0.18 vs 0.16) visits. The proportions of the patients who achieved good visual outcome (logMAR 0.3 or better) after surgery were also similar between the groups.

**Conclusions:** Cataract surgery alone may achieve acceptably similar improvements in vision as combined cataract and ERM surgery among patients with concomitant cataract and ERM.

**Dec 08, 2023 (Fri) 10:30 - 12:00**  
**Venue: S422**

### Utilization of 3D Magnetic Resonance Imaging in Perioperative Assessment for Patients Undergoing Surgery for Myopic Traction Maculopathy

*First Author: Pradeep **SUSVAR***  
*Co-Author(s): Parth **MEHTA***

**Purpose:** To study the utility of 3D MRI as one of the ancillary investigations in the perioperative assessment of patients who underwent surgery for myopic traction maculopathy (MTM).

**Methods:** A retrospective interventional case series of 6 patients with MTMs undergoing surgeries between 2019 and 2023, who were evaluated at a tertiary care hospital. Patients who underwent 3D MRI imaging as an adjunctive other than routine SSOCT, B scan, and OPTOS photo were included in the study. The type of surgery was planned based on this preliminary investigation along with 3D MRI images to assess the posterior staphyloma characteristics and the globe contour as visualized from the exterior in the 3D constructed images on MRI.

**Results:** The mean age of the patients was 52.8 years. Of the 6 patients, 4 patients underwent macular buckle surgery with T shaped buckle, based on the B scan and images on 3D MRI scans. The mean difference in pre- and postop

AXL was 2.86 mm. Patients who underwent macular buckle surgery had good buckle indent seen on both USG and MRI postoperatively. Visual acuity improved in 3, maintained in 2 patients, and worsened.

**Conclusions:** 3D MRI images aided in studying the posterior staphyloma contour from the exterior for planning an appropriate surgery for MTM. They also aided in analyzing the globe contour post macular buckle surgery. 3D MRI scanning can be a good ancillary investigation in the surgical management of MTM.

### Translational Medicine

**Dec 10, 2023 (Sun) 13:45 - 15:15**  
**Venue: S422**

### AMDGD: A Comprehensive Database Provides Landscape Genetic Variation Information for Age-related Macular Degeneration

*First Author: Dongyue **WANG***  
*Co-Author(s): Ming **ZHANG***

**Purpose:** To construct an age-related macular degeneration genetic database to provide a worldwide, integrated platform for research and establish a landscape of genetic variations in AMD.

**Methods:** Genetic variation and related information of patients with AMD and controls from 569 research studies and 82 related cohort studies were collected. All the genetic data was annotated and expanded from 9 related websites, and all the data was integrated into a database: AMDGD. AMDGD also provides a clinical assistance tool for users. Once the patient information is entered, the tool can automatically match and output related studies, offering research information, baseline details, and variation information.

**Results:** A total of 1263 SNP data, 6617 mutation data, and 66 gene data were included in the database. Clinicopathologic data from 129,670 patients worldwide was collected. All genes and single nucleotide variations were classified into different groups



according to disease stratification, gene types, clinicopathologic information, and geographical distribution. Users can visit this database via the following link, <http://amdgd.bioinf.org.cn/>, for their personalized applications and conduct more in-depth studies about data-driven and knowledge-guided modeling and applications. Through gathering all AMD genetic variations together, AMDGD provides users with a platform to perform convenient literature searches, study genetic variations, and explore combinations of these variations to utilize. Additionally, AMDGD can also help users to further investigate AMD genetic variations via enrichment analyses.

**Conclusions:** AMDGD will assist future knowledge-guided modeling for AMD deep phenotyping and precision medicine, and conduct systems biological investigations of AMD heterogeneity.

**Dec 10, 2023 (Sun) 13:45 - 15:15**  
**Venue: S422**

### Delayed Inflammation and Immune Rejection of Xeno-transplanted Human iPSC-RPE Monolayers in Non-human Primates

*First Author: Zengping LIU*

*Co-Author(s): Veluchamy Amutha BARATHI, Lingam GOPAL, Kah Leong LIM, Xinyi SU*

**Purpose:** This study aimed to investigate the immune response and survival of human induced pluripotent stem cell-derived retinal pigment epithelium (iPSC-RPE) monolayers in healthy and diseased monkey retinas without the use of systemic immunosuppression.

**Methods:** In this study, we investigated the transplantation of human iPSC-RPE monolayers into the subretinal space of healthy and micropulse laser-induced diseased retinas in monkeys. The xenografts were closely monitored for 12 months using multimodal ophthalmic imaging to detect any signs of rejection or inflammation. The survival of the transplanted cells was assessed through histological analysis, while pigmentation levels of the RPE cells were monitored over time.

**Results:** Our study demonstrated that the transplantation of human iPSC-RPE monolayers in healthy monkey retinas resulted in delayed localized inflammation and immune rejection. The immune response was observed to occur earlier in cases where the outer retinal-blood barrier (RPE layer) was disrupted by micropulse laser. Interestingly, the immune rejection and inflammation were limited to the area surrounding the transplanted grafts, and not relevant to the surgical sequence in both eyes of the same non-human primate. Despite a gradual loss of pigmentation, the xeno-transplanted cells displayed long-term survival in the subretinal space, as confirmed by histological assessments.

**Conclusions:** Our findings have important implications for RPE cell therapy in clinical trials. The delayed and localized immune response, along with the long-term survival of transplanted cells, provides valuable insights that may inform the development of new strategies to enhance safety and efficacy, ultimately improving patient outcomes.

POSTERS

Cataract and Refractive Surgery

Poster No.: EX1-131  
 Panel No.: 131, Session: EX1  
**Causes of Day-of-surgery Cancellation of Elective Cataract Surgery in Hong Kong**

First Author: Cheuk Lam **LEE**  
 Co-Author(s): Jonathan **CHAN**

**Purpose:** Surgery is the only effective treatment for cataract. While phacoemulsification is generally a safe, quick, and efficient procedure, unplanned cancellation of scheduled elective cataract surgery is not uncommon. This study aimed to analyze the causes of day-of-surgery cancellation of elective cataract surgery, with the goal of identifying possibly alterable factors for improving OT utilization to reduce surgery cancellations and thus limit inefficient use of valuable healthcare resources.

**Methods:** A retrospective review of the surgical log from January 2021 to December 2022 was conducted. A total of 124 cataract cancellations within the 2 years will be presented in descriptive statistics.

**Results:** Among the 124 patients who had same-day cancellations, the most common reason was hypertension (29 patients), followed by conjunctivitis (23 patients) and blepharitis (11 patients). The time for the subsequent surgery to be done after the cancellation (in weeks-months) was also analyzed. It was interesting to see certain factors associated with shorter postponement of surgery, which were chalazion, sty, uncooperative patient, etc. While some factors were associated with longer postponement of surgery, which were systemic diseases like recent coronary artery disease, atrial fibrillation, etc. This may require further extensive investigations and medication adjustments after diagnosis.

**Conclusions:** Based on the reasons behind the cancellations the current study has presented, it is essential to identify and prevent the main risk

factors during preoperative evaluations. Clinical screening of patients or an automated flagging in CMS/OTMS for newly diagnosed systemic diseases (e.g., cardiac events, stroke) may also be helpful.

Poster No.: EX1-132  
 Panel No.: 132, Session: EX1  
**Innovative Modifications in the Yamane Technique for Intra-scleral Fixation of IOL: A Case Series**

First Author: Gajendra **CHAWLA**  
 Co-Author(s): Neha **BIJLANI**

**Purpose:** To analyze the surgical outcomes and complications of a modified Yamane technique for intra-scleral fixation of IOL.

**Methods:** A retrospective, interventional case series in which 15 patients underwent this modified Yamane technique in the past 2 years. Two diagonally opposite paralimbal, curved self-sealing scleral pockets are made 1.5 mm away from the limbus with a 26-gauge needle at 3 and 9 o'clock positions. The needle is then penetrated into the sclera to enter in the anterior vitreous cavity, and brought out through a previously made scleral tunnel in the superior quadrant. The tip of the leading haptic of a 3-piece IOL is fed into the tip of the needle and gradually, the needle is withdrawn from the 3 o'clock position. Similarly, the trailing haptic is withdrawn from the opposite side. Haptics are adjusted to centralize the IOL and finally their ends are cauterized.

**Results:** Postoperative best-corrected visual acuity was 6/18 or better in 87% of cases (13 of 15). Astigmatism induced by scleral tunnel was seen; about 0.75-2.50 D of cylinder was observed. Postoperative complications included raised intraocular pressure in 5 eyes (33%), cystoid macular edema in 2 eyes (13.3%), localized retinal detachment in 1 eye (6.6%), and optic capture with mild decentration in 2 eyes (13.3%) which were managed with conservative treatment.

**Conclusions:** This technique of intra-scleral IOL fixation is safe and works well to restore vision in a majority of cases. In this technique glue, suture, or end-gripping forceps are not required, thus making it an easy, minimally invasive, faster, and more economical option.

Poster No.: EX1-133

Panel No.: 133, Session: EX1

**Intracameral Use of Moxifloxacin Eye Drops After Phacoemulsification and Foldable Intraocular Lens Implantation Surgery**

First Author: Nilutpal **BORAH**

**Purpose:** To evaluate the safety and efficacy of intracameral use of commercially available diluted moxifloxacin eye drops.

**Methods:** 520 eyes of 520 patients were studied prospectively between January 2021 and March 2023. Mean age was 63 years. There were 332 males and 188 females. Inclusion criteria were NS grade III, IV cataract, uncomplicated phacoemulsification and foldable intraocular lens implantation (PKE + FIOL), no macular pathology. Exclusion criteria were pre-existing uveitis, small pupil, diabetes mellitus. Pre- and postoperative VA, IOP, slit-lamp examination, dilated fundus examination, AS OCT, and OCT were done. Patients were divided into 4 groups. Each group had 130 patients (130 eyes). Each group received diluted intracameral moxifloxacin prepared before injection from 4 different commercially available eye drops. After foldable IOL implantation 0.1 mL of diluted moxifloxacin (0.1 mL moxifloxacin mixed with 0.4 mL of distilled water) was injected into the capsular bag and AC through side port.

**Results:** 520 eyes (520 patients) were studied. In group A 2 eyes (1.5%), group B 1 eye (0.8%), group C 0 eyes (0%), and group D 1 eye (0.8%) had developed mild to moderate degree of fibrin reaction 1-3 days after surgery. Pain was seen in 2 patients, irritation 2 patients, watering 3 patients, and dimness of vision 2 patients. Final vision was 6/6, N6 in all affected eyes (n=4) after 5-10 days.

**Conclusions:** Several studies have established that the intracameral use of moxifloxacin greatly reduces the incidence of postoperative endophthalmitis. Our study shows that in absence of in-house dispensing pharmacy commercially available moxifloxacin eye drops (0.1 mL) can be used safely with few complications (4/520) with complete recovery. Also, postoperative AC reactions could be independent of moxifloxacin eye drops.

Poster No.: EX1-134

Panel No.: 134, Session: EX1

**Late-onset Bilateral Methicillin Resistant Staphylococcus aureus Keratitis After Small Incision Lenticule Extraction**

First Author: Timothy Pak Ho **LIN**

Co-Author(s): Vanessa **CHOW**

**Purpose:** To report a case of late-onset bilateral methicillin resistant Staphylococcus aureus (MRSA) keratitis after small incision lenticule extraction (SMILE).

**Methods:** Case report.

**Results:** A 28-year-old Chinese woman underwent uneventful SMILE in both eyes (OU) at a private clinic in 2022. Nine months postoperatively, she presented to our hospital due to acute onset of redness and pain OU. She recently had recurrent episodes of hospital admission due to exacerbation of her underlying severe eczema before onset of her ocular symptoms. On presentation, her uncorrected distance visual acuity was 0.5 in the right eye (OD) and 0.5/60 in the left eye (OS). On slit lamp examination, both eyes were injected with the presence of an inferior corneal ulcer and subepithelial infiltrate OD, and generalized corneal opacity and axial large epithelial defect with scattered infiltrates in the SMILE interface OS. She was diagnosed with infectious keratitis and treated with fortified vancomycin and gentamicin. Due to the extensive extent of infiltrates in her left eye, she underwent interface irrigation with antibiotics, whilst her right eye with less extensive superficial infiltrates was treated conservatively. Both eyes were culture-positive for MRSA, and

## POSTERS

received topical vancomycin with a short course of topical steroid. She was reviewed until the resolution of infiltrates in both eyes. Her corrected visual acuity improved to 1.0 OD and 0.7 OS 5 months afterwards.

**Conclusions:** This is the first report of successful management of late-onset bilateral nosocomial MRSA keratitis after SMILE. Management guided by clinical severity and site of involvement can yield good visual outcomes.

Poster No.: EX1-135

Panel No.: 135, Session: EX1

### Scleral-fixated Aniridia Intraocular Lenses in Severely Traumatized Eyes and Congenital Aniridia Eyes

First Author: Raj Shri **HIRAWAT**

Co-Author(s): Nagesha **CHOKKAHALLI**

**Purpose:** To evaluate intervention rates and visual acuity improvement. To observe intraoperative and long-term postoperative complication rates.

**Methods:** Consecutive eyes with severe ocular trauma and congenital aniridia needing posterior segment surgery followed by rehabilitation procedures were reviewed from 2017-2022. All traumatic eyes underwent primary globe repair after injury and secondary surgeries if needed before planning for aniridia IOL implantation. Complete vitrectomy with implantation of QV Aniridia IOL (rigid, PMMA lens; care group; Gujarat, India) was done in all eyes and followed up for a minimum of 1 year.

**Results:** Total 14 eyes underwent intervention and all had follow-ups ranging from 10-60 months. Among them, 3 eyes had endophthalmitis, 3 vitreous hemorrhage, and 4 retinal detachment at the time of presentation. An average of 1.2 interventions before and 0.5 intervention post IOL implantation were done. Five eyes had simultaneous IOL implantation. All traumatic eyes had light perception (LP) vision and improved to mean BCVA of 6/18 Snellen lines. Five out of 14 eyes needed anti-glaucoma medication to control intraocular pressure. No intraocular inflammation persisted beyond 6 weeks.

**Conclusions:** Post lens implantation interventions were insignificant, favoring aniridia IOL in severely traumatized eyes. Postoperative inflammation was insignificant and secondary glaucoma can be managed conservatively without compromising outcomes. Despite these encouraging findings, we would advise caution in careful patient selection and close follow-ups to manage postoperative vision-threatening complications.

## Cornea and External Eye Disease

Poster No.: EX1-136

Panel No.: 136, Session: EX1

### A Glance at Self and Medical Professional-based Disease Management of MGD-related DED Patients in Hong Kong

First Author: Charlotte Yi-sum **POON**

Co-Author(s): Hoi Ying Emily **CHAN**, Zhichao **HU**, Chong **KAM LUNG**, Xu Lin **LIAO**, Yiu Man **WONG**

**Purpose:** Meibomian gland dysfunction (MGD) is the commonest cause of dry eye disease (DED). We investigated the awareness of diagnosis and treatments given among MGD-related DED patients in Hong Kong.

**Methods:** Subjects completed an online questionnaire during enrollment in an open-recruited randomized controlled trial (clinicaltrials.gov registration: NCT05577910). Only patients confirmed to have mild-to-moderate MGD-related DED by the investigators were analyzed.

**Results:** 185 MGD patients including 133 (71.9%) females, mean (SD) age of  $50.6 \pm 16.0$  were evaluated. Ninety (48.6%) and 18 (9.7%) patients were diagnosed as suffering from DED and MGD, respectively, and 15 had both. While there was no correlation between the age and gender of patients and prior diagnosis of MGD, a positive correlation between these 2 factors ( $p < 0.001$  and  $p = 0.027$ , respectively) and diagnosis of DED existed, with more females diagnosed. Notably, 48 (25.9%) patients were uncertain whether they had DED, and 78 (42.2%) were uncertain for MGD. All patients



diagnosed with MGD were given treatments, but 3 (3.33%) with DED were not. Treatments for DED included artificial tears (87.8%), eyelid warm compress (46.7%), and eye ointment (18.9%). 58.9% of DED patients used 2 or more treatments. Treatments for MGD were given in 77.8%, 77.8%, and 27.8%, respectively.

**Conclusions:** In this cohort of MGD-related DED patients, most were only prescribed topical lubricants while the knowledge of MGD-related DED diagnosis and the importance of home-based management including warm compress therapy were limited.

Poster No.: EX1-137

Panel No.: 137, Session: EX1

### Correlation Between Tear Film Lipid Quality and Meibomian Gland Dropout in Mild to Moderate Meibomian Gland Dysfunction

First Author: Yiu Man **WONG**

Co-Author(s): Kam Lung **CHONG**, Zhichao **HU**, Xu Lin **LIAO**, Andre **MA**, Weng Chi Stella **SIO**

**Purpose:** Patients with meibomian gland dysfunction (MGD) may demonstrate structural changes of meibomian gland (MG) atrophy and functional loss in both quantity and quality of meibum. We evaluated the correlation among lipid layer thickness (LLT), MG dropout, and meibum quality in mild-to-moderate MGD patients.

**Methods:** LLT (average, maximum, minimum) were estimated using LipiView interferometer (TearScience Inc, Morrisville, NC), while upper (UL) and lower lid (LL) meiboscore (0-3) and meibum quality (0-3) in LL were scored by masked ophthalmologists during the enrollment of a randomized clinical trial (Clinicaltrial.gov registration: NCT05577910). Data were analyzed using multiple linear regression and one-way ANOVA using SPSS Statistics 27.0 software.

**Results:** 185 subjects aged  $50.6 \pm 16.0$  (52 males) were recruited. Average ( $P = 0.047$ ,  $\beta = -4.382$ ) and minimum ( $P = 0.040$ ,  $\beta = -4.700$ , respectively) LLT were significantly correlated with LL meiboscore. They were also significantly associated with the meibum quality in central

LL ( $P = 0.015$ ,  $\beta = 1.062$ ;  $P = 0.026$ ,  $\beta = 1.005$ , respectively). Interestingly, better meibum quality in the nasal side of LL was associated with lower minimum LLT ( $P = 0.044$ ,  $\beta = -0.944$ ). Statistically significant difference was indicated between groups of LL meiboscore [ $F(3,171) = 3.213$ ,  $P = 0.024$ ] in maximum LLT. Maximum LLT was significantly lower in eyes with worst LL MG dropout (meiboscore = 3) compared to eyes with less severe dropout (meiboscore = 1) ( $74.88 \pm 23.89$  vs  $85.32 \pm 16.50$ ,  $P = 0.047$ ). There were no significant differences among other severities of MG dropout in UL or LL with average and minimum LLT.

**Conclusions:** Our cohort confirmed that LLT was significantly related to MG dropout and meibum quality in lower lid. Meanwhile, different severities of MG dropout affect maximum LLT.

Poster No.: EX1-138

Panel No.: 138, Session: EX1

### Correlation of Lid Margin Abnormalities with Meibomian Gland Dysfunction Severity

First Author: Chak Fung **NG**

Co-Author(s): Tsun **CHI**, Zhichao **HU**, Chong **KAM LUNG**, Jake **SEBASTIAN**, Weng Chi Stella **SIO**

**Purpose:** Meibomian gland dysfunction (MGD) is a chronic disorder affecting meibomian gland secretion and tear film stability leading to dry eye disease (DED). We investigate the correlation between MGD severity and eyelid margin abnormality.

**Methods:** We analyzed 185 (133 females) patients with mean (SD) age of  $50.6 \pm 16.0$  diagnosed with mild-to-moderate MGD during the enrollment of a randomized controlled trial (clinicaltrial.gov registration: NCT05577910). Dry eye-related parameters and gland secretion were used for evaluating the severity of MGD including ocular surface disease index (OSDI), fluorescein-tear breakup time (FTBUT), and lipid layer thickness (LLT). Results were analyzed using multi-linear regression in SPSS Statistic 29.0 (United States).

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**Results:** Lid margin rounding ( $p = 0.002$ ; 95% confidence interval (CI) unstandardized coefficient (B) = 3.66, 15.46), telangiectasia ( $p = 0.033$ ; 95% CI B = 0.32, 7.58), and female sex ( $p = 0.023$ ; 95% CI B = 1.04, 14.00) were significantly associated with higher (worse) OSDI scores. Lid margin rounding ( $p = 0.025$ ; 95% CI B = -0.76, -0.05), presence of trichiasis ( $p = 0.008$ ; 95% CI B = -0.75, -0.12), staphylococcal crusting ( $p = 0.044$ ; 95% CI B = -0.77, -0.01), and advancing age ( $p < 0.001$ ; 95% CI B = -0.04, -0.01) were significantly associated with shorter (worse) FTBUT. No significant association was found between lid margin abnormalities with LLT.

**Conclusions:** Females, aging, and several lid margin abnormalities were associated with OSDI and FTBUT in this Chinese cohort. However, none of the factors showed a correlation with poorer LLT.

**Poster No.:** EX1-139

**Panel No.:** 139, **Session:** EX1

**Dense Endothelial Deposit and Anterior Capsular Cataract: Effect of 23-year Chlorpromazine Use on the Anterior Segment**

*First Author:* Julia Y.Y. **CHAN**

*Co-Author(s):* Vanessa **CHOW**

**Purpose:** To report a case of a 50-year-old Chinese patient with chlorpromazine related anterior segment manifestation.

**Methods:** A 50-year-old Chinese patient on chlorpromazine for schizophrenia since 2005 complained of insidious blurring of vision. Clinical photos were taken with the patient's written consent.

**Results:** The patient presented with chlorpromazine related anterior segment manifestation affecting both eyes. There were dense opaque deposits over both corneal endothelium and both eyes had anterior capsular cataract. In view of the relatively satisfactory visual acuity and unaffected activities of daily living, the patient was advised to continue his medication and regular follow up is scheduled.

**Conclusions:** This is the first report demonstrating the effect of 23-year chlorpromazine use on the anterior segment in a Chinese patient. Psychiatrists should consider referral to ophthalmologists for assessment should chlorpromazine be prescribed to patients for long-term use.

**Poster No.:** EX1-140

**Panel No.:** 140, **Session:** EX1

**Dry Eye Disease Questionnaires in Patients with Mild to Moderate Meibomian Gland Dysfunction**

*First Author:* Zhichao **HU**

*Co-Author(s):* Eric Ka Ho **CHOY**, Chong **KAM LUNG**, Man Wai **KWOK**, Yingsi **LUO**, Yiu Man **WONG**

**Purpose:** Dry eye symptoms (DES) are the most common complaint in patients with meibomian gland dysfunction (MGD) due to tear film instability. Various questionnaires have been proposed to assess dry eye symptoms (DES). This study aims to investigate the DES of MGD subjects using the most widely used questionnaires and compare their correlation with the MGD parameters.

**Methods:** Five questionnaires including Ocular Surface Disease Index (OSDI), Standard Patient Evaluation of Eye Dryness (SPEED), Symptom Assessment in Dry Eye (SANDE), Ocular Comfort Index (OCI), and Dry Eye Questionnaire (DEQ-5) were self-administered at the baseline visit of a randomized controlled trial (Clinicaltrial.gov registration: NCT05577910). Multiple linear regression models were applied to analyze the correlation between fluorescein tear break-up time (FTBUT), non-invasive keratograph break-up time (NIKBUT), lipid layer thickness (LLT), and those 5 indexes using the IBM SPSS software.

**Results:** A total of 185 subjects (126 females, 68.1%) aged  $50.7 \pm 16.1$  mean (SD) were included. Mean (SD) scores of OSDI, SPEED, SANDE, OCI, and DEQ-5 were  $34.88 \pm 20.50$ ,  $11.91 \pm 5.34$ ,  $61.82 \pm 25.10$ ,  $39.57 \pm 10.18$ , and  $11.72 \pm 4.01$ , respectively. In 3 multiple linear regression models, there was no significant correlation between FTBUT (R Square = 0.015,

P = 0.751), LLT (R Square = 0.007, P = 0.937), and NIKBUT (R Square = 0.034, P = 0.334) with those 5 indexes.

**Conclusions:** We found no linear relationship between different DED questionnaires and MGD-related parameters. The validity of these indexes in reflecting the severity of MGD needs to be further verified.

Poster No.: EX1-141

Panel No.: 141, Session: EX1

### Epidemiology and Etiological Analysis of Keratitis in Northwest China

First Author: Ying **LIU**

Co-Author(s): Ping **GE**, Jie **YANG**, Xiangxiang **YANG**

**Purpose:** This study aims to analyze the epidemiological characteristics and etiology of patients with keratitis in Northwestern China.

**Methods:** 194 patients with keratitis treated from January 2020 to December 2022 were retrospectively analyzed. Sociodemographic data related to risk factors were recorded, and eye exams and corneal scrapes and cultures were performed.

**Results:** A statistical analysis was conducted on 194 patients (226 eyes) with keratitis over a 3-year period. The results showed that 68% of the patients were aged between 30 and 69 years, 17% had simultaneous onset in both eyes, and 60.3% sought medical attention within 1 week of symptom onset. Bacterial infection was identified as the most common cause of keratitis, accounting for 52.1%, followed by viral keratitis at 30.4%, fungal keratitis at 2.6%, and immune-related keratitis at 8.8%. Among the patients, 35.6% had visual acuity lower than 0.3 upon admission, with varying degrees of visual impairment. Additionally, 28.4% had moderate visual impairment, 7.2% experienced severe visual impairment and blindness, and 1.5% had no light perception. Surgical intervention was required for 10.3% of the patients, while most could manage their condition effectively with timely and appropriate medication.

**Conclusions:** Currently, keratitis remains a leading cause of blindness in the region. Due to the low positivity rate of corneal scrapes, we aim to utilize epidemiological data and etiological analysis to establish a foundation for the diagnosis, treatment, and prevention of keratitis. This research endeavors to contribute to the prevention of blindness in our country.

Poster No.: EX1-142

Panel No.: 142, Session: EX1

### Impact of Secondhand Smoking on Dry Eye Prevalence and Severity: A Population-based Study in Hong Kong

First Author: Anakin Chu Kwan **LAI**

Co-Author(s): Jordy **LAU**, Kendrick **SHIH**, Po Yin **WU**

**Purpose:** Smoking is an eye irritant which may cause dry eye in the patient, but only a few studies highlight the impacts of passive smoking (secondhand smoking) on dry eye. This study aims to investigate the impacts of passive smoking on dry eye prevalence and severity.

**Methods:** This was a cross-sectional random population-based study on Chinese subjects aged 50 and above between 1 September 2021 and 31 August 2022. Patients underwent comprehensive dry eye assessment in order from least invasive to most invasive, including dry eye questionnaire (OSDI score), non-invasive keratographic tear breakup time, tear meniscus height, tear breakup pattern, SMTube, and NEI cornea staining score. The definition of dry eye was adopted from the Asia Dry Eye Society.

**Results:** Of 578 patients recruited, 88 had dry eye disease (15.2%), and secondhand smoking exposure was documented in 44 participants (7.61%). The average age was 62.8, and 209 were male (36.2%). OSDI score was found to be significantly higher in participants affected by passive smoking in both univariate (OR = 4.75, CI 95 = 1.20-8.29, p = 0.009) and multivariate logistic regression (OR = 7.21, CI 95 = 2.59-11.84, p = 0.002). The odds of developing dry eye disease were also significantly higher in participants with passive smoking in both

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univariate (OR = 1.07, CI 95 = 0.36-1.73,  $p = 0.002$ ) and multivariate analysis (OR = 1.45, CI 95 = 0.60-2.28,  $p < 0.001$ ). Linear regression did not show any correlation between risk of dry eye and duration of secondhand smoke exposure.

**Conclusions:** Our study showed that individuals with frequent secondhand smoke exposure were more likely to have dry eye disease.

**Poster No.:** EX1-143

**Panel No.:** 143, **Session:** EX1

### Lifestyle and Medical History as Potential Risk Factors of Mild to Moderate Meibomian Gland Dysfunction

*First Author:* Hoi Ying Emily **CHAN**  
*Co-Author(s):* Kelvin Kam-lung **CHONG**, Zhichao **HU**, Charlie **NG**, Yui Cheung **NG**, Jake **SEBASTIAN**

**Purpose:** We investigated the association of lifestyle, ocular, and medical risk factors with symptomatic meibomian gland dysfunction (MGD).

**Methods:** During the enrolment of a randomized controlled trial (Clinicaltrial.gov registration: NCT05577910), after excluding secondary causes, patients recorded their demographics, lifestyle habits, and medical comorbidities by self-administering online questionnaires. Multiple linear regression was used to correlate them with the severity of MGD based on Ocular Surface Disease Index (OSDI), fluorescein tear break-up time (fTBUT), noninvasive keratograph tear break-up time (NIK BUT), and lipid layer thickness (LLT).

**Results:** 185 subjects (133 females, 71.9%) aged 50.6 ( $\pm 16.0$ ) recorded a mean (SD) OSDI score of  $35.0 \pm 20.6$ , fTBUT of  $2.74 \pm 1.27$  seconds, first NIK BUT of  $8.25 \pm 4.84$  seconds, average NIK BUT of  $11.1 \pm 5.21$  seconds, and LLT of  $68.6 \pm 21.3$  nm at baseline. Correlations ( $p < 0.001$ ,  $R^2 = 0.236$ ) were found between worse OSDI scores and female gender, history of eye surgery or floaters (each  $p < 0.05$ , respectively). Longer fTBUT ( $p < 0.001$ ,  $R^2 = 0.172$ ) were found in younger subjects, spectacle-wearers, and non-contact

lens wearers (each  $p < 0.05$ , respectively). History of depression and refractive surgery significantly predicted shorter first and average NIK BUT ( $p < 0.001$ ,  $R^2 = 0.238$ ;  $p < 0.001$ ,  $R^2 = 0.208$ ). Interestingly, longer NIK BUT was found in patients with a history of conjunctivitis diagnosis and contact lens wearers (each  $p < 0.05$ , respectively), but first NIK BUT was negatively associated with years of contact lens use ( $p < 0.05$ ). No significant association was found between drinking or smoking and none of the factors were associated with LLT.

**Conclusions:** Age, sex, lifestyle, medical, and ocular-related risk factors were associated with OSDI, fTBUT, and NIK BUT but not LLT.

**Poster No.:** EX1-144

**Panel No.:** 144, **Session:** EX1

### Ocular Surface Changes in Post Laser-assisted In Situ Keratomileusis Eyes

*First Author:* Tsun **CHIU**  
*Co-Author(s):* Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kelvin Kam-lung **CHONG**, Kenneth **LAI**, Yiu Man **WONG**

**Purpose:** Laser-assisted in situ keratomileusis (LASIK) is a popular laser surgery to correct refractive error. The surgery can damage the sub-basal nerve plexus, which affects corneal blink reflex, lacrimal gland secretion, and reduces tear secretion. Our study aims to report the ocular surface changes in post-LASIK eyes.

**Methods:** Cross-sectional, matched case-control comparison study included 48 post-LASIK right eyes and 48 right eyes of sex- and ages matched healthy controls from a community-based eye screening programme. Outcome measures including anterior segment examination, keratographic, and meibographic imagings.

**Results:** A total of 48 post-LASIK patients (39 females,  $55 \pm 11$  years old) were analyzed. Corneal fluorescein staining, lid parallel conjunctival folds, papillae, meibomian gland plugging, meibomian gland expressibility, and meibum quality were comparable between the 2 groups. Schirmer's test ( $P = 0.0001$ ) and tear meniscus height ( $P = 0.03$ ) were lower in the



post-LASIK eyes. Non-invasive tear break-up time and lipid layer thickness were comparable between the 2 groups.

**Conclusions:** Our study shows that post-LASIK patients mainly suffer from aqueous-deficient dry eye disease (DED). Postoperative care on DED should be addressed.

**Poster No.: EX1-145**

**Panel No.: 145, Session: EX1**

**The Effects of Screen Time, Sleep, and Stress on Dry Eye Disease During the COVID-19 Pandemic**

*First Author: June Oi Yau WONG*

*Co-Author(s): Kelvin Kam-lung CHONG, Xu Lin LIAO, Calvin PANG, Clement THAM, Arthur Chun Chi WONG*

**Purpose:** This study examined the impacts of screen time, sleep, and stress on dry eye disease in order to enhance eye health as part of a healthy lifestyle during the COVID-19 pandemic.

**Methods:** The study involved 104 undergraduate students from tertiary institutions in Hong Kong, and 208 eyes were examined twice: before and after final exam. Dry eye status was assessed using measures, including ocular surface disease index (OSDI), non-invasive keratography tear break-up time (NIK BUT), lipid layer thickness, meibomian gland dysfunction, tear meniscus height (TMH), and Schirmer's test (ST). Three questionnaires, Computer Vision Symptom Scale (CVSS17), Pittsburgh Sleep Quality Index (PSQI), and Perceived Stress Scale (PSS), were distributed to investigate their screen time, sleep quality, and stress level, respectively. Linear regression analysis was utilized to examine the relationship between dry eye parameters, screen time, sleep quality, and stress level.

**Results:** The study participants (68F/36M) had a mean age of  $19.83 \pm 1.55$ . After the final exam, participants had higher CVSS17 scores and OSDI, and shorter NIK BUT average, ST1 results, and TMH ( $P < 0.05$ ). In the multivariate linear regression model, after adjusting for confounders, CVSS17 was found to be

negatively associated with NIK BUT first ( $\beta = -0.17$ , 95% CI: (-0.32, -0.03),  $P = 0.019$ ) and NIK BUT average ( $\beta = -0.19$ , 95% CI: (-0.33, -0.05),  $P = 0.008$ ). PSQI ( $\beta = 1.85$ , 95% CI: (0.72, 2.99),  $P = 0.001$ ), CVSS17 ( $\beta = 1.89$ , 95% CI: (1.54, 2.23),  $P < 0.001$ ), and PSS ( $\beta = 1.20$ , 95% CI: (0.67, 1.73),  $P < 0.001$ ) were positively associated with OSDI.

**Conclusions:** It is important to establish good eye care habits and incorporate them into our daily routine to prevent dry eye disease.

**Poster No.: EX1-146**

**Panel No.: 146, Session: EX1**

**Update on Advancements in Conventional and Novel Treatment Approaches in Moderate to Severe Dry Eye Disease**

*First Author: Carolyn Yu Tung WONG*

*Co-Author(s): Justin Man Kit TONG*

**Purpose:** We aim to review novel treatment attempts in moderate to severe dry eye disease (M-SDED) and discuss new management routes at different M-SDED stages.

**Methods:** Literature search was performed in PubMed on 28/5/2023, using keywords "moderate" and "to" and "severe" and "dry eye" and "treatment". Studies were manually screened via abstract or full text. English articles published in 2021-2023 with full text available were included. Reviews, editorials, and case reports were excluded. Twenty-three relevant studies were reviewed.

**Results:** For M-SDED, 0.15% hyaluronate (HA) solution successfully produced Restasis-equivalent effects in short-term therapy. Efficacious regimens could involve daily daytime use of 0.30% HA ophthalmic gel for severe DEDs, and daily daytime use of 0.18% HA solution alongside nighttime use of 0.30% HA gel for moderate DEDs. Gel promotes improved outcomes in higher concentration HA treatments in severe DED. The combined HA uses with other lubricants could also be potentially long-term effective and outcome-favorable for M-SDED. For conventional 0.05% cyclosporine A (CsA) solution, gel or nanoemulsion preparations brought superior

benefits of improved tolerability, bioavailability, and compliance for better outcomes in M-SDED. Water-free CsA could act as effective steroid alternatives in immediately relieving preoperative M-SDED. Pulsed steroid therapy overcame drop side effects and was deemed advantageous for prolonged usage in M-SDED. Evidence showed unique benefits of autologous serum drops in severe DEDs through growth factor replenishment and punctal catheterization in advanced DEDs through corneal nerve regeneration. Targeted varenicline and acupuncture are potential candidates in M-SDED treatments.

**Conclusions:** Modified regimens alongside novel treatments could better improve M-SDED outcomes at different stages.

## Eye Trauma, Emergencies & Infections

Poster No.: EX1-001

Panel No.: 001, Session: EX1

### A Curious Case of Endogenous Fungal Endophthalmitis with Novel Pathogen Presenting in Acute Angle Closure

First Author: Jeremy **WILLIAMSON**  
Co-Author(s): Joseph **PARK**, Richard **SARAFIAN**

**Purpose:** To report a case of fungal endogenous endophthalmitis presenting with angle closure with a novel pathogen.

**Methods:** Non-diabetic, phakic 54-year-old woman with a history of intravenous methamphetamine use presented with a painful red left eye, perception to light vision, and visual deterioration over the previous 2 days. Initial examination of the left eye revealed intraocular pressure of 39 mm Hg, mid-dilated unreactive pupil with reverse relative afferent pupillary defect, hazy cornea, shallow anterior chamber with no angles visible on gonioscopy. B-scan revealed dense vitritis. Provisional diagnosis was endogenous endophthalmitis complicated by acute angle closure.

**Results:** Treatment included intravenous acetazolamide and topical IOP lowering agents. Vitreous tap and intravitreal injections

were performed followed by vitrectomy, intravitreal ceftazidime, vancomycin, and voriconazole. Systemic therapy included intravenous ceftriaxone, vancomycin, and oral voriconazole. Panfungal PCR from the left vitreous tap identified *Ramularia* species. Bilateral sequential YAG laser peripheral iridotomies were performed. Within 14 days vision improved to 20/100.

**Conclusions:** Acute angle closure presentation was unique as was the causative agent. Angle closure may have been secondary to posterior inflammation. This case underscores the importance of B-scan when fundal examination is challenging. *Ramularia*, predominantly a plant pathogen, rarely infects humans. Infective source remains uncertain, possibly related to intravenous drug use. The emergence of advanced techniques like PCR and subsequent genome sequencing, performed here, enhances diagnostic yield. *Ramularia*'s increasing prevalence in agriculture raises potential for more cases. This case contributes to the understanding of novel endophthalmitis pathogens and emphasizes the importance of early diagnosis and management in such cases.

Poster No.: EX1-002

Panel No.: 002, Session: EX1

### Clinical Features of Novel Coronavirus Infection Associated Acute Macular Neuroretinopathy

First Author: Yusheng **ZHONG**  
Co-Author(s): Yong **CHENG**, Tong **QIAN**

**Purpose:** To evaluate the clinical features of acute macular neuroretinopathy (AMN) associated with SARS-CoV-2 infection.

**Methods:** Retrospective case series studies. A total of 12 eyes of 8 patients diagnosed with SARS-CoV-2 infection associated AMN were included. All patients underwent best-corrected visual acuity (BCVA), spectral-domain optical coherence tomography (SD-OCT), and infrared fundus photography (IR).

**Results:** The time from diagnosis of SARS-CoV-2 infection to the onset of ocular symptoms was  $3.0 \pm 0.93$  days. At the last follow-up, visual

symptoms improved in 7 eyes (58.3%, 7/12) and remained unchanged in 5 eyes (41.7%, 5/12). SD-OCT revealed localized thickening and strong reflection of the outer plexiform layer (OPL) in the macular area, patchy strong reflections in the outer nuclear layer (ONL), and varying degrees of local discontinuity in the adjacent external limiting membrane, ellipsoid zone/interdigitation zone (EZ/IZ), with reduced local reflection in the adjacent retinal pigment epithelium layer in 2 eyes. The strong reflection area of the ONL on corresponding structural OCT was observed more clearly as a lesion range with strong reflection on en-face OCT. The incomplete structure of the EZ/IZ band was observed more clearly as a lesion range with weak reflection on en-face OCT. IR showed several clear-bordered and weakly reflecting lesions at the center of the macula, with the tip pointing to the fovea.

**Conclusions:** The OCT findings of SARS-CoV-2 infection-associated AMN are characterized by strong reflections in the OPL and ONL, and lesion ranges can be observed more clearly at different levels using en-face OCT. The lesions on IR appear as weak reflections.

Poster No.: EX1-003

Panel No.: 003, Session: EX1

**Globe Perforation from Metallic Foreign Body with an Irreparable Posterior Scleral Exit Wound, Good Outcome Following Staged Surgery: A Case Report**

First Author: Bashajan **ALI**

Co-Author(s): Benjamin **CHANG**, Siddharth **SUBRAMANI**

**Purpose:** To describe a case of self-sealing posterior scleral perforation following an intraocular foreign body, managed successfully by staged vitreoretinal surgery.

**Methods:** Retrospective case report.

**Results:** A 41-year-old male presented following a right eye injury while hammering metal. His best-corrected visual acuity was RE 6/60, LE 6/20, respectively. There was a 5 mm right eyelid laceration, 7 mm infero-temporal anterior scleral laceration with uveal tissue

prolapse, and a poor fundal view. CT images showed a metallic foreign body measuring 8 mm x 5 mm x 5 mm lodged within the postero-lateral aspect of the right eyeball. During the primary repair, the eyelid and anterior sclera were repaired, prior to commencing the vitrectomy. The foreign body was found buried deep within the temporal macula. Internal dislodgment was attempted, but it was subsequently removed externally from under the lateral rectus. A large posterior scleral exit wound was uncovered with vitreous and retinal prolapse. The exit wound was too posterior to be sutured. The vitrectomy was aborted due to continuous fluid leakage, hypotony, and widespread choroidal effusion. Over weeks, the irreparable posterior perforation site self-sealed. Six weeks later, the patient underwent a combined phacoemulsification and lens implant plus vitrectomy and retinectomy to isolate incarcerated retina and reduce the macular folds. At 6 weeks, his BCVA improved to 6/40 with a flat retina, resolution of the retinal folds, and reduced distortion symptoms.

**Conclusions:** Irreparable posterior scleral ruptures have the ability to self-seal, and may benefit from a delayed vitrectomy to stabilize the retina and improve the visual outcome.

Poster No.: EX1-004

Panel No.: 004, Session: EX1

**Risk Factors for Band Keratopathy in Aphakic Eyes with Silicone Oil Tamponade for Open-globe Injuries: A Multicenter Case-control Study**

First Author: Mengyu **LIAO**

**Purpose:** To identify the risk factors for band keratopathy (BK) in aphakic eyes following vitreoretinal surgical treatment with silicone oil tamponade for open-globe injuries.

**Methods:** This was a multicenter, case-control study.

**Results:** The incidence of BK was 28% (28/100 eyes). Silicone oil retention time was significantly longer in the BK group ( $13.96 \pm 10.71$  months) than in the non-BK group ( $7.86 \pm 6.81$  months,  $P = 0.001$ ). From the regression

analysis, silicone oil retention time (OR = 1.32; 95% CI: 1.06–1.21) and zone of injury (OR = 6.88; 95% CI: 1.94–24.44) were significant risk factors for BK. From the hierarchical interaction analysis, silicone oil retention over 6 months had a significant risk for BK in eyes with rupture (OR = 5.08; 95% CI: 1.42–18.16,  $P = 0.01$ ), aniridia (OR = 9.84; 95% CI: 1.26–76.74,  $P = 0.01$ ), and zone III injury (OR = 7.74; 95% CI: 1.76–34.10,  $P = 0.03$ ), while zone III injury had a significant risk for BK in eyes with rupture (OR = 6.84; 95% CI: 1.69–27.69  $P = 0.01$ ), incomplete/complete iris (OR = 13.80; 95% CI: 2.76–69.08,  $P = 0.001$ ), and silicone oil retention over 6 months (OR = 7.71; 95% CI: 1.73–34.73,  $P = 0.01$ ). From the restricted cubic splines of silicone oil retention time, there was a marked increase in the risk for BK at  $\geq 10$  months and a slow increase after 6 months, but almost stable within 4–6 months.

**Conclusions:** In eyes following vitreoretinal surgical treatment with silicone oil tamponade for open-globe injuries with aphakia, silicone oil retention time over 6 months and zone III injury were independent risk factors for BK. The risk of BK increases sharply after 10 months of silicone oil tamponade.

Poster No.: EX1-005

Panel No.: 005, Session: EX1

### Through the Microscope: An Insight into the Histopathological Features of Fungal Panophthalmitis

First Author: Amber **DUBEY**

Co-Author(s): Dipankar **DAS**

**Purpose:** To report histopathological characteristics in a case of fungal panophthalmitis.

**Methods:** Descriptive case report.

**Results:** A 58-year-old man presented to our clinic with a 5-day history of severe pain, redness, and decreased vision in his right eye. He reported a recent injury to the eye with a wooden splinter while gardening and underwent corneal tear repair 2 days prior. On examination, his visual acuity was limited to light perception, and the intraocular pressure

(IOP) was significantly elevated. The right eye exhibited extensive conjunctival injection, corneal edema with corneal sutures, hypopyon, and suspected scleral necrosis. Ultrasound B-scan showed extensive vitreous exudates and a subtotal retinal detachment with subretinal echoes. The choroidal thickness was increased with the evidence of T-sign. Given the severity of the infection and the risk of systemic spread, the decision was made to proceed with enucleation of the right eye to prevent further complications. The enucleated specimen showed superficial keratitis with diffuse keratic precipitates and fibrovascular proliferation in the anterior chamber with disorganization of ciliary body. Vitreous cavity showed extensive inflammatory infiltrates with multinucleated giant cells. Episcleral and scleral inflammation was noted with dilated vascular channels. Gomori-methamine silver stain showed septate fungus belonging to *Aspergillus* species.

**Conclusions:** Histopathological analysis remains the cornerstone for identification of pathogenic organism and understanding of the disease process. We attempt to describe these varied features in fungal panophthalmitis gaining insights into the disease progression, aiding in clinical decision-making and management strategies for such severe ocular infections.

Poster No.: EX1-006

Panel No.: 006, Session: EX1

### Triamcinolone to Prevent Traumatic Proliferative Vitreoretinopathy in Open Globe Injury

First Author: Hua **YAN**

**Purpose:** To evaluate the efficacy and safety of intravitreal triamcinolone acetonide (TA) injection at the end of emergency surgery for open globe injury (OGI) to suppress traumatic proliferative vitreoretinopathy (TPVR).

**Methods:** Patients were treated with 0.1 mL TA in the TA group and 0.1 mL balanced salt solution (BSS) in the control group at the end of emergency surgery. Vitrectomy was performed 7–14 days later.



**Results:** The PVR score was significantly better in the TA group ( $9.30 \pm 0.82$ ) than in the control group ( $6.44 \pm 1.06$ ) ( $P = 0.036$ ). The final VA improved in 23 eyes (92%) in the TA group and in 14 eyes (63.64%) in the control group ( $P = 0.008$ ). The retinal attachment rates were 88% and 63.64% in the TA and control group, respectively ( $P = 0.049$ ). The 2 groups showed no significant difference in macular repositioning and PVR recurrence rate ( $P = 0.215, 0.191$ ). Temporary intraocular pressure (IOP) elevation occurred in 1 eye in the TA group after emergency surgery.

**Conclusions:** Early intravitreal TA injection for OGI can help effectively reduce TPVR, increase surgical success, and improve visual prognosis. This method is safe and efficient.

Poster No.: EX1-007

Panel No.: 007, Session: EX1

**Unmasking the Culprit: Post-traumatic Late-onset Chronic Angle Recession Glaucoma Masked by a Concurrent Rhegmatogenous Retinal Detachment**

First Author: Cherry Vhie **ORTEGA**

**Purpose:** Angle recession glaucoma is an open angle glaucoma resulting from blunt ocular trauma. Intraocular pressure (IOP) elevation and glaucomatous optic neuropathy can develop insidiously, remaining unnoticed long after the initial injury. Conversely, retinal detachments typically reduce IOP as fluid exits through the exposed retinal pigment epithelium. This report discusses the diagnostic and management challenges in a case of angle recession glaucoma potentially masked by a concurrent rhegmatogenous retinal detachment.

**Methods:** A 61-year-old male presented with sudden-onset blurring of vision in his left eye. History was generally unremarkable except for a blunt eye trauma 4 decades prior. Initial examination revealed rhegmatogenous retinal detachment in the left eye. IOP was normal in both eyes. Urgent retinal detachment repair (phacoemulsification with intraocular lens implantation-pars plana vitrectomy-endolaser-silicone oil tamponade) was then done.

Following successful retinal reattachment, persistent IOP elevation prompted a more comprehensive evaluation.

**Results:** Gonioscopy and ultrasound biomicroscopy revealed a 360-degree angle recession. Severe generalized optic disc cupping, retinal nerve fiber layer thinning, and visual field depression suggested a chronic glaucomatous process, likely present prior to the onset of retinal detachment. Maximum anti-glaucoma medications initially controlled the IOP, however, elevation recurred after silicone oil removal, necessitating a subsequent glaucoma drainage device implantation.

**Conclusions:** This report highlights the significance of meticulous ophthalmic evaluation and awareness of potential diagnostic masking effects in managing intricate ocular conditions, even in cases with remote and unrecalled history of eye trauma. The concealed elevation of IOP due to angle recession, alongside a coexisting retinal detachment, illustrates the complexity of clinical presentations.

### General Ophthalmology

Poster No.: EX1-147

Panel No.: 147, Session: EX1

**Are Endocrinologists' Grading of Referable Diabetic Retinopathy More Trustworthy than an Artificial Intelligence System?**

First Author: Chi Lik **AU**

Co-Author(s): Steffi, Shing Yee **CHONG**, Callie **KO**, George, Tsz Ho **SHUM**

**Purpose:** To compare an artificial Intelligence (AI) system and local endocrinologists for detecting referable diabetic retinopathy (DR) in an Asian population in Hong Kong.

**Methods:** A retrospective, cross-sectional study was conducted in a tertiary hospital in Hong Kong. Fundus photos and gradings by endocrinologists from all consecutive visits of DR screening in 2/2021 were retrieved. Gradings by the AI system and ophthalmologists were obtained. Primary outcome focused on the sensitivity and

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specificity of the AI system in diagnosing more than mild DR (mtmDR), i.e., referable DR in our locality. Secondary outcome measured the agreement between the AI system and endocrinologists' gradings. The comparison was evaluated by Cohen's kappa, Gwet's first-order agreement coefficient, and McNemar's Chi square test. Statistical analyses were performed using SPSS 26.0.

**Results:** Of 187 individuals recruited, 23 were excluded due to the loss of data. 328 eyes completed the study protocol. Sensitivity and specificity of the AI system for mtm DR was high, 88.0% (95% confidence interval (CI) 69.2%-96.7%) and 90.9% (95% CI 86.8%-93.8%), respectively. Imageability was 98.7% (95% CI 96.5%-99.6%). Good agreement between the AI system and endocrinologists was demonstrated by the Kappa coefficient of 0.505 (95% CI 0.368-0.642),  $P < 0.001$ ; Gwet's first-order agreement coefficient 0.832 (95% CI 0.776-0.888),  $P < 0.001$ .  $P$  value for McNemar's Chi square test for sensitivity and specificity was 1 and 0.216, respectively.

**Conclusions:** This study showed the AI system studied demonstrated high sensitivity and specificity in Asian diabetic patients. The AI system demonstrated a good level of agreement with the screening results provided by the endocrinologists.

**Poster No.:** EX1-148

**Panel No.:** 148, **Session:** EX1

**Clinical Application of Pupillometry in Ocular Disorders: A Systematic Review**

*First Author:* Suet Man LI

*Co-Author(s):* Chong KAM LUNG, Kenneth LAI, Chen Hui TANG, Yifei YANG

**Purpose:** The applications of pupillometry on various ocular diseases have been reported. This systematic review aims to provide an insight into how pupillometry use can be clinically relevant to ocular diseases in general.

**Methods:** We conducted a literature search on Pubmed, Medline, and Cochrane library on 1 September 2023. The searching strategies were as follows: "pupillometry" and "eye" or

"ocular diseases" or "macular degeneration" or "cataract" or "glaucoma" or "amblyopia" or "strabismus" or "dry eye". The abstracts of 928 studies were reviewed. Sixteen studies focusing on ocular diseases were included in this review.

**Results:** Age-related macular degeneration (AMD) patients shows significantly reduced pupil constriction amplitudes in the macular region. However, there is conflict on whether AMD patients have significantly longer mean latency to constriction onset in the fovea, and significantly greater pupil diameters (PD). The reduction of pupillary responses in older individuals was attenuated by severe cataracts. There is also retention of post-illumination pupillary response (PIPR) for blue light stimuli in eyes with cataracts. Glaucoma eyes have lowered pupillary light responses, larger PD, and higher steady-state pupil oscillations. It is suggested that pupil dilation time, constriction amplitude, and PIPR have a descending order of diagnostic performance. Amblyopic eyes had longer contraction latency, shorter contraction duration, and higher dilation velocity, and reduced focal pupil response. No existing research could be found on pupillometry use in strabismus and dry eye.

**Conclusions:** Pupillometry shows potential for diagnosing the 4 ocular diseases mentioned.

**Poster No.:** EX1-149

**Panel No.:** 149, **Session:** EX1

**Comparing Biomechanically Corrected Intraocular Pressure by Corvis ST with Intraocular Pressure by iCare IC200 Across Axial Lengths**

*First Author:* Adrian WONG

*Co-Author(s):* Jordy LAU, Kendrick SHIH

**Purpose:** To evaluate the utility of biomechanically corrected non-contact tonometry intraocular pressure measurement (bIOP), as calculated using Corvis-ST (Oculus, Germany), across different axial lengths, with reference to iCare tonometry measurements.

**Methods:** Right eye data from 2138 consecutive subjects was obtained from a cross-sectional random population study of Chinese

subjects, aged 50 and above, between 1 May 2019 and 30 April 2020. Parameters, including IOP, bIOP, and Corvis Biomechanical Index (CBI) were measured for all subjects. IOP was measured using iCare and Corvis ST devices. Data was grouped according to axial length (AXL), and correlation between IOP and bIOP values were examined across groups.

**Results:** Correlations between iCare IOP and bIOP (0.367 in 20-22 mm,  $p = 0.002$  to 0.643 in 26-30 mm,  $p < 0.001$ ) as well as iCare IOP and uncorrected IOP (0.542 in 20-22 mm,  $p < 0.001$  to 0.729 in 26-30 mm,  $p < 0.001$ ), as measured by CORVIS-ST, significantly increased with axial length. Compared to iCare IOP, uncorrected IOP tended to be overestimated (74.5% overestimated), while bIOP values were equally overestimated and underestimated (51.0% overestimated). Mean CBI was significantly lower in eyes higher axial lengths [0.168 ( $\pm 0.291$ ), 0.133 ( $\pm 0.262$ ), 0.089 ( $\pm 0.220$ ), 0.063 ( $\pm 0.207$ ), 0.110 ( $\pm 0.245$ ),  $F(3,2102) = 9.643$ ,  $p < 0.001$ ].

**Conclusions:** Correlation between bIOP and iCare IOP increased with higher axial lengths. The observed findings may be related to differences in corneal biomechanical properties across axial lengths. Thus bIOP may be more relevant in high myopic patients with longer axial lengths and lower CBIs.

Poster No.: EX1-150

Panel No.: 150, Session: EX1

**Global Prevalence of Orbital and Eyelid Tumors and Projection of Prevalence Through 2045: A Systematic Review and Meta-analysis**

First Author: Ho Ting **MAK**

Co-Author(s): Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kam Lung **CHONG**, Ka Hei Kenneth **LAI**, Kei Hei **LAI**, Calvin Cp **PANG**

**Purpose:** Orbital and eyelid tumors constitute a group of diverse lesions, and malignancies of the ocular adnexal area is the most prevalent cause of orbital exenteration. This systematic review aims to evaluate and project the global and regional prevalence of orbital and eyelid tumors by 2045.

**Methods:** We conducted a literature search of PubMed, Medline, and Cochrane library, and an extensive search of regional and international cancer registries by 18/08/2023. Search terms were ("Prevalence" or "Incidence") and ("Eyelid" or "EYE" or "Ocular" or "Orbital") and ("Tumour" or "Cancer" or "Malignancies" or "Carcinoma" or "Melanoma"). A total of 6240 articles were identified on PubMed using keyword search. We identified 118 relevant articles after abstract screening. A total of 52 original studies covering 20 countries were included after full text screening. Projections of the prevalence of orbital and eyelid tumors were based on meta-analysis by Comprehensive Meta-Analysis software 4.

**Results:** Benign tumor was more common than malignant tumor in both eyelid tumor (75.0%) and orbital tumor (72.5%) across different geographical regions by 2020, and such dominance is predicted to persist by 2045. By 2045, the most common benign and malignant orbital tumors are dermoid cyst and lymphoma, respectively. The most common benign and malignant eyelid tumors are nevi and basal cell carcinoma, respectively. The distribution of subtypes of benign tumors would be more diverse by 2045.

**Conclusions:** Epidemiology of orbital and eyelid tumors has changed by improved diagnosis. Considerable disease burden shall be addressed given the expected increase in the orbital and eyelid tumor population.

Poster No.: EX1-151

Panel No.: 151, Session: EX1

**Lens Power and Associated Factors in Non-human Primate Subjects: A Cross-sectional Study**

First Author: Hongyi **LIU**

Co-Author(s): Jian **WU**

**Purpose:** To examine the normative profile of lens power (LP) and its associations with related parameters among a cynomolgus monkey colony.

**Methods:** This population-based cross-sectional Non-human Primate Eye Study

(NHPES) recruited mid-aged subjects in south China. All included macaques underwent a detailed ophthalmic examination. LP was calculated using the modified Bennett's formula, with biometry data from an autorefractometer and A-scan. SPSS version 25.0 was used for statistical analysis.

**Results:** A total of 296 macaques with the average age of  $18.75 \pm 2.95$  years were collected in this study. The mean LP was  $25.40 \pm 2.96$  diopters (D). Greater LP was independently associated with younger age, longer AL, and lower SE ( $p = 0.028$ ,  $p = 0.025$ ,  $p = 0.034$ , respectively). LP showed positive correlation with age, spherical equivalent refraction, corneal radius (CR), axial length (AL), lens thickness, and anterior chamber depth, while no correlation was observed between lens power and AL/CR ratio.

**Conclusions:** Our results suggested the LP distribution in NHP colony, and indicated the AL and SE strongly influenced the rate of LP. Therefore, this study contributed to a deeper understanding of the relative significance of the LP on the optics of the crystalline lens study.

Poster No.: EX1-152

Panel No.: 152, Session: EX1

**Normative Profile of Retinal Nerve Fiber Layer Thickness and Lamina Cribrosa-related Parameters in a Healthy Non-glaucoma Cynomolgus Monkey Colony**

First Author: Jian **WU**

Co-Author(s): Hongyi **LIU**

**Purpose:** To investigate the normal range of ophthalmic parameters and the correlations between systematic and ocular parameters and retinal nerve fiber layer (RNFL) thickness among a healthy non-glaucoma cynomolgus monkey colony.

**Methods:** All included monkeys were given detailed ophthalmic examinations, including anterior and posterior segments. Furthermore, univariate and multivariate linear regression models were conducted to estimate the relationship between systemic and ophthalmic parameters and global RNFL thickness.

**Results:** A total of 349 non-glaucoma monkeys ( $18.69 \pm 2.88$  years old) were collected. The global RNFL thickness was  $94.61 \pm 10.13$   $\mu\text{m}$ , and sex-specific differences existed in all sectors. The decreasing trend of RNFL is as follows: infero-temporal, supero-temporal, infero-nasal, supero-nasal, temporal, and nasal. For LC-related parameters, cup depth ( $p < 0.01$ ), LC thickness ( $p = 0.014$ ), and Bruch's membrane opening-minimum rim width 2 ( $p = 0.002$ ) were greater in the male group. However, LC depth ( $p = 0.02$ ), anterior lamina insertion depth-1 ( $p = 0.009$ ), and mean anterior lamina insertion depth ( $p = 0.029$ ) of female monkeys were greater than those of male monkeys. In multivariate linear regression, only older age was significantly related to reduced global RNFL thickness ( $p < 0.001$ ).

**Conclusions:** Our findings suggest the differences in RNFL thickness distribution and sex between non-glaucoma cynomolgus monkeys and humans. Therefore, the impact of this difference on outcomes should be fully considered in laboratory animal studies. Our findings are also significant in terms of developing a normative OCT database in non-human primates.

Poster No.: EX1-153

Panel No.: 153, Session: EX1

**Performance of a Novel Large Language Model Framework in Ophthalmology Examinations: An Evaluation with 4,898 Questions**

First Author: Wai Chak **CHOY**

Co-Author(s): Carmen Km **CHAN**, Kam Lung, Kelvin **CHONG**, Calvin **PANG**, Wilson **YIP**

**Purpose:** Large language models (LLMs) have performed variably in answering clinical questions. We aimed to assess the ability of LLMs to generate accurate responses related to ophthalmology and the enhancement in performance with a customized framework, the EyePal.

**Methods:** We compared 3 large language models (ChatGPT, FlanT5, BioMedLM) and their enhancement using LangChain and EyePal pipeline. The models were compared using



4,898 fellowship level questions across 13 subspecialties of ophthalmology using question banks for specialist exams including FRCOphth and the American Board of Ophthalmology Exam. We stratified the questions by the increasing levels of reasoning (Bloom's taxonomy) required. Accuracies were calculated for different methods and compared with paired-T test, and logistic regression was used to calculate the odds ratio.

**Results:** ChatGPT 3.5 outperformed earlier models (accuracy = 43.487%). Across the Bloom's taxonomy levels, ChatGPT 3.5 performed the best in knowledge (48.126%) and comprehension (49.795%) questions. In-context learning with EyeWiki enhanced the model result (accuracy = 45.631%,  $P = 0.00186$ ). Further enhancement using the EyePal framework boosted the performance of ChatGPT 3.5 (accuracy = 66.078%, change = +22.591%,  $P < 0.00001$ ). Statistically significant improvements were observed in all subspecialties except for pathology and tumors (accuracy = +8.114,  $P = 0.61488$ ). There were statistically significant improvements across all levels of Bloom's taxonomy, with the most noticeable change in evaluation (OR = 4.069,  $P = 0.00239$ ) and synthesis (OR = 2.909,  $P = 0.00003$ ).

**Conclusions:** There are inherent limitations of LLM despite recent research and application advances. To prepare for clinical applications, further finetuning, data supplementation, and prompt engineering is necessary to ensure performance of these LLM. The proposed EyePal pipeline can be used as the foundation for future works along this direction.

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**Poster No.:** EX1-154

**Panel No.:** 154, **Session:** EX1  
**Refractive Outcome and Keratometry of a Keratoconus Cornea After Cross-linking Associated Endothelial Damage**

*First Author:* Hong Nien LEE

**Purpose:** To report a case of cornea endothelial recovery after cornea cross-linking procedure.

**Methods:** A case report of a young patient, who was sent to a secondary care center for continuation of care after receiving cornea cross-linking procedure. Clinical observation was done with slit lamp via specular reflection. A mild topical steroid with tapering regime was commenced. Best-corrected visual acuity and keratometry were taken before the procedure and after recovery.

**Results:** A round void area was observed on the endothelial layer with slit lamp via specular reflection. Subsequently, a mild cornea haze with whorl-like reticular pattern on the endothelial developed. Clearing of cornea with normalization of endothelial were seen in the subsequent follow ups. Best-corrected visual acuity returned to baseline at 6/12. No changes in keratometry readings were observed.

**Conclusions:** Endothelial damage may occur in cornea cross-linking procedure. It may be due to a stromal thickness of less than 400 microns or incorrect focusing. Wound healing of the endothelial occurs through cell enlargement and migration. The peripheral corneal endothelial may act as a cell resource for the recovery.

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**Poster No.:** EX1-155

**Panel No.:** 155, **Session:** EX1

**What Can GPT-4 Do for Diagnosing Rare Eye Diseases? A Pilot Study**

*First Author:* Xiaoyan HU

*Co-Author(s):* Carmen Km CHAN, Truong NGUYEN, Emma Anran RAN, Simon SZETO

**Purpose:** Generative Pretrained Transformer-4 (GPT-4) has captured extensive societal interest, drawing widespread evaluation across various fields. Nonetheless, the exploration of GPT-4's capability in ophthalmology remains limited. This study aims to assess GPT-4's ability to identify rare ophthalmic diseases in 3 simulated scenarios for different end users, including patients, family physicians, and junior ophthalmologists.

**Methods:** We selected 10 treatable rare ophthalmic disease cases from the publicly available EyeRounds service. We gradually

increased the amount of information fed into GPT-4 to simulate the scenarios of a patient, family physician, and junior ophthalmologist, using GPT-4. GPT-4's responses were evaluated from 2 aspects: suitability (appropriate or inappropriate) and accuracy (right or wrong) by senior ophthalmologists (>10 years' experience).

**Results:** Among the 30 responses, 83.3% were considered «appropriate» by senior ophthalmologists. In the scenarios of simulated patient, family physician, and junior ophthalmologist, 7 (70%), 10 (100%), and 8 (80%) responses were graded as "appropriate" by senior ophthalmologists, respectively. When compared to the ground truth, GPT-4 achieved the "right" rate of 0 (0%), 5 (50%), and 9 (90%) in the scenarios of simulated patient, family physician, and junior ophthalmologist, respectively.

**Conclusions:** This is a proof-of-concept study that evaluates GPT-4's capacity to identify rare eye diseases in simulated scenarios of patient, family physician, and junior ophthalmologist. The results indicate that GPT-4 has the potential to serve as a consultation assisting tool for patients and family physicians to receive referral suggestions, and an assisting tool for junior ophthalmologists to diagnose rare eye diseases.

## Glaucoma

**Poster No.:** EX1-156

**Panel No.:** 156, **Session:** EX1

**A Multicenter Clinical Study of the Automated Fundus Screening Algorithm**

*First Author:* Jiaxuan **JIANG**

**Purpose:** To evaluate the effectiveness of automated fundus screening software in detecting eye diseases.

**Methods:** We prospectively enrolled 1743 subjects and recorded their information, fundus images, and graded the images according to the study protocol. These images will also be automatically screened by the artificial

intelligence algorithm. Then, the analysis results of automated screening algorithm are compared against the grading results of doctors. The end point goals are lower bounds of 95% CI of sensitivity values that are greater than 0.85 for all 3 target diseases, and lower bounds of 95% CI of specificity values that are greater than 0.90 for referable diabetic retinopathy (RDR) and 0.85 for glaucoma suspect (GCS) and referable macular diseases (RMD).

**Results:** There were 1585 subjects who completed the procedure and yielded qualified images. The prevalence of RDR, GCS, and RMD were 20.4%, 23.2%, and 49.0%, respectively. The overall sensitivity values for RDR, GCS, and RMD diagnosis are 0.948 (95% confidence interval [CI], 0.918-0.967), 0.891 (95% CI, 0.855-0.919), and 0.901 (95% CI, 0.878-0.920), respectively. The overall specificity values for RDR, GCS, and RMD diagnosis are 0.954 (95% CI, 0.915-0.965), 0.993 (95% CI, 0.986-0.996), and 0.955 (95% CI, 0.939-0.968), respectively.

**Conclusions:** Automated fundus screening software demonstrated a high sensitivity and specificity in detecting RDR, GCS, and RMD from color fundus images captured using various cameras.

**Poster No.:** EX1-157

**Panel No.:** 157, **Session:** EX1

**Association of Foveal Avascular Zone Area with Structural and Functional Progression in Glaucoma Patients**

*First Author:* Yinhang **ZHANG**

*Co-Author(s):* Fei **LI**, Xiulan **ZHANG**

**Purpose:** To investigate whether quantitative optical coherence tomography angiography (OCTA) metrics of the superficial/deep macular retina and optic disc are associated with glaucoma progression risk.

**Methods:** A total of 238 eyes from 119 patients with open angle glaucoma or ocular hypertension were included. All participants underwent OCTA imaging with a swept-source OCT (DRI-OCT 1, Topcon, Japan). OCTA metrics were measured by a customized

MATLAB program to obtain foveal avascular zone (FAZ) area, FAZ circularity and capillary density of macular superficial capillary plexus (SCP) and deep capillary plexus (DCP), and radial peripapillary capillary density. Relationships between baseline OCTA metrics, visual field (VF) metrics, intraocular pressure fluctuation, and risk of glaucoma progression were analyzed with the Cox proportional hazards model. A frailty model was used to adjust for intereye correlation.

**Results:** During a mean follow-up duration of 29.39 months, 50, 48, and 16 eyes were determined to have retinal nerve fiber layer (RNFL), ganglion cell-inner plexiform layer (GC-IPL), and VF progression, respectively. FAZ area per standard deviation increase at baseline was significantly associated with both RNFL thinning (HR 1.73;  $p = 0.036$ ) and GC-IPL thinning (HR 2.62;  $p < 0.001$ ), after adjusting for age, axial length, and other potential confounding factors. VF progression was associated with age (HR 1.05;  $p < 0.001$ ) and mean deviation value (HR 0.91;  $p = 0.010$ ), but not with any OCTA metrics.

**Conclusions:** Enlarged FAZ area measured by OCTA was associated with a higher risk of RNFL and GC-IPL thinning associated with glaucoma, but not with functional deterioration in glaucoma.

Poster No.: EX1-158

Panel No.: 158, Session: EX1

### Development and Clinical Deployment of a Smartphone-based Visual Field Deep Learning System for Glaucoma Detection

First Author: Zefeng YANG

Co-Author(s): Fei LI, Xiulan ZHANG

**Purpose:** By 2040, ~100 million people will have glaucoma. To date, there are a lack of high-efficiency glaucoma diagnostic tools based on visual fields (VFs). Herein, we develop and evaluate the performance of iGlaucoma, a smartphone application-based deep learning system (DLS) in detecting glaucomatous VF changes.

**Methods:** A total of 1,614,808 data points of 10,784 VFs (5542 patients) from 7 centers in China were included in this study, divided over 2 phases. In Phase I, 1,581,060 data points from 10,135 VFs of 5105 patients were included to train (8424 VFs), validate (598 VFs), and test (3 independent test sets: 200, 406, 507 samples) the diagnostic performance of the DLS. In Phase II, using the same DLS, iGlaucoma cloud-based application was further tested on 33,748 data points from 649 VFs of 437 patients from 3 glaucoma clinics. With reference to 3 experienced expert glaucomatologists, the diagnostic performance (area under curve [AUC], sensitivity, and specificity) of the DLS and 6 ophthalmologists were evaluated in detecting glaucoma.

**Results:** In Phase I, the DLS outperformed all 6 ophthalmologists in the 3 test sets (AUC of 0.834-0.877, with a sensitivity of 0.831-0.922 and a specificity of 0.676-0.709). In Phase II, iGlaucoma had 0.99 accuracy in recognizing different patterns in pattern deviation probability plots region, with corresponding AUC, sensitivity, and specificity of 0.966 (0.953-0.979), 0.954 (0.930-0.977), and 0.873 (0.838-0.908), respectively.

**Conclusions:** iGlaucoma is a clinically effective diagnostic tool to detect glaucoma from Humphrey VFs, although the target population will need to be carefully identified with glaucoma expertise input.

Poster No.: EX1-159

Panel No.: 159, Session: EX1

### Impact of Postoperative Choroidal Detachment on Trabeculectomy Outcomes: A 4-Year Comparative Study

First Author: Nader MASSIRI

Co-Author(s): Kavousnezhad SARA, Kourosh SHEIBANI, Maryam YADGARI

**Purpose:** To compare trabeculectomy outcomes among patients with and without postoperative serous choroidal detachment (CD).

**Methods:** In this retrospective cohort study, medical records of glaucoma patients older

than 18 who underwent primary trabeculectomy with mitomycin-C between 2012 and 2020 were reviewed. Phakic eyes without history of any other intraocular surgery and with at least 1 year of follow-up were included in the study. Postoperative CD was defined as clinically visible CD developed within the first postoperative week. Cases were categorized into with and without CD and trabeculectomy outcomes were compared. Comparison was carried out using postoperative intraocular pressure (IOP), glaucoma medications, and surgery success.

**Results:** Total of 183 patients including 153 without CD and 30 with CD entered the study. Post-trabeculectomy mean IOPs were significantly higher in the CD group at all follow-up visits at year 1 through 4 (14.70 and 14.82 mm Hg vs 11.03 and 12.59 mm Hg;  $p < 0.05$ ). Similarly, the mean number of glaucoma medications was higher in the CD group at all follow-up visits ( $p > 0.001$ ). Based on success criteria A, cumulative probability of success for patients with CD was not significantly different compared to those without CD at years 1 through 4. However, based on success criteria B, patients with CD had significantly lower cumulative probability of success at years 1 through 4 ( $p < 0.001$ ).

**Conclusions:** Post-trabeculectomy serous choroidal detachment is associated with adverse surgery outcomes. Lower rate of surgery success and higher mean postoperative IOP and glaucoma medications were observed in patients with post-trabeculectomy choroidal detachment.

**Poster No.:** EX1-160

**Panel No.:** 160, **Session:** EX1

**Optic Nerve Head Abnormalities in Non-pathologic High Myopia and the Relationship with Visual Field**

*First Author:* Jingwen **JIANG**

*Co-Author(s):* Xiulan **ZHANG**

**Purpose:** To describe the optic nerve head (ONH) abnormalities in non-pathologic highly myopic eyes based on swept-source

optical coherence tomography (OCT) and the relationship with visual field (VF).

**Methods:** Secondary analysis from a longitudinal cohort study. Highly myopic patients without myopic maculopathy of category 2 or higher were enrolled. All participants underwent swept-source OCT examination focused on ONH. We differentiated between 3 major types (optic disc morphological abnormality, papillary/peripapillary tissue defect, papillary/peripapillary schisis) and 12 subtypes of ONH abnormalities. The prevalence and characteristics of ONH abnormalities and the relationship with VF were analyzed.

**Results:** A total of 857 participants (1389 eyes) were included. Among the 1389 eyes, 91.86% (1276), 68.61% (953), and 34.92% (485) of them had at least 1, 2, or 3 ONH abnormalities, respectively, which corresponded to 29.55% (377 of 1276), 31.79% (303 of 953), and 35.67% (173 of 485) of VF defects, respectively. Among the 12 subtypes of 3 major types, peripapillary hyperreflective ovoid mass-like structure (PHOMS), visible retrobulbar subarachnoid space, and prelaminar schisis were the most common, respectively. Perimetric defects corresponding to OCT abnormalities were more commonly found in eyes with peripapillary retinal detachment, peripapillary retinoschisis, and PHOMS. Glaucoma-like VF defects were more common in eyes with deep optic cup (28.17%, 20 of 71) and with optic disc pit/pit-like change (18.92%, 7 of 37).

**Conclusions:** We observed and clarified the ONH structural abnormalities in eyes with non-pathologic high myopia. These descriptions may be helpful to differentiate changes in pathologic high myopia or glaucoma.



Poster No.: EX1-161

Panel No.: 161, Session: EX1

**Pretreatment with Frequent Topical Betamethasone in Ahmed Glaucoma Valve Implantation**

First Author: Nader **MASSIRI**

Co-Author(s): Kavousnezhad **SARA**, Kourosh **SHEIBANI**, Maryam **YADGARI**

**Purpose:** To evaluate the efficacy of pretreatment with topical betamethasone in Ahmed glaucoma valve (AGV) implantation.

**Methods:** In this randomized clinical trial 62 eyes from 62 patients undergoing AGV were randomly assigned to 2 arms of the study. The case group received AGV implantation with preoperative betamethasone eye drops, and the control group did not receive preoperative betamethasone. Follow-up examinations were performed on postoperative day 1, at least weekly for 4 weeks, and then every 1 to 3 months. Our main outcome measure was the rate of success, defined as intraocular pressure (IOP) < 15 mm Hg and IOP ≤ 18 mm Hg.

**Results:** We analyzed 62 eyes divided to case (n = 33) and control (n = 29) groups. The success rate was significantly higher in the intervention group than in the control group at 12 months postoperatively when considering either IOP < 15 or IOP < 18 mm Hg as success ( $p < 0.001$ ) and also at 6 months when considering IOP < 18 mm Hg as success ( $p < 0.041$ ). The reduction in the number of anti-glaucoma medications used postoperatively was significantly higher in the betamethasone group at follow-up at 1 and 3 months and 1 year.

**Conclusions:** Pretreatment with topical betamethasone in AGV implantations increases the success rate and reduces the need for medications.

Poster No.: EX1-162

Panel No.: 162, Session: EX1

**Real-world Study on Ocular Surface Condition in Patients with Primary Angle Closure and Primary Angle-Closure Glaucoma Before Treatment**

First Author: Jie **YANG**

**Purpose:** This study aimed to investigate the real-world ocular surface condition in primary angle closure (PAC) and primary angle-closure glaucoma (PACG) patients before treatment and evaluate its relationship with disease severity.

**Methods:** We conducted a retrospective analysis of clinical data from a group of PAC and PACG patients. Parameters including age, gender, Ocular Surface Disease Index (OSDI), Schirmer's test, ocular surface comprehensive analysis, confocal microscopy examination, and IL-6 detection. Disease severity was also assessed and correlated with anterior segment condition.

**Results:** A total of 30 PAC, 30 PACG, 20 dry eyes patients, and 30 healthy controls were included. Abnormal anterior segment conditions were commonly observed before treatment. The Schirmer test results in the dry eye group were lower than those in the PAC group, PACG group, and control group.

**Conclusions:** The ocular surface parameters and baseline data of untreated PAC and PACG patients were better than those of the dry eye population but significantly lower than those of the healthy control group. Among them, the ocular surface status of untreated PAC patients was better than that of PACG patients. This suggests that the ocular surface microenvironment of PAC and PACG patients is already in a poor state before the use of intraocular pressure-lowering medications.

**Poster No.:** EX1-163

**Panel No.:** 163, **Session:** EX1

**Single-cell Transcriptomic Atlas of Aging Macaque Ocular Outflow Tissues**

*First Author:* Jian **WU**

*Co-Author(s):* Hongyi **LIU**, Ningli **WANG**

**Purpose:** To elucidate the molecular basis and biological significance of the aging process in TM.

**Methods:** We established a dynamic single-cell transcriptomic landscape of aged macaque TM, wherein we classified the outflow tissue into 12 cell subtypes and identified mitochondrial dysfunction as a prominent feature of TM aging.

**Results:** Our work further demonstrated that silencing the APOE gene could increase migration and reduce apoptosis by releasing the inhibition on the PI3K-AKT pathway and downregulating the expression of extracellular matrix components, thereby increasing the aqueous outflow rate and maintaining intraocular pressure within the normal range. Our work provides valuable insights for future clinical diagnosis and treatment of glaucoma.

**Conclusions:** We found that the APOE gene was an important differentially expressed gene in cluster 0 during the aging process, highlighting the close relationship between cell migration and extracellular matrix regulation, and TM function.

**Poster No.:** EX1-164

**Panel No.:** 164, **Session:** EX1

**The Effect of Early Post Trabeculectomy Bleb Leakage on Surgical Outcome: A Prospective Cohort Study**

*First Author:* Maryam **YADGARI**

*Co-Author(s):* Kavousnezhad **SARA**, Kourosh **SHEIBANI**, Nader **MASSIRI**

**Purpose:** To evaluate the effect of early post-trabeculectomy bleb leakage on the trabeculectomy surgery outcomes and success rate.

**Methods:** The present prospective cohort study was conducted on 203 eyes of 203 patients

who underwent trabeculectomy at Torfeh and Imam Hosein medical centers, Tehran, Iran, between 2016 and 2021. Patients were divided in 2 groups: those patients with early bleb leakage (during the first month postoperative) and those without bleb leakage. The success rate of surgery was compared 12, 18, and 24 months after surgery in the 2 groups. The average intraocular pressure (IOP) and the need for medications in patients 1, 3, 6, 9, 12, 18, and 24 months after the trabeculectomy were also compared.

**Results:** Bleb leakage was detected in 33 eyes during the first month after trabeculectomy (16.3%). The mean decrease in IOP in the group with leakage was significantly lower than in the patients without the leakage in 1, 6, 9, 12, 18, and 24 months after surgery ( $p < 0.05$ ). The need for anti-glaucoma medication was significantly higher among patients with bleb leakage 3 months ( $p = 0.04$ ) and 9 months ( $p = 0.047$ ) after surgery ( $p < 0.05$ ). The success rate 12, 18, and 24 months after surgery was significantly lower in the group with the leakage than the group without the leakage.

**Conclusions:** Our study results suggest that early post-trabeculectomy bleb leakage has a negative effect on surgery success rates. Also, IOP reduction was lower in patients with early leakage.

**Poster No.:** EX1-165

**Panel No.:** 165, **Session:** EX1

**The Effect of the Hypertensive Phase on the Long-term Outcomes of Ahmed Glaucoma Valve Implantation**

*First Author:* Nader **MASSIRI**

*Co-Author(s):* Kavousnezhad **SARA**, Kourosh **SHEIBANI**, Maryam **YADGARI**

**Purpose:** To investigate the long-term effect of the hypertensive phase (HP) on the clinical outcomes of Ahmed glaucoma valve (AGV) implantation.

**Methods:** The records of patients with different etiologies of glaucoma who underwent AGV implantation with at least 3 years of follow-up were retrospectively reviewed. HP was defined

as the IOP > 21 mm Hg during the first 3 months after surgery. The main outcome measure was cumulative success defined as  $5 < \text{IOP} \leq 21$  mm Hg and 20% reduction from the baseline with or without IOP lowering medications. Results that did not achieve cumulative success or underwent glaucoma reoperation during the follow-up period were considered failures. The secondary outcome measures were intraocular pressure (IOP) and the number of glaucoma medications.

**Results:** A total of 120 patients (28 patients with HP, 92 patients without HP) with an average age of  $48.9 \pm 19.6$  years and mean follow-up of  $4.5 \pm 1.4$  years were enrolled. The mean duration of survival was  $5.3 \pm 0.5$  years in the HP group which was significantly shorter than  $6.4 \pm 0.2$  years in non-HP ( $P = 0.04$ ). Mean IOP and number of IOP lowering agents were higher in postoperative visits at 1, 2, 3, and 4 years in HP patients compared with non-HP (all  $P_s < 0.01$ ). Higher baseline IOP was significantly associated with higher rates of surgical failure.

**Conclusions:** In the long-term follow-up, the duration of survival was significantly longer in the non-HP group. In the non-HP group, the failure rate was significantly lower than the HP group.

Poster No.: EX1-166

Panel No.: 166, Session: EX1

### The Role of Primary Needle Revision After Ahmed Glaucoma Valve Implantation

First Author: Maryam YADGARI

Co-Author(s): Kavousnezhad SARA, Kourosh SHEIBANI, Nader MASSIRI

**Purpose:** To evaluate the efficacy and safety of primary needle revision after Ahmed glaucoma valve (AGV) implantation in comparison with glaucoma medication use.

**Methods:** In this interventional case series, 23 eyes of 23 patients who underwent AGV implantation were enrolled. Needle revision was performed when the intraocular pressure was higher than the target pressure before glaucoma medications. Using a 30-gauge needle, the Tenon's capsule over the plate was

incised and the bleb was reformed. Patients were examined on postoperative day 1, weekly (for 4 weeks), and every 1–3 months. Two criteria were used to define cumulative success as a minimum 20% reduction in IOP and  $5 < \text{IOP} \leq 21$  mm Hg (criteria A) or  $5 < \text{IOP} \leq 18$  mm Hg (criteria B) without (complete success) or with (qualified success) glaucoma medication.

**Results:** The mean number of primary needle revisions was  $2.2 \pm 1.6$ . One year postoperatively, the cumulative success rate was 91.4% and 86.9% based on criteria A and B, respectively. The mean preoperative IOP was  $28.26 \pm 8.86$  mm Hg, reaching  $13.78 \pm 3.54$  mm Hg at the end of the 1-year follow-up ( $P < 0.001$ ). The mean preoperative medication significantly decreased from a median of 4 at baseline to 2 after the 1-year follow-up ( $P < 0.001$ ). One patient experienced leakage over the plate, which was successfully treated via conservative management.

**Conclusions:** Primary needle revision is a safe and effective method for controlling IOP after AGV implantation resulting in lower need for medication.

## Intraocular Inflammation, Uveitis & Scleritis

Poster No.: EX1-008

Panel No.: 008, Session: EX1

### Analysis of Clinical Significance of Positive IGRA Test in Uveitis Patients

First Author: Minwoo LEE

Co-Author(s): Hyun Goo KANG

**Purpose:** Among various laboratory tests, interferon gamma releasing assay (IGRA) is performed to diagnose latent tuberculosis and tuberculosis-related uveitis. Since the lifetime prevalence in Korea is higher than other countries, there are concerns about how to interpret results of IGRA. Therefore, we attempted to compile data helpful in establishing a diagnostic plan by analyzing records of uveitis patients who underwent IGRA test.

**Methods:** We retrospectively analyzed the records of 83 IGRA-positive patients between

2019/01 and 2022/01. The results of laboratory tests and records of the progress and diagnosis were analyzed. To compare and analyze the detailed diagnosis between the IGRA-positive and IGRA-negative patients, a chi-square test for the number of patients was used.

**Results:** Of the total 372 patients, 83 (22.3%) were positive for IGRA. Seventeen patients (13.6%) were diagnosed with TB-related uveitis. The cause of uveitis was difficult to estimate in most cases (n = 23, 27.8%), followed by ocular toxocariasis (n = 12, 14.5%). There was significant difference in the chi-square test between the number of ocular toxocariasis in the IGRA-negative group and in the IGRA-positive group (P = 0.02). In t-test analysis, level of toxocariasis Ab-IgG also showed significant difference between IGRA-positive and IGRA-negative patients (P = 0.01). There were 19 cases with past history of pulmonary tuberculosis, and causes of uveitis in these 19 patients were diverse, with no particular tendency.

**Conclusions:** The main meaning of IGRA-positive is thought to relate to tuberculosis history. There seemed to be a strong relationship between ocular toxocariasis and IGRA-positive, so additional theoretical evidence and research is necessary. With abnormal laboratory test results other than IGRA, it would be reasonable to primarily find causes other than tuberculosis-related. Also, even if IGRA-positive without any other abnormal laboratory findings, the patient could be diagnosed as tuberculosis-related after excluding other causes.

**Poster No.:** EX1-009

**Panel No.:** 009, **Session:** EX1

**Azathioprine-induced Alopecia Totalis as an Early Marker of Pancytopenia in Uveitis: A Rare Case**

**First Author:** Reema **BANSAL**

**Co-Author(s):** Prabal **BARMAN**, Sabia **HANDA**, Ankur **JINDAL**

**Purpose:** Azathioprine (AZA) is a commonly used immunosuppressive agent for non-infectious posterior uveitis. However, it may

rarely encounter alopecia totalis soon after its initiation in genetically predisposed patients. We report a case of AZA-induced alopecia totalis and pancytopenia in a child with panuveitis.

**Methods:** A 13-year-old girl had bilateral panuveitis. Fluorescein and indocyanine green angiography showed bilateral choroidal granulomas. She had cushingoid facies due to prior oral corticosteroid therapy. With a diagnosis of presumptive ocular sarcoidosis, oral corticosteroids were started. As steroid sparing agents, methotrexate (15 mg/week) and azathioprine (100 mg/day) were started after a normal baseline hemogram (Hb 13.2 gm/dL, TLC 12000/cumm, platelets 3,10,000/cumm).

**Results:** Panuveitis resolved. However, 2 weeks after starting AZA, she presented with complete loss of hair (alopecia totalis), with hyperpigmentation of knuckles. Hemogram revealed Hb 8.6 gm/dL, TLC 1700/cumm, and platelets 25,000/cumm. AZA was stopped. Injection G-CSF 300 µg was given for 2 weeks. Mycophenolate mofetil was added. NUDT15 mutation study revealed homozygous variant. Normalization of hemogram was seen over 1 month (Hb 12 gm/dL, TLC 10440/cumm, platelets 1,99,000/cumm). Reversal of hair loss and knuckle pigmentation was seen as early as 2 weeks (figures 1 and 2). At 5 months, there was complete recovery of scalp hair with normal hemogram and resolution of panuveitis, on methotrexate and mycophenolate.

**Conclusions:** This case highlights the importance of AZA-induced alopecia totalis as an early marker of myelosuppression in genetically predisposed patients, and cautions uveitis specialists to recognize early clinical clues before the dreaded complication of pancytopenia.



Poster No.: EX1-010

Panel No.: 010, Session: EX1

### Choroidal Thickness Changes Determined by EDI-OCT in Patients with Unilateral CMV Anterior Uveitis

First Author: Oyunzaya **LUVSANTSEREN**

**Purpose:** To evaluate the choroidal thickness changes in patients with CMV positive unilateral anterior uveitis.

**Methods:** We reviewed 11 patients with unilateral CMV iritis who presented from 2012 to 2017. The affected eye was the study eye and the fellow eye of same patient was the control eye. All patients were diagnosed of CMV iritis by PCR from aqueous sampling. We compared the subfoveal choroidal thickness (SFCT) during the active phase and the remission phases of uveitis by using enhanced depth imaging–spectral domain optical coherence tomography (EDI-OCT). Remission phases were performed at months 6 and 12 after the initiation of antiviral treatment.

**Results:** The mean age of all the 11 patients was  $49.45 \pm 9.75$  years (range, 34 to 68 years). Majority of the patients were male consisting of 63.63% (7 patients). During the active phase, the mean subfoveal choroidal thicknesses in the study eye and control eye were  $287.89 \pm 78.65$  and  $289.75 \pm 76.02$  ( $p > 0.05$ ), respectively. In the remission phase, the mean subfoveal choroidal thickness of study eyes and control eyes were at 6 months  $269.56 \pm 80.73$  and  $287.15 \pm 76.15$  ( $p > 0.05$ ) and at 12 months  $264.68 \pm 65.88$  and  $281.18 \pm 68.89$  ( $p > 0.05$ ), respectively. We also observed that the decreases of uveitis activity were correlated to improvement of visual acuity.

**Conclusions:** In CMV positive unilateral anterior uveitis, the choroidal thickness of the study eye and control eye were almost equal in the active phase, but the study eyes were found to be thinner than control eyes in the remission phase. Choroidal thickness seems not a good indicator for disease activity in CMV iritis patients.

Poster No.: EX1-011

Panel No.: 011, Session: EX1

### Clinical Characteristics of Syphilitic Uveitis at a Referral Hospital in Japan

First Author: Wataru **MATSUMIYA**  
Co-Author(s): Naoki **FUKUSHIMA**, Sentaro **KUSUHARA**, Makoto **NAKAMURA**, Rei **SOTANI**

**Purpose:** This study aims to report the clinical features of syphilitic uveitis at Kobe University Hospital in Japan.

**Methods:** A retrospective analysis was conducted on clinical records of 12 cases involving 21 eyes of patients diagnosed with syphilitic uveitis at our hospital between April 2014 and April 2023. The clinical characteristics and disease progression were investigated.

**Results:** The mean age was 44 years, and all cases were male. HIV antibody positivity was observed in 3 cases (25%). The distribution of uveitis types was anterior uveitis in 1 eye (5%), posterior uveitis in 13 eyes (59%), and panuveitis in 7 eyes (32%). The annual distribution at the time of diagnosis was as follows: 2014-2016: 1 case (8%), 2017-2019: 6 cases (50%), 2020-2023: 5 cases (42%). The most common ocular findings were papillitis and retinal vasculitis, each seen in 10 eyes (45%), followed by acute syphilitic posterior placoid chorioretinitis (ASPPC) in 7 eyes (32%) (with overlap). Out of the 12 cases, 19 eyes received treatment at our hospital, including intravenous penicillin G in 8 cases (73%), oral amoxicillin in 2 cases (18%), and intravenous ceftriaxone in 1 case (9%). One eye underwent vitreous surgery for diagnostic purposes. At the final follow-up after treatment, visual acuity was 1.0 or better in 17 eyes (89%) and 0.1 or worse in 1 eye (5%).

**Conclusions:** Syphilitic uveitis has shown an increasing trend in recent years; however, early treatment offers a high possibility of maintaining visual acuity. ASPPC, a finding in syphilitic uveitis, is not rare and requires attention.

Poster No.: EX1-012

Panel No.: 012, Session: EX1

## Clinical Features, Long-term Outcomes, and Prognostic Factors of Eales' Disease in Korean Patients

First Author: Min **KIM**

Co-Author(s): Youngje **CHOI**, Seung Min **LEE**

**Purpose:** We documented the clinical features and long-term outcomes in Korean patients with Eales' disease and analyzed its association with tuberculosis (TB), given South Korea's high TB burden.

**Methods:** We retrospectively reviewed the medical records of 75 patients (106 eyes) diagnosed with Eales' disease and treated between September 2005 and April 2021.

**Results:** Among 106 eyes, the average age of diagnosis was 39.28 years, with 82.7% male and 58.7% having unilateral involvement. Patients who underwent vitrectomy showed greater long-term improvement in visual acuity ( $P = 0.047$ ), while those with glaucoma filtration surgery showed less improvement ( $P = 0.008$ ). Having glaucoma through disease progression was associated with poor visual outcomes (odds ratio = 15.556,  $P < 0.02$ ). Twenty-seven out of 39 patients (69.23%) who underwent IGRA screening tested positive for TB.

**Conclusions:** In Korean patients with Eales' disease, we observed male predominance, unilateral presentation, older age of onset, and a link with TB. Timely diagnosis and management before the disease advances to stage 4 with glaucoma are crucial for maintaining good vision in patients with Eales' disease.

Poster No.: EX1-013

Panel No.: 013, Session: EX1

## Clinical Outcomes in Managing Macular Edema in Patients with Non-infectious Uveitis Treated with Suprachoroidal Injections of Triamcinolone Acetonide Suspension: A Post-hoc Analysis of a Phase III Study

First Author: Raymond **WONG**

Co-Author(s): Jackie **KAM**, Barry **KAPIK**, Qing **LIU**, Eddy **WU**

**Purpose:** PEACHTREE [NCT02595398] was the clinical study evaluating suprachoroidal injections of triamcinolone acetonide suspension (SCS-TA) for treating macular edema (ME) associated with noninfectious uveitis (NIU). This post-hoc analysis aims to evaluate whether baseline disease characteristics impact the efficacy of SCS-TA.

**Methods:** 160 eligible patients were randomized to receive SCS-TA or a sham procedure in a 3:2 ratio. Patients received SCS-TA at day 0 and week 12. Best-corrected visual acuity (BCVA) and central subfield thickness (CST) were evaluated every 4 weeks. Changes in BCVA and CST based on the disease categories, time since NIU diagnosis, time since ME diagnosis, NIU disease onset, and NIU duration were analyzed by t-test and ANOVA model for each visit and between treatments at week 24.

**Results:** At week 24, a shorter time since ME diagnosis ( $\leq 71$  days) and a shorter NIU duration ( $\leq 3$  months) led to statistically significant improvements in BCVA than a longer time since ME diagnosis (15.5 versus 8,  $p = 0.024$ ) and a longer NIU duration (19.6 versus 12.4,  $p = 0.048$ ), respectively. Non-significant trends were also observed in BCVA improvement related to time since NIU diagnosis and in CST improvement related to time since ME diagnosis.

**Conclusions:** SCS-TA demonstrated significant improvements from baseline in BCVA and CST in all groups at all visits, with non-significant trends that earlier diagnosis and shorter disease duration may lead to better improvements, suggesting earlier treatment upon diagnosis.

Poster No.: EX1-014

Panel No.: 014, Session: EX1

### Development and Validation of Novel Retina Biomarkers and Artificial Intelligence Models for Behçet Disease Uveitis Prediction

First Author: Ao **LU**

Co-Author(s): Keyan **LI**, Guannan **SU**, Peizeng **YANG**, Xinle **ZHANG**

**Purpose:** The aim of this study was to create quantitative diagnostic biomarkers and artificial intelligence (AI) models for the prediction of Behçet disease uveitis (BU), a condition currently lacking such markers.

**Methods:** Fifty-seven OCTA scan of 33 BU patients and 59 OCTA scans of 35 healthy people were captured between December 2021 and January 2022 (derivation cohort). We extracted 837 radiomic features (RFs) from each scan and subjected them to a specially designed feature engineering iteration. The engineered RFs were used for the final AI modeling and clinical data were used to boost the performance of the model, which were further validated using 47 OCTA scans from 29 BU patients and 46 OCTA scans from 26 healthy individuals (temporal validation cohort).

**Results:** From the 837 radiomic features derived from the OCTA scans, the top 20 features were utilized for AI modeling. The neural network (NN) model displayed the highest area under the receiver operating characteristic curve (AUC) of 0.995 in the training set. The integration of clinical data further enhanced the model's performance, leading to an AUC of 0.908 in the temporal validation cohort.

**Conclusions:** Our research indicates that the radiomic score (RS) and the clinical integrated score (IS) can function as independent diagnostic biomarkers for BU. The developed AI models offer promising potential for clinical and translational research, representing a step towards addressing the need for quantitative imaging biomarkers in BU diagnosis. However, more validation and assessment are essential to ascertain their practical use in clinical scenarios.

Poster No.: EX1-015

Panel No.: 015, Session: EX1

### Enigmatic Subretinal Lesion Presenting with Bullous Retinal Detachment and Its Management

First Author: Raj Shri **HIRAWAT**

Co-Author(s): Nagesha **CHOKKAHALLI**, Prakhar **SINGHAI**

**Purpose:** To illustrate diagnosis and management of a large subretinal abscess of presumed tubercular origin and its resolution with treatment. The case highlights diagnostic dilemma and slow but complete response to the treatment.

**Methods:** An adolescent girl was evaluated for sub-acute loss of vision in her left eye to counting fingers. Examination revealed minimal anterior segment non-granulomatous inflammation. Fundus showed exudative total bullous retinal detachment with a 3-clock hour area of large subretinal yellow lesion in the supero-temporal periphery. She was investigated for granulomatous inflammation including radio imaging to rule out mass lesions or secondary deposits.

**Results:** Her Mantoux and Tb gold tests were positive and radio imaging ruled out solid pattern mass in eye/orbit and brain. ATT was started followed by steroids with a diagnosis of a presumed tubercular abscess. Over 6 months, the lesion regressed with localized subretinal fibrosis and exudation cleared improving vision to 6/6.

**Conclusions:** Subretinal mass lesions in young patients need thorough evaluation to rule out infections and mass lesions including secondaries. The tubercular abscess should be one among the differentials which can present with bullous RD as in the present case.

**Poster No.:** EX1-016

**Panel No.:** 016, **Session:** EX1

### Evaluating Intravitreal Dexamethasone Implants in Non-infectious Uveitis

*First Author:* Ayushi **CHOUDHARY**  
*Co-Author(s):* Ankush **KAWALI**, Padmamalini **MAHENDRADAS**, Aditya **PATIL**, Radhika **SRIRAM**

**Purpose:** To evaluate the efficacy of intravitreal dexamethasone implant (Ozurdex) in the treatment of various non-infectious uveitic pathologies.

**Methods:** Retrospective interventional study. The efficacy of dexamethasone implant in non-infectious uveitis was analyzed in terms of control of inflammation (vitreous haze), central retinal thickness (CRT), and visual outcome as best-corrected visual acuity (BCVA) along with its possible side effects like intraocular pressure (IOP) spike, cataract progression, etc.

**Results:** Forty eyes of 34 patients (range, 13-80 years) were included. The most common anatomical presentation was posterior uveitis (42.5%) followed by panuveitis (40%). Following the intravitreal Ozurdex implant, the improvement in BCVA, reduction in CRT, and vitreous haze were analyzed at the first, fourth, and sixth months post-injection. BCVA significantly improved during the first month ( $\log\text{MAR } 0.42 \pm 0.51$ ,  $p = 0.013$ ). The CRT showed significant improvement at the first month post-injection (mean  $324.04 \pm 195.7 \mu\text{m}$ ,  $p = 0$ ) and persisted up to six months ( $402.78 \pm 183.37$ ,  $p = 0.006$ ). A significant reduction of vitreous haze was seen in the first and fourth post-injection months ( $p = 0$ ,  $p = 0.008$ ). Of the 34 patients, 9 received more than 1 injection with an interval of 3 to 11 months between 2 injections. Raised intraocular pressure as a complication was present in 32.5% ( $n = 13$  eyes) who were managed with anti-glaucoma medications.

**Conclusions:** Intravitreal dexamethasone implant can be considered as an option in cases of non-infective uveitis requiring long-term oral steroids along with appropriate immunomodulatory therapy.

**Poster No.:** EX1-017

**Panel No.:** 017, **Session:** EX1

### Managing Vogt-Koyanagi-Harada Syndrome with Human Immunodeficiency Virus: A Dual Battle Between Immunosuppression and Immune Support

*First Author:* Twinkey **BHUTIA**  
*Co-Author(s):* Manabjyoti **BARMAN**, Subham **SINHA ROY**

**Purpose:** This case explores the intricate management of a 33-year-old male from North East India presenting with Vogt-Koyanagi-Harada syndrome (VKH) while concurrently battling human immunodeficiency virus (HIV), chronic liver disease, autoimmune thyroiditis, hearing impairment, alopecia totalis, and skin issues. The purpose is to shed light on the challenges faced by ophthalmologists when treating VKH in immunocompromised individuals and emphasize the need for a delicate balance between immunosuppression and immune support.

**Methods:** A comprehensive clinical evaluation was conducted, encompassing visual acuity assessment, slit lamp exam, intraocular pressure (IOP) measurement, fundus fluorescein angiography, and optical coherence tomography. Blood investigations, including complete blood count, liver function tests, CD4 count, and viral load assessment, were performed to guide treatment decisions.

**Results:** On presentation, the patient showed severe visual impairment with occlusio pupillae, hyperemic discs, and exudative retinal detachment in both eyes. VKH was diagnosed alongside HIV, chronic liver disease, and autoimmune thyroiditis. High dose steroids and immunomodulators were initiated, leading to significant visual improvement and resolution of retinal detachment. Surgical peripheral iridectomy was performed for secondary glaucoma. Visual acuity improved further, hair regrowth was observed, and inflammation subsided; however, CD4 count dropped significantly from 791 to 176 during treatment.

**Conclusions:** Managing VKH with concurrent HIV infection requires a delicate balance



between immunosuppression for VKH and immune support for preventing opportunist infections in HIV. Such a rare and complex scenario underscores the challenges faced by ophthalmologists and the importance of interdisciplinary collaboration, further research, and scientific discourse to refine treatment strategies and strike the right equilibrium between preserving vision and safeguarding the immune system.

Poster No.: EX1-018

Panel No.: 018, Session: EX1

### Ocular Manifestations and Diagnosis of Tuberculosis Involving the Uvea: A Case Series

First Author: Rachel **CHEUNG**

Co-Author(s): Stephanie **POON**, Jennifer **TSUI**

**Purpose:** Ocular tuberculosis (TB) affects 1-2% of patients with TB, with TB uveitis being the most common. This series aims to look at different manifestations of tuberculosis associated uveitis and the tests to make a diagnosis.

**Methods:** Patients diagnosed with TB related uveitis in Hong Kong from 2017-2020 were reviewed. Demographics, clinical features, investigations, and treatments were collected.

**Results:** Fifteen eyes in 10 patients with a mean age of  $57.30 \pm 10.17$  years were included. The ocular manifestations on presentation included anterior uveitis (50%), posterior uveitis (40%), and panuveitis (10%), where 70% were unilateral and 30% were bilateral; on subsequent visits the manifestations further developed into posterior uveitis (40%), panuveitis (40%), and anterior uveitis (20%), where 50% were unilateral and 50% bilateral. Tuberculosis tests were positive in 5 of 7 Mantoux tests, 4 of 4 T-SPOT TB tests, 3 of 4 QuantiFERON-TB gold tests, 1 of 1 lymph node biopsy, and 0 of 9 chest X-rays (CXR). Vision impairing complications occurred in 6 patients, with retinal vasculitis most common. With anti-TB treatment prescribed in 9 patients, side effects occurred in 5 patients, including ocular hypertension, disc swelling, and hepatitis.

**Conclusions:** Ocular TB may have various manifestations, and bilateral involvement is common. When suspected, diagnostic confirmation requires multimodal investigations where a negative CXR is not useful in ruling out ocular TB, especially in an endemic region like Hong Kong. In these patients, it is crucial to have a high index of suspicion for TB, even when they do not demonstrate classical respiratory signs and symptoms of TB.

Poster No.: EX1-019

Panel No.: 019, Session: EX1

### Revealing Academic Evolution and Frontier Pattern in the Field of Uveitis Using Bibliometric Analysis, Natural Language Processing, and Machine Learning

First Author: Ao **LU**

Co-Author(s): Keyan **LI**, Guannan **SU**, Peizeng **YANG**

**Purpose:** Thousands of uveitis articles have been published in this century, underneath which hides valuable intelligence. We aimed to characterize the evolution and patterns in the field of uveitis using a combined technique of bibliometric analysis, natural language processing (NLP), and multiple machine learning (ML) algorithms.

**Methods:** A total of 15,994 uveitis papers were divided into 4 consecutive time periods for bibliometric analysis via data mining facilitating tools (Bibliometrix, VOSviewer, and Citespace). Papers in the latest period were analyzed using AI techniques including latent Dirichlet allocation (LDA) topic modeling, naive Bayes (NB), logistic regression (LR), neural network (NN), support vector machine (SVM), and kernel SVM.

**Results:** The yearly uveitis publication pattern in this century fitted the curve:  $1.21335x^2 - 4848.95282x + 4844935.58876$  ( $R^2 = 0.98311$ ). Fourteen optimal LDA topics were identified. The USA, the most productive country/region and the highest h-index holder, focused on topics related to ankylosing spondylitis, uveitis complications, biologic therapy, and molecular mechanisms, whereas China (mainland) focused on topics related to OCT, Behcet/Vogt-

Koyanagi-Harada disease, retina/vitreous, and molecular mechanisms. In ML test sets, the NB model presented the highest AUC (0.688), followed by LR (0.677) and NN (0.606), among which the LR had the best accuracy (71.6%).

**Conclusions:** In this century, a continuously growing number of countries/regions/authors/journals are involved in the study of uveitis, promoting the scientific output and thematic evolution in this field. Our study, for the first time, characterized the academic evolution and revealed the frontier patterns in the field of uveitis using a combined technique of bibliometric analysis, NLP, and multiple ML algorithms.

**Poster No.:** EX1-020

**Panel No.:** 020, **Session:** EX1

**Suprachoroidal Injections of Triamcinolone Acetonide Suspension in Patients with Non-infectious Uveitis Complicated by Macular Edema: First in Asia Real-world Case Report**

*First Author:* Chun Sum **PANG**

*Co-Author(s):* Nicholas **FUNG**, Jackie **KAM**, Qing **LIU**, Eddy **WU**

**Purpose:** Suprachoroidal injections of triamcinolone acetonide suspension (SCS-TA) received approval for clinical use by the U.S. Food and Drug Administration in 2021, for treating uveitic macular edema (UME). Earlier usage of SCS-TA in Hong Kong was enabled through a named-patient program. This case report aims to interpret the pilot results of local usage.

**Methods:** A total of 3 eyes in 2 patients were treated with SCS-TA since 2022 September. The baseline characteristics of best-corrected visual acuity (BCVA) and central subfield thickness (CST) were measured when receiving SCS-TA and followed in a monthly manner. The post-injection results were reported for a better understanding of the efficacy and safety issues.

**Results:** Among the 3 treated eyes, SCS-TA controlled uveitis and patients needed not to have any rescue treatment for 9 months in 2 eyes, and for 7 months in another eye. CMT and BCVA demonstrated significant

improvements for all patients, in which the BCVA improvement was observed as early as 1 week after the injection in 1 of the eyes. Concomitant use of topical steroids was stopped after the injection.

**Conclusions:** SCS-TA is a straightforward method with a low learning curve to introduce steroids into the suprachoroidal space. The short-term efficacy can be observed after 1 week. The preliminary data suggested long-term benefits and durability of SCS-TA in managing UME.

**Poster No.:** EX1-021

**Panel No.:** 021, **Session:** EX1

**'Juxtapapillary' Serpiginous-like Choroiditis: A Distinct and New Phenotype of Ocular Tuberculosis Predisposing to Anterior Scleritis**

*First Author:* Reema **BANSAL**

*Co-Author(s):* Amod **GUPTA**, Vishali **GUPTA**

**Purpose:** Serpiginous-like choroiditis (SLC) and anterior scleritis are 2 independent signs of ocular inflammation, with SLC having a predominantly tubercular etiology, and anterior scleritis an autoimmune background. Their sequential occurrence in the same eye, treated for ocular tuberculosis (TB), has not been reported. We report phenotypic features of eyes which developed anterior scleritis following treatment for SLC.

**Methods:** Retrospective review of 7 patients (11 eyes) who received anti-tubercular therapy (ATT) for SLC in a tertiary eye center.

**Results:** Anterior scleritis developed after SLC healed in 6 patients (within a range of 5 months to 17 years), and with SLC in 1 patient. Mean age was  $33.86 \pm 14.02$  years (4 males, 3 females). Nine eyes (6 patients) had placoid and 2 eyes (1 patient) multifocal SLC lesions. SLC lesions were juxtapapillary in 9 eyes, involving macula in all.

**Conclusions:** Juxtapapillary SLC with placoid macular lesions may represent a distinct phenotype of ocular TB, with an increased predisposition to anterior scleritis. It may suggest Mycobacterium tuberculosis (MTB)

sequestration within the eye, rather than an immune-mediated hypersensitivity reaction. Considering the contiguous involvement of optic disc, retinoblastoma, and sclera in sequential pattern, it needs to be explored by histopathological or molecular methods whether the dormant MTB remains harbored within the retinal pigment epithelium or sclera in between the episodes of choroiditis and scleritis.

### Ocular Imaging (APOIS)

Poster No.: EX1-167

Panel No.: 167, Session: EX1

#### Are Current Data Augmentation Approaches for Ophthalmological Imaging Model Refinement Truly Results-reassuring and Applicability-beneficial?

First Author: Carolyn Yu Tung **WONG**  
Co-Author(s): Pearse **KEANE**, Timing **LIU**, Ciara **O'BYRNE**, Priyal **TARIBAGIL**

**Purpose:** By reviewing data augmentation (DA) approaches in different ophthalmic imaging modalities, we discuss shortcomings of current DA selection approaches and propose indicators to ensure applicable and optimally performing DA selection.

**Methods:** Literature search was performed in PubMed on 30/4/2023, using keywords "data augment" and "OCT eye image"; "data augment" and "adaptive optics retinal imaging"; "data augment" and "slit lamp image"; "data augment" and "external eye image"; "data augment" and "microscopy eye". Studies were manually screened via abstract or full text. English articles with full text were included. Reviews, editorials, and case reports were excluded. Fourteen relevant studies were included.

**Results:** Both simple and advanced DA techniques were advantageous for training high-performance classifiers and segmentation models in analyses of higher-resolution adaptive optics scanning laser ophthalmoscope and corneal confocal microscopy imaging, alongside lower-resolution anterior segment

and optical coherence tomography imaging. Despite the exhibited model potency achieved with DA, the inadequate theoretical reasoning, insufficient quality control, and limited dimensionality in DA-specific profitability establishment have made reported DA benefits a proof-of-concept without reassuring evidence of resultant quality and size incrementation being optimal and practical. To translate DA benefits to real-world models, it is best to select DA techniques with context knowledge guidance. Context knowledge includes model intent, imaging attributes, primary dataset struggles, and economic expectations. They are indicators of DA's sufficiency in training enhancement and carry variable weights in DA selection process in a context-based manner.

**Conclusions:** DA's improvements to training exhibited limited practicability and reliability. Future research is warranted to explore DA method's applicability in a context-guided approach.

Poster No.: EX1-168

Panel No.: 168, Session: EX1

#### Assessment of Mild Cognitive Impairment via a Retinal Imaging-based Deep Learning Model

First Author: Yau Ho Herbert **HUI**  
Co-Author(s): Carol **CHEUNG**, Xiao Yan **HU**, Vincent **MOK**, Emma Anran **RAN**

**Purpose:** The recent accelerated approval of 2 amyloid beta-directed antibodies by the FDA signifies a paradigm shift in the management of early Alzheimer's disease (AD), and highlights the importance of detecting mild cognitive impairment (MCI), a clinical precursor stage of AD. This study evaluated the performance of our established AD detection deep learning (DL) model on recognizing subjects with MCI based on retinal imaging.

**Methods:** In this study, we collected 1365 pairs of optic nerve head (ONH)-centered and macula-centered retinal photographs of both eyes from 80 clinically diagnosed MCI patients (with CDR scale questionnaire, MMSE, MoCA, and a standard neuropsychological battery). All images were input into our DL model trained

with paired ONH- and macula-centered retinal photographs from AD-dementia or cognitively normal subjects only, without including MCI patients. A score ranging from 0 and 1 (0: AD-dementia, 1: no dementia) was output for each image pair. The cutoffs for the binary classification were determined by the largest Youden index during 5-fold cross-validation in the primary dataset.

**Results:** The model exhibited promising performance in detecting MCI patients as AD. On a subject level, where a patient is considered to be identified as AD if the model output a score lower than the respective cutoffs for any of the patient's image pairs, the 5-folds demonstrated accuracies of 76.3%, 38.8%, 95.0%, 85.0%, and 88.8%, respectively.

**Conclusions:** This study demonstrated the potential application of our model in the detection of MCI. Further work could be conducted to train an MCI-specific model to improve its performance in early AD screening.

**Poster No.:** EX1-169

**Panel No.:** 169, **Session:** EX1

### Association Between Alzheimer's Disease and Artificial Intelligence-based Glaucomatous Optic Neuropathy Score

*First Author:* Victor **CHAN**

*Co-Author(s):* Christopher Li-hsian **CHEN**, Vincent **MOK**, An Ran **RAN**, Xi **WANG**

**Purpose:** Previous studies have suggested a possible link between Alzheimer's disease (AD) and glaucoma, but the evidence remains inconsistent. We aimed to assess the association between AD and glaucomatous optic neuropathy (GON) using artificial intelligence (AI) predicted continuous scores from optical coherence tomography (OCT) volumetric scans.

**Methods:** This study included 2,269 volumetric optic disc OCT scans measured with Cirrus HD-OCT (Carl Zeiss Meditec, Dublin, CA) from 440 eyes of 233 AD subjects and 1,158 OCT scans from 271 eyes of 136 cognitively normal subjects. GON score was calculated from OCT scan using a validated AI deep-learning

algorithm. GON score was a continuous variable ranging from 0 to 1, and a higher score represented a higher probability of GON. Retinal nerve fiber layer (RNFL) thicknesses were also assessed.

**Results:** There was no significant difference in AI-based GON scores between AD and cognitively normal subjects ( $0.28 \pm 0.31$  vs  $0.30 \pm 0.33$ ,  $p = 0.20$ ). However, AD subjects had significantly thinner RNFL thickness on average ( $85.97 \pm 17.65 \mu\text{m}$  vs  $90.35 \pm 13.71 \mu\text{m}$ ,  $p < 0.001$ ) and in all quadrants ( $p < 0.001$ ). After adjusting for age and image signal strength, the association between AD and AI-based GON predicted scores was insignificant ( $p = 0.199$ ). AD was only weakly and inversely associated with RNFL average ( $R = -0.125$ ,  $p < 0.001$ ), temporal ( $R = -0.174$ ,  $p < 0.001$ ), and inferior ( $R = -0.103$ ,  $p < 0.001$ ) thicknesses.

**Conclusions:** Although AD subjects had thinner RNFL thickness than cognitively normal subjects, AD was not associated with AI-based GON score.

**Poster No.:** EX1-170

**Panel No.:** 170, **Session:** EX1

### Code-free Deep Learning for Angle Closure Detection in Anterior Segment Optical Coherence Tomography Images

*First Author:* Hin Yin **CHAN**

*Co-Author(s):* Eric Ka Ho **CHOY**, Chak Fung **NG**, Ruyue **SHEN**, Clement **THAM**

**Purpose:** Primary angle-closure glaucoma (PACG) is a major cause of blindness in Asia. This study aims to develop code-free deep learning (CFDL) models for angle-closure detection from anterior segment optical coherence tomography (AS-OCT) images, while comparing the usability of different CFDL platforms for model development.

**Methods:** 1900 anterior chamber angle (ACA) images (1130 open-angle and 770 angle-closure) were collected from 272 eyes of 185 subjects using AS-OCT. 1515 and 385 ACA images were used for model training and testing, respectively. Deep learning models were trained on 4 CFDL platforms: Amazon,



Apple, Baidu, and Google. Usability of CFDL platforms was evaluated by model performance and the number of significant platform features available. Model performance was evaluated by area under precision-recall curve (PR-AUC), sensitivity, and specificity. Nine platform features such as confusion matrix generation were highlighted as significant for model development. Numbers of significant features available on each platform were counted.

**Results:** The platforms with highest model performances were Amazon and Google, compared with other CFDL platforms. Amazon achieved an overall PR-AUC of 1.000, with 100% sensitivity and 100% specificity. Google achieved an overall PR-AUC of 1.000, with 99.5% sensitivity and 99.5% specificity. Google offered the highest number of significant features among platforms, with 7 out of 9 significant features available.

**Conclusions:** The CFDL models could detect angle-closure with high accuracy and reliability. These models could be deployed to support angle-closure screening, triage for specialist evaluation, and prompt treatment.

Poster No.: EX1-171

Panel No.: 171, Session: EX1

**Comparison of Bleb Morphologies Between Phacoemulsification Combined with Ex-PRESS Minishunt Implantation, Phacotrabeculectomy, and Trabeculectomy Alone: A 2-year Retrospective In Vivo Confocal Microscopy Study**

First Author: Hongyang ZHANG

Co-Author(s): Yuqiao ZHANG

**Purpose:** To compare the bleb morphologies of phacoemulsification combined with Ex-PRESS implantation (Phaco-ExPRESS), phacotrabeculectomy (Phaco-Trab), and trabeculectomy (Trab) in postoperative 2 years.

**Methods:** Patients with primary open-angle glaucoma (POAG) coexisting cataract or not were included in this study. All patients underwent surgeries of Phaco-ExPRESS, Phaco-Trab, or Trab. The morphologic structures of the filtering bleb, including microcysts

area, hyperreflective dot density, and stromal connective tissue under in vivo confocal microscope (IVCM) were compared between the 3 groups. The data were collected preoperatively and postoperatively at 2 weeks, 1 month, 3 months, 6 months, 12 months, 18 months, and 24 months.

**Results:** A total of 89 eyes of 89 patients were enrolled, including 32 in the Phaco-ExPRESS group, 25 in the Phaco-Trab group, and 32 in the Trab group. In 24-month follow up, bleb morphologies in Phaco-ExPRESS were similar to the Trab group. The area of epithelial microcysts was significantly increased in the Phaco-ExPRESS and Trab groups while significantly decreased in Phaco-Trab. At postoperative 24 months, the complete success rate was 65.1% in Phaco-ExPRESS, 32.0% in Phaco-Trab, and 59.4% in the Trab group ( $P = 0.03$ ). The Phaco-Trab group had more postoperative anti-glaucoma medications than the other 2 groups ( $P < 0.05$ ).

**Conclusions:** The Phaco-ExPRESS group and Trab group had similar bleb morphologies in IVCM, with larger microcysts area, looser connective tissue, and less inflammation than Phaco-Trab, indicating that the function of blebs in the Phaco-ExPRESS and Trab group were more potent than that of Phaco-Trab. All these surgical methods provided adequate IOP control, but Phaco-Trab required more anti-glaucoma medications.

Poster No.: EX1-172

Panel No.: 172, Session: EX1

**Comparison of Image Quality of Retinal Photographs Captured by 2 Non-mydratric Fundus Cameras**

First Author: Anni LING

Co-Author(s): An Ran RAN, Kaiser SHAM

**Purpose:** To compare the image quality (gradable vs ungradable) of retinal photographs captured by 2 non-mydratric fundus cameras.

**Methods:** Macula-centered and optic nerve head (ONH)-centered retinal photographs from both eyes were captured for 104 subjects (age  $63.41 \pm 14.54$  years old; 49 female and

55 male) without pharmacological dilation in a dark room. Each subject underwent retinal photography using 2 non-mydratric fundus cameras (Topcon Triton DRI-OCT with 45-degree and Topcon NW500 with 50-degree). We evaluated and reported the image quality with a validated AI algorithm and manual grading, respectively.

**Results:** We collected a total of 832 images from 2 groups (416 from the Triton group and 416 from the NW500 group, respectively). In the Triton group, the percentage of gradable images evaluated by the AI algorithm and manual grading was 63.70% and 51.92%, respectively. In the NW500 group, the percentage of gradable images of evaluated by the AI algorithm and manual grading was 99.76% and 99.04%, respectively. For subjects over 60 years old (72.12% of the cohort), the percentage of gradable images evaluated by the AI algorithm and manual grading was 55.67% and 44.67% in the Triton group, 99.67% and 98.67% in the NW500 group, respectively.

**Conclusions:** Topcon NW500 can capture a higher percentage of gradable images, especially among those over 60 years old. Further study is required to verify its capability with larger sample size, particularly among subjects with small pupils and cataracts.

**Poster No.:** EX1-173

**Panel No.:** 173, **Session:** EX1

**Complications of Retinal Racemose Hemangioma**

*First Author:* Xuejiao **QIN**

*Co-Author(s):* Yanyan **CUI**, Shaohua **LIU**

**Purpose:** To find the common complications related to retinal racemose hemangioma (RRH).

**Methods:** RRH is a rare congenital disorder that often co-occurs with other ocular complications. Fundus examination, fluorescein angiography, and optical coherence tomography are used to make diagnosis. Reports of publications of ocular complications or associations with RRH were searched and analyzed.

**Results:** Retinal vein occlusion and macular edema were detected in a patient identified

as group 3 RRH. A total of 140 papers describing 167 RRH cases were found. The mean age of diagnosis was 22.97 years. Ocular complications were mentioned in 32 (19.16%) cases. Retinal vein occlusion (46.88%) was the major ocular complication in RRH, followed by hemorrhage (34.38%). Eight (4.79%) cases were associated with other ocular diseases such as Sturge-Weber syndrome, morning glory disc anomaly, and macroaneurysm.

**Conclusions:** Although RRH is a relatively non-progressive condition, its complications may lead to vision loss and should be treated in a timely manner.

**Poster No.:** EX1-174

**Panel No.:** 174, **Session:** EX1

**In Vivo Confocal Microscopy Predicts Cytomegalovirus as the Cause of Chronic or Recurrent Anterior Uveitis Among Chinese**

*First Author:* Stephanie Hiu-wai **KWOK**

*Co-Author(s):* Ka Wai **KAM**, Eugenie **MOK**, Alvin **YOUNG**

**Purpose:** To evaluate and compare endothelial features by in vivo confocal microscopy (IVCM) in Chinese eyes with chronic or recurrent anterior uveitis with and without cytomegalovirus (CMV).

**Methods:** A double-masked, prospective cohort study at a tertiary eye clinic.

**Results:** Thirty eyes of 30 subjects were analyzed. Fifteen eyes (50%) were CMV positive, while 15 eyes were negative for herpes simplex, varicella zoster virus, and CMV. Absence of pseudoguttata was the strongest, independent risk factor for CMV (OR 34.53, 95% CI: 1.84-648.02,  $p = 0.018$ ), followed by severe iris depigmentation (OR 31.45, 1.02-965.81,  $p = 0.048$ ) and low corneal endothelial cell density (ECD) (OR 14.79, 1.14-191.30,  $p = 0.039$ ) on univariable regression. All 3 remained statistically significant after adjustment. The combination of absence of pseudoguttata and low ECD on IVCM achieved a similar predictive value as iris depigmentation examination.

**Conclusions:** Absence of pseudoguttata on IVCM was an independent predictor of

positive CMV detection after adjusting for iris depigmentation and corneal endothelial cell density. The addition of this feature to severe iris depigmentation and low corneal ECD can increase the PPV of detecting CMV. IVCM was a useful non-invasive tool to predict CMV in patients with chronic or recurrent AU.

**Poster No.:** EX1-175

**Panel No.:** 175, **Session:** EX1

**Incremental Training for Multi-modality Imaging in Anterior Chamber Angle Classification Using Automated Machine Learning**

*First Author:* Eric Ka Ho **CHOY**

*Co-Author(s):* Hin Yin **CHAN**, Anni Annie **LING**, Chak Fung **NG**, Ruyue **SHEN**

**Purpose:** Incremental training is important for continuous improvement of machine learning algorithms to adapt to new datasets and new imaging modalities. This study aims to evaluate the performance of an incrementally trained automated machine learning (AutoML) model on classifying anterior chamber angle (ACA) into angle-closure or open from anterior segment optical coherence tomography (AS-OCT) images.

**Methods:** We previously trained a batch-learning AutoML model for ACA classification (open-angle versus angle-closure) on Google Vertex AI using 1848 Casia 1 AS-OCT images collected from 206 subjects. A total of 1253 Casia 2 AS-OCT images from 123 subjects were then input to the model for incremental training. Results were compared with an AutoML batch-learning model trained exclusively using Casia 2 images. To measure forgetting in the incrementally trained model, the same testing dataset in Casia 1 batch-learning model was used for batch prediction.

**Results:** The Casia 2 batch-learning model achieved overall area under precision-recall curve (AUPRC) of 0.962, 96.05% overall sensitivity and specificity. The sensitivity and specificity to angle-closure were 93.69% and 97.88%, respectively. The overall AUPRC of the incrementally trained model was 0.979, with 95.65% overall sensitivity and specificity. The

model demonstrated a sensitivity of 95.50% and specificity of 95.77% to angle-closure. Batch prediction using Casia 1 images yielded 95.84% accuracy.

**Conclusions:** The incremental-learning model exhibited a higher AUPRC and sensitivity to angle-closure to the Casia 2 batch-learning model, with comparable results in other evaluation metrics. This study underpins the potential of the AutoML model as a sustainable tool for angle-closure detection that could adapt to multi-modalities with minimal forgetting using incremental training.

**Poster No.:** EX1-176

**Panel No.:** 176, **Session:** EX1

**Investigating the Utility of Anterior Chamber Depth and Axial Length Thresholds in Predicting Anatomical Angle Closure in Chinese Patients**

*First Author:* Yik Tsz **LAM**

*Co-Author(s):* Jordy **LAU**, Kendrick **SHIH**

**Purpose:** To compare and determine the diagnostic performance of anterior chamber depth (ACD) and axial length (AL) in accurately predicting anatomical angle closure in Chinese subjects.

**Methods:** This was a cross-sectional random population-based study on 1068 right eyes in 1068 consecutive Chinese individuals, aged 50 or above. Anterior segment imaging was performed with CASIA2 SS-OCT (50,000 A-scans/s; 800 A-scans/B-scan). Each eye was imaged 3 times (total scan time was 0.26 s x 3) in the dark. Angle opening distance (AOD) at 500  $\mu$ m from the sclera spur (SS) and trabecular iris space area (TISA) at 500  $\mu$ m from the SS were measured automatically by the software after manual detection of SS by 2 observers in 32 angle meridians. ACD and axial length were measured using Pentacam. The association of AOD500 with axial length and ACD was analyzed with simple linear regression. Area under the receiver operating characteristic curves (AUC), sensitivity, and specificity for gonioscopic angle closure were compared.

**Results:** Univariate linear regression showed positive correlation of AOD500 with ACD ( $R^2 = 0.509$ ,  $p < 0.001$ ) and axial length ( $R^2 = 0.156$ ,  $p < 0.001$ ). AUC for predicting anatomical angle closure was 0.962 ( $p = 0.000$ , 95% CI 0.929-0.996) for ACD and 0.818 ( $p = 0.000$ , 95% CI 0.747-0.888) for axial length. Sensitivity and specificity were 93.3% and 88.3% for ACD  $\leq 2.69$  mm, and 73.3% and 71.5% for axial length  $\leq 23.1$  mm.

**Conclusions:** ACD was more strongly correlated with AOD500 than axial length. ACD had better predictive performance in detecting anatomical angle closure than axial length, as well as higher sensitivity and specificity.

Poster No.: EX1-177

Panel No.: 177, Session: EX1

**OCT Biomarkers in Retinal Vein Occlusion Associated Macular Edema After Anti-VEGF Injection**

First Author: Kin **TSANG**

Co-Author(s): Vivian Wing Ki **HUI**, Shaheeda **MOHAMED**, Simon **SZETO**

**Purpose:** Macular edema (ME) is one of the complications of retinal vein occlusion (RVO), resulting in visual loss. Anti-vascular endothelial growth factor (anti-VEGF) intravitreal injection is a treatment for ME. However, despite evidence demonstrating its effectiveness, proportion of patients had unsatisfactory results. This study aims to identify clinically important optical coherence tomography (OCT) biomarkers and hence to predict visual outcome in patients suffering from RVO associated ME.

**Methods:** This is a retrospective cohort study performed in a tertiary eye center in Hong Kong Eye Hospital. Patients who suffered from RVO associated ME and received anti-VEGF injections between 1 January 2020 and 31 December 2021 were included. Respective medical records were retrieved for analysis of baseline demographics, characteristics of RVO, and visual acuity. OCT images at baseline and after completion were retrieved and analyzed for quantitative and qualitative analysis.

**Results:** The study included 86 eyes suffering from RVO associated ME. Our analysis has shown that few OCT biomarkers were associated with worse baseline visual acuity (VA), and VA at 12 and 18 months. The study also demonstrated the association between baseline OCT biomarkers and subsequent VA change. It also showed the association between improvement in OCT biomarkers and improvement of VA.

**Conclusions:** The study supports the use of OCT features in providing prognostication of treatment response in patients with RVO associated ME.

Poster No.: EX1-178

Panel No.: 178, Session: EX1

**Reference-based Super-resolution Framework for Enhancing Image Quality of OCT Angiography Images with Low Resolution**

First Author: Dawei **YANG**

Co-Author(s): Hao **CHEN**, Yuyan **RUAN**, Simon **SZETO**, Ziqi **TANG**

**Purpose:** To develop a deep-learning (DL) framework to reconstruct 6 mm  $\times$  6 mm OCT-A images to tackle the "resolution trade-off" issue between field of view and image quality.

**Methods:** A novel reference-based super-resolution DL framework was built for reconstruction of 6 mm  $\times$  6 mm fovea-centered OCT-A images acquired from a swept-source OCT (Triton DRIOCT, Japan). 296 eyes from 158 individuals with diabetes were used for training and primary validation (8:2) with each eye consisting of one 3 mm  $\times$  3 mm and one 6 mm  $\times$  6 mm fovea-centered OCT-A image. Structural similarity index measure (SSIM) and peak signal-to-noise ratio (PSNR) were used to compare the image quality before and after reconstruction. To test the correlation between OCT-A metrics and diabetic retinopathy (DR) severity on the reconstructed images, we used a non-overlapping dataset (no DR: 22; mild DR: 20; moderate DR: 18; severe or proliferative DR: 18) with each eye consisting of five 3 mm  $\times$  3 mm (1 fovea-centered and 4 at parafoveal regions) and one fovea-centered 6 mm  $\times$  6 mm OCT-A images. Five 3 mm  $\times$  3 mm OCT-A



images were then stitched as montage to provide a high-resolution 6 mm × 6 mm image serving as the “ground truth” to the reconstructed images.

**Results:** The SSIM (0.670 vs 0.500,  $p < 0.001$ ) and PSNR (19.71 vs 17.41,  $p < 0.001$ ) of the reconstructed images were significantly higher than that of the original images. In the non-overlapping dataset, we found that the associations of the OCT-A metrics (i.e., FAZ area, FAZ circularity, vessel density) with DR severity between “ground truth” and reconstructed images largely remained identical.

**Conclusions:** The proposed reference-based super-resolution DL framework can enhance the image quality of low-resolution OCT-A images and maintain the accuracy of quantitative OCT-A measurements.

Poster No.: EX1-179

Panel No.: 179, Session: EX1

**Repeatability, Interocular Correlation, and Agreement of Optic Nerve Head Vessel Density in Healthy Eyes: A Swept-source Optical Coherence Tomography Angiography Study**

First Author: Danqi **FANG**  
Co-Author(s): Haoyu **CHEN**, Carol **CHEUNG**, Xiaoting **MAI**, Dawei **YANG**

**Purpose:** To investigate the repeatability, interocular correlation, and agreement of quantitative swept-source optical coherence tomography angiography (SS-OCTA) optic nerve head (ONH) metrics in healthy subjects.

**Methods:** Thirty-three healthy subjects were included. The optic nerve heads of both eyes were imaged 4 times by an SS-OCTA (Triton DRI-OCT, Topcon, Inc., Japan) using 3 mm x 3 mm scanning protocol. The images of radial peripapillary capillary (RPC) were analyzed by a customized Matlab program, and the following metrics were measured: circumpapillary vessel density (cpVD), fractal dimension, and vessel diameter index. The repeatability of the 4 scans was determined by intraclass correlation coefficient (ICC). Then the most well-centered

optic disc of the 4 repeated scans were picked up for the interocular correlation and agreement analysis by Pearson correlation coefficient ( $r$ ), ICC, and Bland-Altman plots.

**Results:** All SS-OCTA ONH metrics have excellent or good repeatability, as shown by the  $ICC > 0.760$  and  $CoV \leq 7.301\%$ . cpVD ( $ICC = 0.857$ ), vessel diameter index ( $ICC = 0.857$ ), and fractal dimension ( $ICC = 0.906$ ) showed good to excellent interocular correlation, while circumpapillary vessel density had moderate interocular correlation ( $ICC = 0.687$ ). Bland-Altman plots showed the range of agreement was from -5.26% to 6.21% for cpVD.

**Conclusions:** OCTA ONH metrics show good repeatability in healthy subjects. The interocular correlation of papillary vessel density, fractal dimension, and vessel diameter index was high, whereas cpVD was only moderate.

Poster No.: EX1-180

Panel No.: 180, Session: EX1

**Structural and Functional Analysis of Multiple Subretinal Fluid Blebs After Successful Surgery for Rhegmatogenous Retinal Detachment**

First Author: Yingchao **WANG**  
Co-Author(s): Kangjie **KONG**, Yingqin **NI**, Sisi **XU**

**Purpose:** This retrospective study investigated the clinical characteristics of multiple subretinal fluid blebs (MSFBs) after successful surgery for rhegmatogenous retinal detachment (RRD) and explored the association between MSFB with best-corrected visual acuity (BCVA) and metamorphopsia.

**Methods:** The study comprised 206 patients after successful surgery for RRD, with 58 and 148 eyes undergoing, respectively, scleral buckling (SB) and pars plana vitrectomy (PPV). The clinical characteristics of MSFBs were analyzed by optical coherence tomography (OCT). The choroidal vessels in some cases were evaluated with OCT angiography. M-charts were used to determine the metamorphopsia.

**Results:** MSFBs occurred in 17 (29.3%) and 8 (5.4%) eyes given SB and PPV, respectively.

MSFBs appeared  $5.6 \pm 5.5$  weeks after surgery and required  $34.9 \pm 13.8$  weeks to disappear. Disrupted external limiting membrane and ellipsoid zone could still be seen in 83.3% and 66.7% of the patients 12 months after surgery; these rates were significantly higher than those of patients without MSFBs ( $p = 0.047$ ,  $0.022$ , respectively). Twelve months post-surgery, BCVA and metamorphopsia scores of the patients with MSFBs were statistically comparable to those of the controls.

**Conclusions:** MSFBs occur more commonly after SB than PPV. MSFBs may delay the recovery of the outer retina structure but do not affect postoperative BCVA and metamorphopsia.

**Poster No.:** EX1-181

**Panel No.:** 181, **Session:** EX1

### Tackling Imbalanced Datasets for Vision-threatening Diabetic Retinopathy Detection via New Deep Learning Methods

*First Author:* Shu Yi **ZHANG**

*Co-Author(s):* Xiaoyan **HU**, An Ran **RAN**, Simon **SZETO**, Da Wei **YANG**

**Purpose:** To apply and compare 3 state-of-the-art deep learning (DL) methods on imbalanced datasets for vision-threatening diabetic retinopathy (VTDR) detection.

**Methods:** A baseline DL model was firstly developed to detect VTDR from fundus photographs. To tackle imbalanced dataset issues, 3 methods, including weighted random sampler (RS), class-balanced focal loss (CB focal), and global and local mixture consistency cumulative learning (GLMC), from aspects of resampling data, reweighting and module improvement, were applied to the baseline model, and denoted as Baseline+RS, Baseline+CB Focal, and Focal Baseline+GLMC, respectively. These methods were compared with the baseline model in the Chinese University of Hong Kong-Sight Threatening Diabetic Retinopathy Study dataset (STDR) and a publicly available dataset (Messidor).

**Results:** In the STDR dataset, the baseline model obtained an area under the curve (AUC)

of 0.736 (95% CI 0.701-0.771) for detecting VTDR. All methods have positive impacts on VTDR detection, with the Baseline+GLMC obtaining best performance with an AUC of 0.898 (0.874-0.922), followed by the Baseline+RS with an AUC of 0.886 (0.861-0.911), and the Baseline+CB Focal with an AUC of 0.884 (0.859-0.909). In the Messidor dataset, the baseline model had an AUC of 0.824 (0.794-0.854) and the Baseline+RS did not enhance performance, with an AUC of 0.783 (0.75-0.816). However, the remaining 2 methods showed positive impacts on VTDR detection, with an AUC of 0.963 (0.948-0.978) and an AUC of 0.970 (0.956-0.984) for the Baseline+CB Focal and the Baseline+GLMC.

**Conclusions:** DL methods of reweighting and module improvement have improved performance on imbalanced datasets for VTDR detection.

**Poster No.:** EX1-182

**Panel No.:** 182, **Session:** EX1

### Ultrasound Biomarkers: Contrast Enhanced Ultrasound and Nakagami Imaging to Differentiate Benign and Malignant Choroidal Tumors

*First Author:* Vishal **RAVAL**

*Co-Author(s):* Karla **MERCADO-SHEKHAR**, Himanshu **SHEKHAR**

**Purpose:** We hypothesize that contrast-enhanced ultrasound (CEUS) using a focused microbubble technique quantifying microvascular changes, while Nakagami imaging is used for tissue characterization, would provide a new approach for diagnosing and differentiating benign and malignant choroidal lesions.

**Methods:** One patient with choroidal hemangioma (CH) and choroidal melanoma (CM) was selected. Definity, which contains perflutren microbubbles, was administered as a slow IV bolus (1 mL). CEUS was performed for 1 minute post injection of the dye with continuous video recording. The mean intensity was calculated for each ROI, and the time-averaged difference in pixel intensities of post-injection frames relative to reference

pre-injection frame was calculated. Based upon Nakagami statistical distribution model, 2 parameters,  $m$  and  $\Omega$ , where  $m$  (shape parameter), representing tissue heterogeneity, and  $\Omega$  (scale parameter), representing the average energy of backscattered signals, was studied.

**Results:** CEUS analysis showed the time-averaged contrast increased by a percentage difference of  $9.9\% \pm 5.2\%$  (mean  $\pm$  SD) for CH and decreased by  $4.2\% \pm 4.7\%$  for CM. Furthermore, the intensity within the normal choroidal region was higher compared to the choroidal tumor region for both CH and CM. Nakagami analysis showed the  $m$  estimates were comparatively higher for hemangioma than melanoma (18.7 vs 8.8), indicating that hemangioma is more heterogeneous compared to melanoma. There was no significant difference in  $\Omega$  estimates between hemangioma and melanoma (0.65 vs 0.54).

**Conclusions:** Quantitative intensity-based contrast enhancement using novel B-scan CEUS and back-scattering signal analysis characterizing tissue heterogeneity using Nakagami imaging can be a potentially promising tool for differentiating benign and malignant choroidal lesions.

Poster No.: EX1-183

Panel No.: 183, Session: EX1

Uncertainty-inspired Open Set Learning for Retinal Anomaly Identification

First Author: Haoyu CHEN

Co-Author(s): Xinjian CHEN, Huazhu FU, Tian LIN, Meng WANG

**Purpose:** Failure to recognize samples from the classes unseen during training is a major limitation of artificial intelligence in the real-world implementation for recognition and classification of retinal anomalies. This study aims to develop and validate an uncertainty-based multi-category classification model for detecting both in-category and out-of-distribution retinal conditions.

**Methods:** The model was developed based on pre-trained ResNet-50, and the uncertainty

score was calculated based on evidence collected from the feature extractor network. The algorithm was trained with 9 categories of retinal conditions, and the uncertainty score threshold was determined using the validation set. The model's performance was assessed in the internal testing set, 2 external testing sets, 2 fundus image sets with diseases not included in the training set, 1 low-quality fundus image set, and 3 non-fundus image sets.

**Results:** Our model with thresholding strategy achieved an F1 score of 99.55%, 97.01%, and 91.91% for the internal testing set, external target categories (TC)-JSIEC dataset, and TC-unseen testing set, respectively, compared to the F1 score of 92.20%, 80.69%, and 64.74% by the standard AI model. Furthermore, our model correctly predicted high uncertainty scores, which would prompt the need for a manual check in the datasets of non-target categories of retinal diseases, low-quality fundus images, and non-fundus images.

**Conclusions:** Uncertainty-inspired open-set learning provides a robust method for real-world screening of retinal anomalies.

## Ocular Imaging

Poster No.: EX1-022

Panel No.: 022, Session: EX1

Association of Neuroretinal Rim Width and Diabetic Retinal Neurodegeneration in Patients with Diabetes

First Author: Truong NGUYEN

Co-Author(s): Simon SZETO, Dawei YANG, Tang ZIQI

**Purpose:** To investigate whether Bruch's membrane opening-minimum rim width (BMO-MRW) could be an early indicator of diabetic retinal neurodegeneration (DRN) among subjects with diabetes mellitus (DM) but without diabetic retinopathy (DR).

**Methods:** This cross-sectional study consisted of 128 eyes from 106 DM subjects without diabetic retinopathy (DR) and 104 eyes from 52 healthy controls. BMO-MRW and peripapillary retinal nerve fiber layer ( $\rho$ -RNFL) thickness were

imaged by the Spectralis OCT (Heidelberg Engineering, Heidelberg, Germany), whereas macular ganglion cell-inner plexiform layer (m-GCIPL) and macular retinal nerve fiber layer (m-RNFL) thicknesses were measured by the Cirrus HD-OCT (Carl Zeiss Meditech). Multivariable logistic regression models with generalized estimating equations were used to assess the associations between clinically relevant factors and BMO-MRW thickness. One-way analysis of variance was used to compare BMO-MRW, m-GCIPL, m-RNFL, and p-RNFL thickness between the 2 groups.

**Results:** Older age ( $\beta = -1.16$ ; 95% CI, -1.92 to -0.15) and larger Bruch's membrane opening area ( $\beta = -43.17$ ; 95% CI, -58.29 to -28.05) were associated with smaller BMO-MRW (all  $p < 0.001$ ), while higher body mass index was associated with thicker BMO-MRW. The mean of BMO-MRW in the DM group was not significantly different from those of the healthy group after adjusting covariates ( $299.18 \pm 56.09$  vs  $297.81 \pm 54.10$ ,  $p = 0.981$ ). However, subjects with DM had significantly thinner m-GCIPL, m-RNFL, and p-RNFL thicknesses compared to healthy controls (all  $p < 0.05$ ).

**Conclusions:** The thinning of m-GCIPL, m-RNFL, and p-RNFL thicknesses preceded that of the BMO-MRW, implying that BMO-MRW might not be a good indicator to identify DRN among those without clinically visible DR.

**Poster No.:** EX1-023

**Panel No.:** 023, **Session:** EX1

**Choroidal Structural Analysis Using Optical Coherence Tomography in Macular Telangiectasia Type 2 with and without Choroidal Neovascular Membrane**

**First Author:** Ayushi **CHOUDHARY**  
**Co-Author(s):** Rupesh **AGRAWAL**, Santosh **GOPIKRISHNA GADDE**, Chaitra **JAYADEV**, Gaurang **SEHGAL**

**Purpose:** To evaluate the subfoveal choroidal thickness (SFCT) and choroidal vascularity index (CVI) in eyes with macular telangiectasia type 2 (MacTel 2) using enhanced depth imaging spectral domain optical coherence tomography (EDI-SD OCT).

**Methods:** This is a retrospective case-control study of 47 eyes with MacTel 2 and 16 healthy controls. The OCT scans of MacTel 2 patients were compared against controls and between proliferative and non-proliferative subtypes, distinguished by the presence/absence of choroidal neovascular membrane (CNVM). The SFCT was measured and images were binarized to derive the choroid's luminal (vascular) area and stromal area. CVI is defined as the percentage of total choroidal area that is vascular.

**Results:** MacTel 2 patients had larger SFCT ( $p < 0.001$ ) and lower CVI ( $p = 0.033$ ) than the controls. The CNVM group had larger SFCT ( $p = 0.017$ ) compared to the non-CNVM group, with no significant difference in CVI.

**Conclusions:** Reduced CVI with increased SFCT in MacTel 2 suggested significantly greater increment in the stroma than vasculature. Unchanged CVI with increased SFCT in the CNVM subtype throws light on the retinochoroidal origin of neovascularization with secondary choroidal changes.

**Poster No.:** EX1-024

**Panel No.:** 024, **Session:** EX1

**Clinical and Structural Progression of Macular Telangiectasia Type 2 in Thai Patients**

**First Author:** Nattha **MEECHAREON**

**Purpose:** To demonstrate the demographic data and clinical course of Thai patients with macular telangiectasia type 2 (MacTel 2).

**Methods:** Total 30 eyes of 15 patients (3 men and 12 women) with MacTel2 were included, with at least 6 months of follow up. Demographic data, BCVA, and imaging data of color fundus photographs and SD-OCT were collected. Differences in BCVA, central subfield thickness (CST), and the length of ellipsoid zone loss were compared between initial and final visit, separating the worse eyes and the better eyes in each patient using mixed-effects regression models.

**Results:** In this study of MacTel2, the mean age was 63.8 years. The most common fundoscopic



finding was parafoveal retinal graying (loss of retinal transparency). The mean initial logMAR BCVA of the worse eyes and the better eyes group was  $0.596 \pm 0.485$  and  $0.252 \pm 0.169$ , respectively. During follow-up the changes in BCVA were not statistically significant in both groups. The numerical changes in EZ loss were significantly increased in the group of worse eyes, mean difference 237.93 ( $P = 0.008$ ), whereas they were non-significant in the group of better eyes. The CST was significantly decreased in the group of better eyes, mean difference -15.0 ( $P = 0.009$ ), but there were non-significant changes in the group of worse eyes.

**Conclusions:** Thai patients may have slower progression than in Caucasian patients. BCVA was rarely affected but the progression of structural changes in early disease could show a decrease of CST prior to the change of EZ loss.

Poster No.: EX1-025

Panel No.: 025, Session: EX1

### Evaluation of Peripheral Retinal Degeneration Using Ultra-widefield Swept Source Optical Coherence Tomography

First Author: Ayushi **AGARWAL**

Co-Author(s): Shorya **AZAD**, Rohan **CHAWLA**, Vinod **KUMAR**, Nawazish **SHAIKH**, Pradeep **VENKATESH**

**Purpose:** To describe the features of peripheral retinal degenerations using ultra-widefield (UWF) swept source optical coherence tomography (SS-OCT).

**Methods:** In this cross-sectional study done at a tertiary eye care center in Northern India, peripheral retinal degenerations such as lattices, snail track lesion, paving stone, white without pressure (WWOP), microcystoid lesions, retinoschisis, and other suspicious lesions were identified with clinical examination. Following clinical examination, these eyes with peripheral retinal degenerations underwent UWF SS-OCT.

**Results:** 105 eyes with peripheral lesions like lattices (33.33%), snail track lesions (13.33%), peripheral retinoschisis (7.6%), pigmented doubtful lesions (7.6%), WWOP (7.6%), paving

stone (6.66%), peripheral retinal detachment (6.66%) along with congenital hypertrophy of the retinal pigment epithelium (CHRPE), microcystoid lesions, and dark without pressure areas were identified. All the lesions could be imaged with the help of UWF SS-OCT. It significantly helped in improving diagnostic capability with early identification of specific structural features such as vitreoretinal attachment and traction, full-thickness hole or tear, and subretinal fluid which were not so evident on indirect ophthalmoscopy.

**Conclusions:** UWF-OCT deepens our understanding of the structure of the retina and its associated peripheral pathologies, allowing early recognition of vision-threatening lesions that may influence clinical management.

Poster No.: EX1-026

Panel No.: 026, Session: EX1

### Microvasculature and Structural Changes of Optic Disc in Pachychoroid Spectrum Disease

First Author: Tae Rim **KIM**

Co-Author(s): Eung-suk **KIM**, Kiyoung **KIM**, Jong Beom **PARK**, Seung-young **YU**

**Purpose:** To analyze the patterns of microvasculature density and structural changes in the optic discs in patients with pachychoroid spectrum disease with optical coherence tomography angiography (OCTA).

**Methods:** A retrospective study of 28 eyes of 28 patients with pachychoroid spectrum disease who underwent optic nerve 6.0 x 6.0 mm imaging through swept-source optical coherence tomography angiography (SS-OCTA). The microvasculature density of the peripapillary nerve fiber layer and the optic disc were evaluated. The cup-to-disc (C/D) ratio and the retinal nerve fiber layer (RNFL) thickness in patients with pachychoroid spectrum disease were analyzed through optical coherence tomography (OCT).

**Results:** The patient group consisted of 21 males and 7 females out of a total of 28 patients with pachychoroid spectrum disease. The average age of patients was  $63.32 \pm 13.04$  years old, and the choroidal thickness

( $\mu\text{m}$ ) of the patient group was  $298.93 \pm 48.28$ . The vasculature density (%) of blood flow in the optic disc was  $34.37 \pm 9.34$ , which was significantly lower than that of the control group (%) of  $40.95 \pm 8.17$  ( $p = 0.018$ ). The average C/D ratio was  $0.64 \pm 0.12$  in the patient group, higher than  $0.57 \pm 0.14$  in the control group ( $p = 0.096$ ), but it was not statistically significant. There were no significant differences in the analysis of gender, age, intraocular pressure, best-corrected visual acuity, and history of diabetes mellitus and hypertension.

**Conclusions:** In the study, a reduction in vascular density and an increase in C/D ratio of the optic disc were observed through OCTA in patients with pachychoroid spectrum disease.

**Poster No.:** EX1-027

**Panel No.:** 027, **Session:** EX1

**Multicolor Imaging Features of Age-related Macular Degeneration and Polypoidal Choroidal Vasculopathy**

*First Author:* Dominic **TING**

**Purpose:** To evaluate the accuracy of multicolor imaging compared to color fundus photography (CFP) in differentiating AMD from normal eyes, and in detecting features of PCV.

**Methods:** In a prospective study of 50 consecutive patients presenting with PCV or AMD, standardized multimodal imaging was performed. PCV was diagnosed using ICGA as the gold standard. CFP and multicolor images were graded using standardized grading protocols to determine sensitivity, specificity, positive, and negative predictive values (PPV and NPV) in differentiating AMD from normal eyes, and in detecting features of PCV.

**Results:** Of 100 eyes, 44 had PCV, 11 had neovascular AMD, 21 non-neovascular AMD, and 23 were normal. On the multicolor channel, polyps appeared as dark-green oval lesions in 39/44 eyes (88.6%). The branching vascular network (BVN) appeared as mottled grey lesions in 16/44 eyes (36.4%) on the infrared channel. Multicolor had superior specificity (73.9% vs 52.2%) and NPV (94% vs 85.7%) compared to CFP for detecting all types of

AMD, with similar sensitivity (97.7% vs 97.4%). For PCV, multicolor had higher sensitivity (86.4% vs 59.1%) and NPV (89.3% vs 74.3%) compared to CFP, while the specificity and PPV were similar. PCV lesions were best visualized on the infrared channel. Using BVN as a parameter, infrared imaging had high specificity (96.6%) and PPV (88.9%) for detecting PCV.

**Conclusions:** Multicolor imaging is superior to CFP in differentiating AMD from normal eyes and detecting features of PCV. The presence of BVN on infrared imaging and dark-green oval lesions should alert ophthalmologists to the presence of PCV.

**Poster No.:** EX1-028

**Panel No.:** 028, **Session:** EX1

**Multimodal Imaging Analysis for Eyes with Autosomal Recessive Bestrophinopathy**

*First Author:* Masahiro **MIURA**

*Co-Author(s):* Shinnosuke **AZUMA**, Shuhei **KAMEYA**, Shuichi **MAKITA**, Kazushige **TSUNODA**, Yoshiaki **YASUNO**

**Purpose:** To examine the involvement of the retinal pigment epithelium (RPE) in the eyes with autosomal recessive bestrophinopathy (ARB) using multimodal imaging.

**Methods:** Both eyes of 2 patients from a single family with ARB were evaluated. One patient was evaluated for 4 years from the age of 15 years and another patient was evaluated for 3 years from the age of 20 years, using commercial OCT, short wave autofluorescence (SW-AF: excitation 488 nm), and near-infrared AF (NIR-AF: excitation 785 nm) imaging. NIR-AF images were compared with RPE-melanin optical coherence tomography (OCT) images calculated from prototype multi-contrast OCT dataset.

**Results:** Commercial OCT images showed serous retinal detachment throughout follow-up period. SW-AF images showed hyper-AF regions and NIR-AF images showed hypo-AF area and hyper-AF dots. Shapes of hyper-SW-AF lesions changed throughout the follow-up period. Areas of hypo-NIR-AF were constantly distributed across the affected regions.

Locations of hyper-NIR-AF dots changed throughout the follow-up period. RPE-melanin OCT imaging showed decrease of RPE-melanin at hypo-NIR-AF areas and RPE-melanin accumulation at hyper NIR-AF dots.

**Conclusions:** In the eyes with ARB, diffuse RPE damage at macular lesion was confirmed with NIR-AF and RPE-melanin OCT imaging. Hyper NIR-AF dots with RPE-melanin accumulation might represent the presence of stacked RPE cells or RPE dysmorphia.

Poster No.: EX1-029

Panel No.: 029, Session: EX1

### Myopia and Its Associations Between Axial Length and Optical Coherence Tomography Angiography Biomarkers

First Author: Jessica LAU

Co-Author(s): Mingming ZHU

**Purpose:** To determine the associations between axial length (AL) and optical coherence tomography angiography (OCTA)-based eye-related parameters.

**Methods:** A prospective cross-sectional study of the right eye of 6953 individuals between the ages 50 and 97, with a range of AL from 19.1 to 31.7 mm, was performed. Central subfield thickness (CST), foveal avascular zone (FAZ), and mean vessel density (mVD) were measured by OCTA. Associations between OCTA-based parameters, eye-related, and systemic-related parameters were assessed using 1-way ANCOVA and multiple regression analysis.

**Results:** AL and OCTA-based parameters were negatively correlated with age. Increased AL was associated with increased CST ( $\beta = 3.59$ ), decreased FAZ ( $\beta = 0.02$ ), and decreased mVD ( $\beta = -0.4$ ) (all  $p = 0.000$ ). Better best-corrected visual acuity (BCVA) was associated with larger FAZ ( $\beta = -0.07$ ) and higher mVD ( $\beta = -3.160$ ) ( $p = 0.002$ ,  $p = 0.000$ ). Hypertension and diabetes mellitus correlated with increased mVD ( $\beta = 0.5$ ) and decreased mVD ( $\beta = -0.18$ ), respectively ( $p = 0.000$ ,  $p = 0.023$ ).

**Conclusions:** Increased AL is associated with lower mVD which may be a potential factor between myopia and poor BCVA.

Poster No.: EX1-030

Panel No.: 030, Session: EX1

### Optical Coherence Tomography Assessment of Vitreous Opacities and Their Correlation with Retinal Breaks

First Author: Suklengmung BURAGOHAIN

Co-Author(s): Priyank BHOLA, Subham SINHA ROY

**Purpose:** This study aims to investigate the relationship between vitreous opacities (stardust sign) visualized through optical coherence tomography (OCT) and the presence of retinal breaks.

**Methods:** Fifty-three patients who reported floaters of less than 2 weeks' duration were included. They underwent spectral-domain OCT (SD-OCT) scans using Heidelberg Spectralis. The presence of the stardust sign was examined. The group exhibiting a positive stardust sign was further analyzed, focusing on opacities' number and its association with retinal breaks, vitreous hemorrhage, and retinal hemorrhage. ImageJ software was employed to enhance images, and the VGG image annotator quantified opacities in fovea-centered scans.

**Results:** Among the 53 patients with floaters, 45.3% (24) were stardust sign positive. Among the stardust sign positive cases, 58.3% had retinal breaks, 54.2% had vitreous hemorrhage, and 37.5% had retinal hemorrhage. Statistically significant associations were observed between the quantity of vitreous opacities and the presence of retinal breaks ( $p = 0.014$ ), vitreous hemorrhage ( $p = 0.03$ ), and retinal hemorrhage ( $p = 0.03$ ).

**Conclusions:** Presence of stardust sign can be a risk factor for the presence of retinal breaks or hemorrhage. Number of vitreous opacities and presence of retinal breaks, vitreous, and retinal hemorrhage have a statistically significant association. Therefore, SD-OCT imaging can be a valuable tool for screening retinal tears in patients presenting with floaters, aiding in timely identification and management of potential retinal pathologies.

Poster No.: EX1-031

Panel No.: 031, Session: EX1

## Outcomes of Switching to Brolucizumab in Eyes with Neovascular Age-related Macular Degeneration

First Author: Seungyeon **LEE**

Co-Author(s): Eung-suk **KIM**, Kiyoung **KIM**, Jong Beom **PARK**, Seung-young **YU**

**Purpose:** To analyze functional and anatomical outcomes, including factors of vessel morphology using swept-source optical coherence tomography angiography (SS-OCTA) after switching to intravitreal brolucizumab injection in eyes with neovascular age-related macular degeneration (nAMD) previously treated with other intravitreal anti-vascular endothelial growth factor (VEGF) agents.

**Methods:** We retrospectively analyzed 35 eyes of patients with nAMD who were switched from other anti-VEGF agents to brolucizumab. Best-corrected visual acuity (BCVA, logMAR), injection intervals (weeks), central subfield thickness (CST), and subretinal fluid (SRF) were compared between baseline (before the switch to brolucizumab) and 12 months (after the switch to brolucizumab). Quantitative parameters, including choroidal neovascularization (CNV) area, fractal dimension (FD), and lacunarity were analyzed from en face images of SS-OCTA.

**Results:** The mean BCVA showed no significant change from  $0.50 \pm 0.30$  to  $0.48 \pm 0.33$  at 12 months ( $p = 0.556$ ). CST significantly decreased from  $273.11 \pm 66.03$  to  $230.07 \pm 76.08 \mu\text{m}$  ( $p = 0.002$ ). The injection intervals were extended from  $12.04 \pm 4.12$  to  $13.96 \pm 4.18$  weeks ( $p = 0.004$ ) after switching to brolucizumab. SRF was completely resolved in 46% of eyes and reduced in 31% of eyes after the switch. The FD value was reduced after treatment from  $1.62 \pm 0.06$  to  $1.60 \pm 0.06$  ( $p = 0.019$ ), and lacunarity was increased from  $0.72 \pm 0.23$  to  $0.78 \pm 0.26$  ( $p = 0.021$ ). However, the CNV area demonstrated no significant difference.

**Conclusions:** Intravitreal brolucizumab injections showed better functional and

anatomical outcomes in patients in this real-world experience.

Poster No.: EX1-032

Panel No.: 032, Session: EX1

## Prediction of Treatment Response in Center-involved Diabetic Macular Edema Using a Deep Learning Approach Based on Optical Coherence Tomography

First Author: Thanaporn **KRITFUANGFOO**

Co-Author(s): Tharikarn **SUJIRAKUL**, Sipat **TRIUKOSE**

**Purpose:** This study aims to develop a deep learning (DL) model for predicting treatment response in center-involved diabetic macular edema (ci-DME) following anti-vascular endothelial growth factor injections, using optical coherence tomography (OCT) images.

**Methods:** We included 1,000 OCT images of ci-DME patients. Radial scans through the fovea were extracted from the initial OCT images taken before treatment initiation. These patients were then categorized into a response group (central subfield thickness (CST) improvement  $> 10\%$ ) and a nonresponse group (CST change  $\leq 10\%$ ) after 3 monthly bevacizumab injections. The EfficientNet B0 network was employed for model development, using 90% of the dataset for training and the remaining 10% for evaluation. Model construction involved dividing the 900 OCT images into 2 subsets, 550 for the response group and 350 for the nonresponse group, used for training the model.

**Results:** Our DL approach, based on OCT, demonstrated promising predictive power, achieving an accuracy of 75% in forecasting treatment response among patients with ci-DME who received bevacizumab injections. These results provide valuable insights into the potential of DL techniques for predicting treatment response in ci-DME cases. Moreover, this model has the potential to be applied in identifying cases within the nonresponsive group, where early switching to alternative drugs might lead to more substantial benefits.



**Conclusions:** This study presents a DL approach utilizing OCT images to predict treatment response in ci-DME patients. These findings are significant for personalized treatment choices in ci-DME, emphasizing the need for more extensive information and larger datasets to fine-tune and validate the DL model.

Poster No.: EX1-033

Panel No.: 033, Session: EX1

**Vortex Vein Drainage System in Healthy Chinese People Using Ultra-widefield Optical Coherence Tomography Angiography**

First Author: Zhonghua LUO

**Purpose:** To determine the pattern of vortex vein drainage system in healthy Chinese people using ultra-widefield optical coherence tomography angiography (UWF-OCTA).

**Methods:** A total of 140 eyes of 140 healthy Chinese participants having no history of retinal or choroidal diseases were included in this study. The proportion of choroidal vortex vein drainage system (VV%) was analyzed using montage enface optical coherence tomography (OCT) images (>200 degree). In each vortex vein (VV) drainage quadrant, mean choroidal thickness (ChT), choroidal vascular volume (CVV), and choroidal vascularity index (CVI) were evaluated using 9 × 9 mm OCTA scan model.

**Results:** The mean age was  $43.03 \pm 12.55$  years (range, 22-72 years), and the mean axial length (AL) was  $24.88 \pm 1.11$  mm (range, 22-27 mm). In superotemporal (ST), superonasal (SN), inferonasal (IN), inferotemporal (IT) drainage quadrant, mean ChT was  $257.15 \pm 45.92$   $\mu\text{m}$ ,  $250.11 \pm 40.25$   $\mu\text{m}$ ,  $189.02 \pm 38.79$   $\mu\text{m}$ , and  $215.99 \pm 49.35$   $\mu\text{m}$ , respectively; VV% was  $25.15 \pm 0.72\%$ ,  $25.31 \pm 0.93\%$ ,  $24.65 \pm 0.91\%$ , and  $24.87 \pm 0.84\%$ , respectively,  $p = 0.210$ ; CVV was  $7.97 \pm 2.02$   $\text{mm}^3$ ,  $7.76 \pm 2.14$   $\text{mm}^3$ ,  $5.01 \pm 1.89$   $\text{mm}^3$ , and  $6.34 \pm 2.19$   $\text{mm}^3$ , respectively. Thicker submacular choroid was associated with higher CVV in each quadrant. VV%, CVV, and CVI had no significant association with age and AL.

**Conclusions:** In Chinese normal eyes, the balanced vortex vein drainage system was common. The pattern of vortex vein drainage system in healthy people may not be associated AL and age.

Ocular Oncology & Pathology

Poster No.: EX1-034

Panel No.: 034, Session: EX1

**A Case Report of Metastatic Thyroid Follicular Carcinoma Masquerading as Primary Lacrimal Gland Tumor**

First Author: Ana Camille SANCHEZ

Co-Author(s): Sandra WORAK

**Purpose:** To present a case of metastatic thyroid follicular carcinoma masquerading as lacrimal gland tumor in a 75-year-old female.

**Methods:** Case report.

**Results:** This is a case report of a 75-year-old Asian female, who came in due to gradual left eye proptosis of 3 months' duration. No other systemic features were noted at this time. On computed tomography scan with contrast, there was a lobulated lesion in the supero-lateral portion of the left extraconal orbital region centered within the lacrimal fossa, with secondary mild proptosis and inferomedial displacement of the left globe. Initial histopathologic findings on incision biopsy showed benign epithelial and myxoid mesenchymal elements with glandular lobules with multiple acini commonly seen in lacrimal gland tissue. However, upon further microscopic studies, it revealed histomorphologic and immunochemical features consistent with metastatic follicular carcinoma. Patient subsequently underwent ancillaries for primary thyroid malignancies which revealed thyroid lobules on ultrasonography.

**Conclusions:** This case demonstrates the advantage of immunohistochemistry in conjunction with imaging modalities in establishing a conclusive diagnosis in orbital tumors in order to recommend appropriate management and achieve best outcomes.

Poster No.: EX1-035

Panel No.: 035, Session: EX1

## A Rare Case of Neoplastic Masquerade Syndrome with Neovascular Glaucoma in Metastatic Lung Adenocarcinoma

First Author: Hong Nien **LEE**

Co-Author(s): M.Farahi Syazani **AB HALIM**

**Purpose:** To describe a case of bilateral choroidal metastases with unilateral total exudative retinal detachment and neovascular glaucoma in disseminated advanced lung adenocarcinoma.

**Methods:** Case report.

**Results:** A 61-year-old chronic smoker with underlying lung adenocarcinoma and liver metastasis, who had undergone chemotherapy, presented with sudden visual loss of the left eye. Left eye vision was perception to light with presence of relative afferent pupillary reflex. Slit lamp examination showed bullous exudative total retinal detachment with low teen pressure. B-scan revealed a normal contour globe with thickened moderate-to-high reflective, V-shaped membrane posteriorly with a point of attachment at optic disc. There was also an echogenic choroidal mass in the inferotemporal equator region. In the subsequent follow ups, he developed rubeosis iridis and neovascular glaucoma.

**Conclusions:** Neoplastic masquerade syndrome is not uncommon in patients with cancer. Our patient developed choroidal metastasis with secondary total exudative retinal detachment. Close monitoring is important as it is associated with other complications such as neovascular glaucoma. Together with conservative and palliative treatment, close observation of the unaffected eye is vital for prevention of blindness.

Poster No.: EX1-036

Panel No.: 036, Session: EX1

## Bilateral Diffuse Uveal Melanocytic Proliferation: A Case Report and Review of the Literature

First Author: Ye **LI**

Co-Author(s): Thomas **CAMPBELL**, Andrew **ROWLANDS**

**Purpose:** To present a case and literature review of bilateral diffuse uveal melanocytic proliferation (BDUMP), report the utility of multimodal imaging in its diagnosis, and assess the role of plasmapheresis in its treatment.

**Methods:** Case report and literature review.

**Results:** A 70-year-old male presented with 3-month history of bilateral progressively worsening vision. He had a background of metastatic esophageal cancer treated with esophagectomy, chemotherapy, and nivolumab commenced 12 months prior. On examination, visual acuity was 6/30 and 6/18 in the right and left eye, respectively. The anterior chamber and vitreous were quiet. Fundus exam showed bilateral macular serous detachments with numerous circular hyperpigmented spots. OCT showed bilateral subretinal hyperreflective deposits with subretinal fluid, disruption of outer retinal layers, and choroidal thickening. OCT-angiography demonstrated flow-voids in the outer retina corresponding to the subretinal deposits with no neovascularization. Lesions appeared hyperautofluorescent with surrounding patchy hypoautofluorescence. There was no leakage on fluorescein angiogram. Bilateral orbital floor triamcinolone followed by a tapered dose of oral prednisone was trialled. Nivolumab was withheld due to possibility of checkpoint-inhibitor associated serous detachment with no effect. Due to worsening vision, he was commenced on 8 cycles of weekly plasmapheresis. Six weeks following cessation, visual acuity improved to 6/18 in the right eye and 6/9 in the left eye with a reduction in subretinal fluid.

**Conclusions:** BDUMP is rare with limited evidence regarding effective treatment options. History and multimodal imaging can be

helpful in its differentiation from other causes of serous retinal detachment. Plasmapheresis was effective in this case with functional and anatomical improvement.

Poster No.: EX1-037

Panel No.: 037, Session: EX1

### Differentiation of Choroidal Metastasis from Primary Cancer Sites: A Multimodal Imaging Study

First Author: Anjali MAHESHWARI

Co-Author(s): Vishal RAVAL

**Purpose:** To differentiate choroidal metastasis from various primary cancer sites based on clinical presentation and multimodal imaging.

**Methods:** Retrospective, observational multimodal imaging study of 67 eyes (58 patients) diagnosed with choroidal metastasis in an Indian population.

**Results:** The mean age at presentation was 60 years, with M:F ratio of 1:1. At presentation, 41 eyes (61%) with choroidal metastasis had a known primary cancer whereas 26 eyes (39%) precluded the diagnosis of primary cancer. Overall, primary cancer sites were lung (36 eyes; 53%), breast (14 eyes; 21%), gastrointestinal tract (6 eyes; 11%), genitourinary tract (4 eyes, 8%), and others (7 eyes, 13%). About two-thirds of patients with lung carcinoma had eye lesions as the presenting feature compared to only one-fifth of patients with breast carcinoma ( $p = 0.006$ ). Majority of all the choroidal lesions were yellowish color except for 5 eyes with orange color secondary to lung neuroendocrine tumors. On multimodal imaging, FFA demonstrated hyperfluorescence in early and late phases in 11 eyes (61%), whereas ICG demonstrated hypofluorescence throughout all phases in 11 eyes (69%). OCT showed presence of lumpy-bumpy choroid with compression of overlying choriocapillaries in 52 eyes (91%), and surrounding subretinal fluid in 40 eyes (75%). Based upon b-scan findings, lung metastatic lesions presented with a mean basal diameter to thickness ratio of 2.8 compared to breast lesions of 3.7 ( $p = 0.06$ ).

**Conclusions:** Multimodal imaging in combination with clinical presentation can provide clues to the origin of choroidal metastasis from various cancer sites thereby aiding in early diagnosis, staging, and treatment of primary cancer.

Poster No.: EX1-038

Panel No.: 038, Session: EX1

### Effect of Geography on Eye Care Access Among Retinoblastoma Patients in the Philippines

First Author: Roland Joseph TAN

Co-Author(s): Aldous Dominic CABANLAS, Josemaria CASTRO, Kimberley Amanda COMIA, Mara Augustine GALANG

**Purpose:** To determine the eye care access of retinoblastoma patients from Luzon, Visayas, and Mindanao and to determine if access is associated with delay in consultation, staging, and outcomes.

**Methods:** Cohort study of retinoblastoma patients seen in 11 institutions located in Luzon, Visayas, and Mindanao from 2010-2020.

**Results:** 636 patients, involving 821 eyes, were included. 195 (30%) patients lived in the same region where they were seen. Delay of consultation was shorter in patients from Luzon than Visayas ( $p < 0.003$ ) and Mindanao ( $p < 0.04$ ). Distance travelled of patients from Luzon was shorter than Visayas ( $p < 0.0001$ ) and Mindanao ( $p < 0.0001$ ). Patients from Visayas had a longer distance travelled than Mindanao ( $p < 0.03$ ). A significant correlation between distance of hometown institution in kilometers to delay in consultation exists and was 0.02 months/km ( $p < 0.0001$ ). Systemic staging of patients from Visayas was different from patients from Luzon ( $p < 0.01$ ) and Mindanao ( $p < 0.02$ ). There were significant differences in the outcomes between patients from Luzon and Visayas ( $p < 0.001$ ) and Mindanao ( $p < 0.0001$ ).

**Conclusions:** Inaccessibility to eye care remains a challenge for retinoblastoma patients in the Philippines as 70% had to travel to another region and had to travel an average of 106 kilometers. Longer distance

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travelled by patients from Visayas is from the underrepresentation from Visayas. But it still highlights inaccessibility to capable hospitals in the area. Patients from Visayas had more advanced IRSS stages and different outcomes compared to Luzon due to longer delay in consultation. These highlight the disparity in the local situation of retinoblastoma patients in the past decade. This can be explained by the significant differences found in their IRSS stages.

**Poster No.:** EX1-039

**Panel No.:** 039, **Session:** EX1

**Episcleral Plaque Radiotherapy as Salvage Treatment for Retinoblastoma Following Intravenous Chemotherapy**

**First Author:** Vishal **RAVAL**

**Co-Author(s):** Swathi **KALIKI**, Vijay Anand **REDDY**

**Purpose:** To describe the clinical presentation and treatment outcomes of patients undergoing episcleral plaque radiotherapy (EPR) as salvage treatment for retinoblastoma (RB) following intravenous chemotherapy (IVC).

**Methods:** Retrospective chart review of 44 eyes of 42 patients.

**Results:** The mean age at presentation was 18 months (range, 3 to 72 months). Based on ICRB classification, 8 (18%), 8 (18%), 16 (36%), and 5 (12%) tumors belonged to groups B, C, D, and E, respectively. All patients were treated with 6 cycles of systemic IVC along with adjuvant focal treatment. The indications for EPR included solid tumor recurrence (n = 20; 45%), solid tumor residue (n = 16; 36%), new subretinal seeds (n = 5; 12%), and new solid tumor (n = 3; 7%) noted at a mean interval of 7.4 months (range, 3 to 21 months) following IVC. The mean tumor height was 4 mm (range, 1.5 to 6 mm). All patients were treated with Ru-106 plaque (round or notch) with a mean total dose of 45 Gy delivered to the tumor apex. At a mean post plaque follow-up period of 28 months (range, 3 to 132 months), tumor regressed in 25 eyes (56%). Tumor recurrence within plaque site was noted in 8 eyes (18%) associated with a type 2 regression pattern

(75%). At the last follow-up, the globe salvage rate was 24 eyes (55%), while 2 patients (5%) died due to metastasis secondary to advanced RB in the contralateral eye and progressive tumor in the ipsilateral eye.

**Conclusions:** EPR can be an effective salvage treatment for focal tumors (new or recurrent) following systemic IVC.

**Poster No.:** EX1-040

**Panel No.:** 040, **Session:** EX1

**Ocular Manifestations of Patients with Mature T/NK-cell Lymphomas**

**First Author:** Ping **FEI**

**Co-Author(s):** Peiquan **ZHAO**

**Purpose:** To investigate the ocular involvement and characteristics of patients with MTNKL.

**Methods:** A retrospective cohort study was conducted in 168 patients with MTNKL from April 2019 to April 2022. Patients who presented with ocular symptoms were carefully examined by an ophthalmologist.

**Results:** Seventeen of 168 patients had ocular symptoms (13 males and 4 females) with a median age of 49 years. There was no significant difference between patients with and without ocular symptoms in age distribution. Thirteen were diagnosed as extranodal NK/T-cell lymphoma (ENKTL), 2 were peripheral T-cell lymphoma, not otherwise specified (PTCL, NOS), and the remaining 2 cases were angioimmunoblastic T-cell lymphoma (AITL). Primary orbital MTNKL occurred in 2 patients, and the average interval from the diagnosis of MTNKL to the onset of ocular symptoms in the remaining 15 patients was 18.33 months. The 17 cases were diagnosed as orbital infiltration of lymphoma (9), intraocular metastasis of lymphoma (5), thrombocytopenia related retinal hemorrhage (1), cytomegalovirus (CMV) retinitis (1), and radiation retinopathy (1). All the cases had vision impairment. During a mean follow-up time of 18.59 (range, 1-53) months, 8 patients died. Of the total remaining 12 eyes, 9 eyes had poor visual prognosis and 3 eyes retained a visual acuity of 20/32 or above.



**Conclusions:** Mature T/NK-cell lymphoma with intraocular involvement is rare, but it is increasing with the improvement in survival rates and can be misdiagnosed as uveitis or orbital cellulitis. MTNKL patients with ocular symptoms have a poor visual prognosis.

**Poster No.:** EX1-041

**Panel No.:** 041, **Session:** EX1

**Predictive Potential of the Aqueous Humor Proteome for Metastasis in Uveal Melanoma**

**First Author:** Liya XU

**Purpose:** Gene expression profiling (GEP) is a clinically validated method to stratify metastasis risk in uveal melanoma (UM) patients. However, the limitations of GEP, such as reliance on intraocular tumor biopsies and issues of small tumor size and heterogeneity, have prompted the exploration of liquid biopsies as a less invasive alternative. Although blood biopsy has shown limited success in UM, the eye-specific aqueous humor (AH) liquid biopsy holds promise. In this study, we aim to identify the AH proteome associated with the high-risk GEP class 2, utilizing diagnostic AH specimens.

**Methods:** We collected AH from 20 UM patients before plaque brachytherapy. Patients were grouped into GEP 1 (12) and GEP 2 (5) based on gene expression profiling. AH samples were analyzed using a multiplexed platform for protein expression (1472 targets). Expression levels were compared between GEP classes, correlated with clinical features, and subjected to pathway analysis.

**Results:** GEP 2 class correlated with AJCC stages ( $P = 0.012$ ), advanced clinical tumor stages ( $P = 0.007$ ), and mutated BAP1 ( $P = 0.018$ ). Among 45 DEPs comparing GEP classes, 31 were up-regulated ( $FC > 2$ ,  $P < 0.01$ ) and 14 down-regulated ( $FC < 0.5$ ,  $P < 0.01$ ) in GEP 2 vs GEP 1. Clustering analysis differentiated samples by GEP classes; GEP NA clustered with GEP 1.

**Conclusions:** Identifying 45 AH DEPs capable of distinguishing GEP class 1 and 2 during the diagnostic stage, even when tumors were

too small for biopsy, underscores their clinical potential.

**Poster No.:** EX1-042

**Panel No.:** 042, **Session:** EX1

**Role of 18-fluorodeoxyglucose Positron Emission Tomography/Computed Tomography in Uveal Melanoma: A Prospective Interventional Study**

**First Author:** Anchal GERA

**Co-Author(s):** Rohan CHAWLA, Seema KASHYAP, Neiwete LOMI, Radhika TANDON, Rakesh KUMAR

**Purpose:** To correlate the metabolic activity of primary uveal melanoma on 18-fluorodeoxyglucose positron emission tomography/computed tomography (18-FDG PET/CT) scan with the known clinical and pathological prognostic factors.

**Methods:** This prospective interventional study recruited 30 primary uveal melanoma cases. Whole body 18 FDG PET/CT scan was done prior to initiation of treatment and post intervention at 12 months to assess standardized uptake value (SUVmax) of the tumor and its correlation with known clinical and histopathological high-risk features and metabolic response to treatment at 12 months follow up.

**Results:** Out of 30 patients, 22 patients underwent enucleation and 8 patients underwent conservative management. All the 30 eyes showed 18 FDG uptake with mean SUVm uptake of 4.93 (range 1.1-13.81). The mean patient age was 48.9 years (SD 14.5 years). SUVmax values were found to have a significant correlation with the tumor largest basal diameter, apical thickness, size by COMS classification, proximity to optic disc, presence of necrosis, and retinal detachment. SUVmax did not statistically correlate with age, gender, laterality, ciliary body involvement, pigmentation, location, proximity to fovea, histopathology, and local invasion. In the conservatively managed group, the metabolic activity showed a corresponding decrease with the tumor response to conservative radiation treatment.

**Conclusions:** Baseline FDG PET/CT has been found useful to prognosticate high-risk uveal melanoma patients for early and more aggressive treatment and follow up.

## Ophthalmic Epidemiology

**Poster No.:** EX1-043

**Panel No.:** 043, **Session:** EX1

### A Comparison of Retinoblastoma Cases in the Philippines from 2010-2015 to 2016-2020

*First Author:* Roland Joseph **TAN**  
*Co-Author(s):* Beltran Alexis **ACLAN**,  
 Charmaine Grace **CABEBE**, So **JAYSON**, Adriel  
 Vincent **TE**

**Purpose:** To compare the clinical profile, treatment, and outcomes of retinoblastoma patients seen in the Philippines from 2010-2015 to 2016-2020.

**Methods:** Cohort study of retinoblastoma patients seen in 11 institutions in the Philippines from 2010-2020.

**Results:** 821 eyes of 636 patients were included. 330 patients were seen in 2010-2015 while 306 patients in 2016-2020. Proportion of patients with unilateral disease seen from both timelines was similar ( $p = 0.51$ ). Age at onset of symptom, at initial consultation, and delay in consult from both timelines were similar too. Leukocoria was the most common presenting symptom while enucleation was the most common treatment mode performed for both timelines. There was a decrease in the need for systemic chemotherapy. There were increases in patients who completed systemic chemotherapy ( $p < 0.01$ ) and the proportion of alive and dead patients ( $p < 0.001$ ).

**Conclusions:** This study compared the most comprehensive data on retinoblastoma patients in the country. There was no improvement in the age at initial consult and delay of consultation over time as financial concerns remained the major cause. There were significant increases in grade E eyes and IRSS stage 1 and 3 patients over time despite similar delay in consultation due to decrease of patients with no data in

the second half of the decade. Enucleation remained the most common treatment mode due to the similar proportions of patients with unilateral disease. There was significant improvement in survival over time as a result of the decrease in abandonment and from a decrease in patients with IRSS stage 4 and the increase in patients who completed systemic chemotherapy treatment.

**Poster No.:** EX1-044

**Panel No.:** 044, **Session:** EX1

### Metabolomic Phenotyping of Obesity for Profiling Cardiovascular and Ocular Disease Outcomes

*First Author:* Pingting **ZHONG**

**Purpose:** To evaluate the impacts of metabolomic body mass index (metBMI) phenotypes on the risks of cardiovascular and ocular diseases outcomes.

**Methods:** By leveraging the serum metabolome and BMI data from UK Biobank, this study developed and validated a metBMI prediction model using a ridge regression model among 89,830 participants based on 249 metabolites. Five obesity phenotypes were obtained by metBMI and actual BMI (actBMI): normal weight (NW, metBMI of 18.5–24.9 kg/m<sup>2</sup>), overweight (OW, metBMI of 25–29.9 kg/m<sup>2</sup>), obesity (OB, metBMI  $\geq 30$  kg/m<sup>2</sup>), overestimated (OE, metBMI-actBMI  $> 5$  kg/m<sup>2</sup>), and underestimated (UE, metBMI-actBMI  $< -5$  kg/m<sup>2</sup>). Additional participants from the Guangzhou Diabetes Eye Study (GDES) were included for validating the hypothesis.

**Results:** In the UKB, although the OE group had lower actBMI than NW group, the OE group had a significantly higher risk of all-cause mortality than those in the NW prediction group (HR = 1.68). Similarly, the OE group had a 1.7–3.6-fold higher risk than their NW counterparts for cardiovascular mortality, heart failure, myocardial infarction, and coronary heart disease. In addition, risk of age-related macular degeneration (HR = 1.96) was significantly higher in the OE group. In contrast, UE and OB groups showed similar

risks of mortality and of cardiovascular and age-related eye diseases, though the UE group had significantly higher actBMI than the OB group. In the GDES cohort, we further confirmed the potential of metabolic BMI fingerprints for risk stratification of cardiovascular diseases using a different metabolomic approach.

**Conclusions:** Metabolomics allowed for leveraging the future of diagnosis and management of 'healthily obese' and 'unhealthily lean' individuals.

### Orbital & Oculoplastic Surgery

Poster No.: EX1-184

Panel No.: 184, Session: EX1

#### Case of Nasopharyngeal Carcinoma Presenting with Acute Loss of Vision

First Author: Yi Han LAU

Co-Author(s): Wing Man HO, Yip KWOK FOO NELSON, Kenneth Kai Wang LI

**Purpose:** We report a case of a 64-year-old-man who presented with an acute painless loss of vision in 1 eye following a cataract surgery. He presented to the Accident and Emergency Department with only light perception in his right eye, 6 hours after an uneventful cataract surgery performed under topical anesthetic. His preoperative visual acuity was 0.6 decimal place. He had a background history of diabetes, hypertension, and hepatitis carrier status which were well controlled with medications. His younger brother had a history of nasopharyngeal carcinoma (NPC) at the age of 30.

**Methods:** On presentation, his visual acuity was only light perception OD and 0.7 OS. Neurological examination revealed a grade 3 relative afferent pupillary defect and limited extraocular movement of abduction, elevation over right eye. His other extraocular movements were full, with no proptosis or ptosis. Testing of the trigeminal nerve revealed weakness of right side over ophthalmic, while maxillary and mandibular branch remained intact. Slit lamp examination was unremarkable, with the newly implanted intraocular lens in situ. Dilated fundal

examination showed a healthy optic disc, with no edema or pallor.

**Results:** Magnetic resonance imaging of the orbit revealed a 5.5 x 2.7 cm lesion over nasopharynx with invasion towards the right orbital apex and cavernous sinus. Patient was referred to the Ear Nose and Throat team for an urgent biopsy.

**Conclusions:** NPC was the twelfth leading cause of cancer deaths in Hong Kong. It is uncommon for patients with undiagnosed NPC to present with initial ophthalmic complaints. This case highlights the importance of prompt recognition and referral for such aggressive disease for early management and better prognosis.

Poster No.: EX1-185

Panel No.: 185, Session: EX1

#### Clinical and Radiological Outcomes of Double Versus Triple Therapy in the Treatment of Dysthyroid Optic Neuropathy

First Author: Weng Chi Stella SIO

Co-Author(s): Fatema Mohamed Ali Abdulla ALJUFAIRI, Kam Lung, Kelvin CHONG, Jake Uy SEBASTIAN, Kenneth Ka Hei LAI

**Purpose:** To compare the clinical and radiological outcomes of double versus triple medical decompression in patients with dysthyroid optic neuropathy (DON).

**Methods:** Prospective comparative study of 82 patients (115 eyes) diagnosed with DON between January 2012 and June 2023. Nineteen patients (25 eyes) received double therapy (intravenous methylprednisolone (IV-PMP) with either steroid sparing agent or orbital radiotherapy). While 63 patients (90 eyes) received triple therapy (IV-PMP, steroid sparing agent, and orbital radiotherapy). Main outcome measures included pre- and post-treatment clinical parameters and radiological parameters. The latter involved manual segmentation of magnetic resonance imaging parameters of rectus muscle size and intensity before and after medical decompression.

**Results:** Triple therapy showed a significant improvement in clinical activity score (CAS) (p

=  $1.9e-14$ ), best-corrected visual acuity (BCVA) ( $p = 0.001$ ), improvement of eye movements in all gazes (abduction  $p = 0.0057$ , adduction  $p = 0.0091$ , elevation  $p = 0.00021$ , and depression  $p = 0.033$ ), and a reduction in the amount of exophthalmos ( $p = 0.0037$ ). While dual therapy showed only a significant improvement in CAS ( $p = 0.0049$ ). All rectus muscle size and intensity significantly reduced after triple therapy (T1SR  $p = 2.3e-08$ ; T1IR  $p = 1e-09$ ; T1MR  $p = 2.7e-08$ ; T1LR  $p = 2.6e-09$ ; T2SR  $p = 3.7e-08$ ; T2IR  $p = 5e-11$ ; T2MR  $p = 2e-06$ ; T2LR  $p = 0.0028$ ), while only 2 muscle sizes significantly reduced after double therapy (T1IR  $p = 0.045$ , T1MR  $p = 0.047$ ).

**Conclusions:** Medical decompression using triple therapy provides better improvement in most of the clinical and radiological parameters, including BCVA, extraocular motility, amount of proptosis, reduction in rectus muscle size, and inflammation. This can potentially preserve the optic nerve function and spare patients from surgical decompression.

Poster No.: EX1-186

Panel No.: 186, Session: EX1

**Dacryocystitis in Patients with Lacrimal Duct Obstruction: A Systematic Review**

First Author: Nicole Tsz Yan **WONG**

Co-Author(s): Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kelvin **CHONG**, Jake **SEBASTIAN**, Kenneth Ka Hei **LAI**

**Purpose:** Dacryocystitis (DC) is a relatively new minimally invasive surgical technique for lacrimal duct obstruction (LDO). This is a systematic review to study the diagnostic and therapeutic role of DC in LDO, as well as its safety.

**Methods:** Up to 25 July 2023, 176 studies from PubMed, Cochrane Library, and Ovid MEDLINE were analyzed. After removing duplicates and imposing selection criteria, 17 eligible studies were included. Risk of bias assessment was performed. The main outcomes included diagnostic ability, therapeutic success rate, and complications. The types of DC, techniques, stents used, as well as the application of adjuvants were also explored.

**Results:** DC has a diagnostic role in terms of identifying the type (structural or secretory) or the cause, the location (pre-sac or post-sac), and the pattern (focal or diffuse) of LDO. In particular, pressure-controlled air-insufflated high-definition dacryocystitis yields significantly better image quality. DC also shows therapeutic success both objectively on anatomical and functional patency, and subjectively on symptomatic improvement. The use of a trephine and adjuvants including steroids and antibiotics irrigation also contributes to the therapeutic success. DC has few to no complications, in which false passage created could be managed effectively.

**Conclusions:** DC is an effective and safe technique to diagnose and treat LDO in patients of different ages. It has the potential to be generalized in clinical practice to substitute the current invasive techniques.

Poster No.: EX1-187

Panel No.: 187, Session: EX1

**Efficacy and Safety of Early Orbital Radiotherapy with Combined Immunosuppression in Moderate-severe Active Thyroid Eye Disease**

First Author: Hong Yu Ryan **FONG**

Co-Author(s): Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Karen **CHAN**, Kelvin **CHONG**, Kenneth Ka Hei **LAI**

**Purpose:** Thyroid eye disease (TED) is a chronic autoimmune disorder that can lead to severe ocular motility disturbances. This study reports the clinical outcomes of early orbital radiotherapy (ORT) with combined intravenous methylprednisolone (IVMP) and mycophenolate mofetil (MMF) in TED patients with restrictive myopathy.

**Methods:** Prospective comparative case series of patients managed at The Chinese University of Hong Kong from 2015 to 2021. Primary outcome was the change in Gorman diplopia score. Secondary outcomes were the changes in extraocular muscle motility (EOMy) and maximum thickness of extraocular muscle (EOM) on MRI at 52 weeks.



**Results:** The study included 41 patients with moderate-to-severe, active TED (18 double: received IVMP and MMF, 23 triple: received IVMP, MMF, and early ORT). The sex and smoking status were comparable. Triple group had a higher age (56 versus 47 years,  $P = 0.028$ ). The presenting clinical activity score, EOMy, and diplopia scores were comparable between the 2 groups. When we compared the reduction of the most affected EOM (inferior rectus) at 52 weeks after treatment, significant reduction was only observed in the triple group ( $P = 0.012$ ). Despite being statistically comparable, the improvement of diplopia (-0.5 versus -0.3,  $P = 0.4$ ) and EOMy (-0.5 versus -0.3,  $P = 0.3$ ) showed a higher average score in the triple group.

**Conclusions:** Our findings suggest that triple therapy regimens are more effective in improving the radiological outcomes in TED patients. Further investigation, ideally through a randomized controlled clinical trial, is warranted to provide more robust evidence for the role of orbital radiotherapy in TED management.

Poster No.: EX1-188

Panel No.: 188, Session: EX1

**Humphrey Visual Field Defects in Dysthyroid Optic Neuropathy**

First Author: Charlie **NG**

Co-Author(s): Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kam Lung **CHONG**, Ka Hei Kenneth **LAI**, Jake **SEBASTIAN**

**Purpose:** To compare the visual field (VF) defects in definite dysthyroid optic neuropathy (DON) and equivocal DON.

**Methods:** A prospective cohort study of VF defects in definite DON and equivocal DON. The VF defects were classified into 1 to 10 categories, divided into 3 stages. Stage 1 involved inferior VF defect, stage 2 involved inferior VF with superior VF defect advancement, and stage 3 with total VF defect. Stage X was also included as a miscellaneous category.

**Results:** 494 eyes of 249 subjects were examined. 350 eyes were classified as definite

DON subjects. Stage X was most commonly presented, with 172 of 350 eyes (49.14%), followed by stage 1, with 77 of 350 eyes (22.00%); stage 2, with 21 of 350 eyes (6.00%); and stage 3, with 4 of 350 eyes (1.14%). 101 eyes were classified as equivocal DON subjects. Stage X was most frequently presented, with 19 of 101 eyes (18.81%), followed by stage 1, with 11 of 101 eyes (10.89%). None of the subjects presented with stage 2 or 3 VF defects. For both definite and equivocal DON subjects, stage X was most presented. When comparing the MD value between definite DON and equivocal DON, they were significant with  $p = 0.0260$ .

**Conclusions:** Stage X was most presented in definite and equivocal DON subjects. Definite DON subjects have the worst VF defect, followed by equivocal DON.

Poster No.: EX1-189

Panel No.: 189, Session: EX1

**Inferior Rectus Myositis After Orbital Fracture Repair with a Medpor Implant in a 38-year-old Chinese Male**

First Author: Ting Hei **TSANG**

Co-Author(s): Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kelvin Kam-lung **CHONG**, Ka Hei Kenneth **LAI**, Jake **SEBASTIAN**

**Purpose:** To report a rare case of Medpor orbital implant-related inferior rectus (IR) myositis post-orbital fracture repair.

**Methods:** A retrospective review of a clinical case.

**Results:** A 38-year-old man, who underwent uneventful orbital floor fracture repair using a Medpor implant, presented a week later with a dull ache and acute onset of diplopia on both up- and downgaze. The symptoms were gradually relieved after a secondary surgery performed at our institution, using a transorbital, transantral biplanar approach involving the removal of orbital Medpor implant and repair of orbital fracture. The procedure involved creating a maxillary window through the upper buccal vestibular incision, and using a novel kangaroo pouch technique

that was described by one of the co-authors, to dissect the maxillary mucosa and remove the Medpor orbital implant. A dermis fat graft was harvested and positioned to tamponade the floor defect. The patient had successful results with complete coverage of the fracture site and improved ocular alignment over time.

**Conclusions:** Despite the high success rates seen with Medpor orbital implants, the body may recognize the implant as a foreign body and can mount an immune response against it. Intraoperatively, combining a dermis fat graft with a Medpor orbital implant reduces the rate of adhesions and implant exposure.

**Poster No.:** EX1-190

**Panel No.:** 190, **Session:** EX1

### Investigating the Pattern and Satisfaction of Online Information Seeking of Thyroid Eye Disease Patients

*First Author:* Chun Hei Thomas **LO**  
*Co-Author(s):* Kelvin Kam-lung **CHONG**, Wing Sum Glodia **MUN**, Chun Hei Ryan **TANG**

**Purpose:** Thyroid eye disease (TED) is a complex extrathyroidal manifestation of autoimmune thyroid disease (AITD), often misunderstood by patients. Our study aims to enhance patient education by evaluating the online health information seeking behavior of TED patients. The findings will shed light on the current state of online information and identify areas for improvement in online platforms dedicated to TED education.

**Methods:** Eighty TED patients completed a screening questionnaire. Fourteen were invited for a semi-structured interview and the results were qualitatively analyzed via the framework method.

**Results:** Participants with experience seeking online health information were selected via screening questionnaire. They commonly searched for etiology, clinical features, treatment options, and prognosis of TED. Most found current online sources satisfactory and preferred Chinese sources, hospital websites, or doctor-recommended sites. They preferred information delivery through online sources and

physical brochures. Participants desired more information on treatment and prognosis of TED and wanted more practical online resources such as appointment-making websites and a centralized referral network. They expressed a desire for increased use of photos, videos, and statistics on online sources. TED information had no emotional impact on most participants, but some experienced positive reassurance while others experienced exacerbated worries.

**Conclusions:** Our study identified characteristics of online health information use among Chinese TED patients and gathered their perspectives on existing sources. This may aid in delivering more patient-centered TED-related information and improve future online health education efforts.

**Poster No.:** EX1-191

**Panel No.:** 191, **Session:** EX1

### Orbital Recurrence of Uveal Melanoma: 7 Years After Enucleation

*First Author:* Agnes **HO**

**Purpose:** To report a rare case of recurrent uveal melanoma 7 years after enucleation.

**Methods:** Interventional case report.

**Results:** Uveal melanoma is a rare intraocular tumor. Local tumor recurrence after primary treatment is uncommon with limited cases reported in the literature. We herein report a case of a 62-year-old male with right orbital recurrence of uveal melanoma 7 years after enucleation. The patient presented with a right lower lid mass for 1 month in March 2023. He had previously undergone right eye enucleation and orbital implant insertion as a treatment for choroidal melanoma in 2016. The pathology report then showed a stage pT4aNx spindle B type choroidal melanoma with clear resection margins. Right anterior orbitotomy for orbital mass removal was performed in April 2023. Intraoperatively, a bulging black tumor with a thin pseudocapsule and semi solid content was found in the right lower lid. Pigmentary deposits were present in the surrounding orbital fat and on the inferior retractor muscle. Pathology report was consistent with recurrent

melanoma. The patient subsequently received radiotherapy for disease control.

**Conclusions:** Uveal melanoma could recur even after enucleation with clear margins. It is important for clinicians to continue regular monitoring for any local recurrence and systemic metastasis even after enucleation.

**Poster No.:** EX1-192

**Panel No.:** 192, Session: EX1

**Periorbital Mixed Tumor: The Cutaneous Counterpart of Pleomorphic Adenoma**

*First Author:* Shui King **TSOI**

*Co-Author(s):* Chun Wah Matthew **LAM**, Hunter **YUEN**

**Purpose:** Pleomorphic adenoma, which commonly arises in the major salivary glands, is uncommon in periorbital locations other than the lacrimal gland. This report presents a unique case of a 40-year-old woman who developed a periorbital "pleomorphic adenoma".

**Methods:** The patient initially complained of a painless, slowly growing mass in the right medial periorbital region, alongside the nasal bridge. Clinical examination revealed a mobile, firm, bluish, non-tender mass measuring approximately 1.3 x 1.0 cm in diameter.

**Results:** Computed tomography (CT) revealed a hyperdense non-contrast enhancing subcutaneous lesion with no signs of local invasion. The patient underwent complete surgical excision of the tumor. Histopathological examination and immunohistochemical analysis of the excised specimen showed features of a pleomorphic adenoma.

**Conclusions:** According to World Health Organization Classification of Skin Tumours (5th ed.), pleomorphic adenomas arising from the skin are better known as cutaneous mixed tumors, which are derived from mesenchymal and sweat gland components. In the past, this was labelled as chondroid syringoma but this name is no longer recommended. Complete excision is rarely associated with recurrence. Microscopic examination is essential to rule out the remote possibility of a

malignant counterpart that has the potential to metastasize and can be fatal.

**Poster No.:** EX1-193

**Panel No.:** 193, Session: EX1

**Quality of Life Assessments in Patients with Dysthyroid Optic Neuropathy: A Cross-sectional Comparative Study**

*First Author:* Eric Ka Ho **CHOY**

*Co-Author(s):* Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kelvin Kam-lung **CHONG**, Kenneth **LAI**, Calvin Cp **PANG**

**Purpose:** Dysthyroid optic neuropathy (DON) is a visual-threatening complication of thyroid eye disease (TED) that may result in irreversible visual loss. This study aims to compare the quality of life (QoL) impairment between DON and non-DON moderate-to-severe TED patients and correlate the QoL with clinical parameters.

**Methods:** In a cross-sectional study, 77 TED patients (30 DON and 47 moderate-to-severe) were recruited. The primary outcome was QoL surveys (Graves' Ophthalmopathy-QoL and TED-QoL). Secondary outcomes include ocular surface disease index (OSDI), lid and orbital parameters, clinical activity score (CAS), and NOSPECS. Surveys were translated into Chinese.

**Results:** DON subjects in our cohort had older age ( $57.6 \pm 9.94$ ), higher female-to-male ratio (19:11), and higher smoker/ex-smoker status (46.7%) than non-DON subjects ( $P > 0.05$ ). GO-QoL functioning and appearance subscale ( $31.2 \pm 21.9$ ;  $47.1 \pm 32.5$ ); TED-QoL overall, functioning, and appearance subscale ( $8.3 \pm 2$ ;  $7.73 \pm 2.24$ ;  $7.4 \pm 2.47$ ); and OSDI ( $49.6 \pm 20.5$ ) were worse than the non-DON subjects (all  $P < 0.002$ ). Visual acuity was positively correlated with GO-VF ( $r = 0.4$ ,  $P = 0.02$ ), and CAS was negatively correlated with a GO-QoL functioning score ( $r = -0.4$ ,  $P = 0.02$ ). Increased marginal reflex distance 2, more severe exophthalmos, and extraocular muscle movement restriction were negatively correlated with GO-QoL appearance subscale and TED-QoL appearance subscale (all  $P < 0.05$ ). DON patients with diplopia had worse

OSDI score than those without diplopia ( $P < 0.03$ ).

**Conclusions:** The QoL in DON patients is significantly affected when compared to moderate to severe TED patients. The correlation between clinical parameters and QoL should be further explored in TED patients.

**Poster No.:** EX1-194

**Panel No.:** 194, **Session:** EX1

**Squamous Cell Carcinoma of the Caruncle**

*First Author:* Ming Kei **PANG**

**Purpose:** To report a case of squamous cell carcinoma of the caruncle, the subsequent management, and review similar cases in the literature.

**Methods:** Interventional case report.

**Results:** A 47-year-old male with good past health presented with foreign body sensation in his right eye for 2 months. A raised lesion with irregular surface and leukoplakia was noted at the right caruncle. Subsequent biopsy confirmed squamous cell carcinoma of the caruncle. The management included surgical excision with 'no touch technique', intraoperative frozen section control of the resection margins, cryotherapy, mitomycin-C (MMC) application, and amniotic membrane ocular surface reconstruction. Postoperatively, 0.04% topical MMC was given 4 times a day for 1 week on, 1 week off, 1 week on for 2 cycles along with topical antibiotics and steroid. Follow-up examination did not show evidence of recurrence.

**Conclusions:** Caruncular neoplasm is a rare entity with non-specific features. Biopsy should be warranted with a low threshold if there is clinical suspicion. Such uncommon condition may occur in young patients with no risk factors.

**Poster No.:** EX1-195

**Panel No.:** 195, **Session:** EX1

**Survey of Dysthyroid Optic Neuropathy Management Among Orbital and Oculoplastic Surgeons in Hong Kong**

*First Author:* Pui Yu Vienna **LEI**

*Co-Author(s):* Fatema Mohamed Ali Abdulla **ALJUFAIRI**, Kelvin **CHONG**, Kenneth **LAI**, Jake Uy **SEBASTIAN**

**Purpose:** To report the practice patterns of medical and surgical management of dysthyroid optic neuropathy (DON) patients amongst Hong Kong orbital and oculoplastic surgeons.

**Methods:** A survey with 54 questions on respondent profile, diagnostic approach, medical, and surgical management of DON was sent to the members of Hong Kong Society of Ophthalmic Plastic and Reconstructive Surgery email database. Responses were collected in multiple choice and/or text typing for understanding favored practice trends through tabulated responses.

**Results:** Among 43 survey invitations, 13 responses were received. Respondents report the most sensitive clinical sign of DON is color testing, mainly Ishihara test (83.3%). Most surgeons prescribe intravenous steroid (91.7%) to DON patients, but when the patient develops any adverse events or resistance, no signs of improvement, or deterioration of clinical parameters from baseline in 1 week (66.7%), then many surgeons (66.7%) proceed to early surgical orbital decompression and orbital radiotherapy (58.3%). Regarding emergency orbital decompression in DON patients, surgeons' most favorable modality is 2-wall (lateral and medial) bony orbital decompression (58.3%). To allow prolapse of the orbital fat, the periorbita is incised while preserving a middle periorbital behind sleeve (66.7%). Most surgeons report fewer than 25% of DON eyes require additional surgical decompression (91.7%) or repeat decompression (100%). A majority of surgeons find that medical treatment (66.7%) is the most promising treatment plan for DON patients.



**Conclusions:** Although medical treatment remains the most promising DON treatment approach from oculoplastic surgeons' perspective, surgical decompression is also important when the medical treatment is ineffective due to increased resistance/side effects.

**Poster No.:** EX1-196

**Panel No.:** 196, **Session:** EX1

**Transorbital Decompression of Traumatic Superior Orbital Fissure Syndrome: A Case Report**

*First Author:* Jason **WONG**

*Co-Author(s):* Fatema **ALJUFAIRI**, Kelvin **CHONG**, Kenneth **LAI**

**Purpose:** Traumatic superior orbital fissure (SOF) syndrome is a severe condition that can result in complete ophthalmoplegia, ptosis, and exophthalmos. Reported approaches of surgical decompression include transcranial, transthomoidal, transmaxillary, and transnasal approaches. To the best of our knowledge, transorbital approach has only been reported once previously in a case of SOF cavernous hemangioma. We report a case of traumatic SOF syndrome treated via transorbital decompression with navigation guidance.

**Methods:** Case report.

**Results:** A 60-year-old man was presented with a history of falling from 5 feet height at work. Upon physical examination, he displayed complete ptosis and oculomotor, trochlear, and abducens nerves palsy, with facial numbness over the dermatome of the first branch of trigeminal nerve. The best-corrected visual acuity was 20/20 and 20/35 in right and left eyes, respectively. Intraocular pressure was normal; both slit lamp and fundus examination were unremarkable. MRI orbit scanning confirmed the presence of inferior and lateral orbital wall fractures and a bone fragment abutting on the lateral rectus of the left eye. The patient was unresponsive to 1 course of megadose intravenous methylprednisolone. Navigation-guided transorbital SOF decompression was performed, and the bone fragment was removed. Upon discharge,

the patient showed improvement of ptosis and facial numbness was resolved, yet complete ophthalmoplegia persisted 2 weeks postoperatively.

**Conclusions:** Despite persistence of ophthalmoplegia, we believe the transorbital approach is a safe and effective option in SOF syndrome decompression. Further studies and case series are required to confirm the reproducibility and application range of this uncommon surgical method.

**Poster No.:** EX1-197

**Panel No.:** 197, **Session:** EX1

**Treatment of Orbital Lymphatic Malformations with Oral Sirolimus Therapy Alone**

*First Author:* Yik To **HO**

*Co-Author(s):* Hunter **YUEN**

**Purpose:** To describe a case of orbital lymphatic malformation successfully treated with oral sirolimus therapy alone.

**Methods:** Interventional case report.

**Results:** A 30-year-old Chinese woman presented with a 3-year history of progressive right eye proptosis. On examination, there was a right relative afferent pupillary defect, a 9-mm axial proptosis of the right eye, as well as restricted right eye elevation and abduction. Magnetic resonance imaging of the orbit revealed a large intraconal mass displacing and compressing onto the right globe, with partial encasement of the right optic nerve. Imaging features were suggestive of a lymphatic malformation. The patient was started on a course of oral sirolimus, with improvement in proptosis and extraocular movements after initiation of treatment. Shrinkage of the orbital mass was demonstrated on follow up MRI imaging. At her latest follow up, there was no evidence of recurrence of the orbital lymphatic malformation 6 months after cessation of sirolimus.

**Conclusions:** Management of orbital lymphatic malformations are often complex owing to their infiltrative nature. Treatment options include surgical resection and sclerotherapy, but they

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may not be appropriate for cases that encase the optic nerve. In these patients, medical therapy such as sirolimus may be a safe and effective alternative.

### Other (General Ophthalmology)

Poster No.: EX1-045

Panel No.: 045, Session: EX1

#### Big Challenges in a Small Eye: Management of Secondary Angle Closure Glaucoma and Aqueous Misdirection in a Nanophthalmic Patient, a Case Report

First Author: Cherry Vhie **ORTEGA**

**Purpose:** Nanophthalmos is a rare ocular disorder presenting with a short axial length and a high lens/eye volume ratio, wherein patients are predisposed to develop secondary angle closure glaucoma (SACG). This report discusses the management of a challenging case of a nanophthalmic patient with SACG, who subsequently developed aqueous misdirection.

**Methods:** A 40-year-old female with nanophthalmos presented with left eye pain, blurring of vision, and elevated intraocular pressure (IOP). Anti-glaucoma medications were given, and 2 laser procedures were done prior to and in preparation for incisional surgery: (1) laser iridotomy and (2) MicroPulse transscleral cyclophotocoagulation. Two incisional procedures were performed to manage SACG: (1) trabeculectomy with mitomycin and (2) phacoemulsification with intraocular lens implantation combined with glaucoma drainage device (GDD) implantation (Paul Glaucoma Implant, PGI).

**Results:** Despite maximum tolerated anti-glaucoma medications, laser procedures, and trabeculectomy, the IOP remained fluctuating, hence the need to perform a second incisional procedure in the form of lens extraction with GDD implantation. However, the IOP and AC were still rising and progressively shallowing, respectively. Ultrasound biomicroscopy revealed findings suggestive of aqueous misdirection, for which pars plana

vitrectomy combined with GDD repositioning, synechiolysis, surgical iridectomy, and transeptal injection of steroids were performed. Post-surgery, the AC deepened and the IOP stabilized until 10 days post-surgery.

**Conclusions:** Management of glaucoma in nanophthalmos can be quite challenging and results can be very unpredictable. The outcomes of this report suggest that a meticulous tailor-made approach and very careful vigilance for complications, even many weeks post-surgery, are required so prompt management can be performed.

Poster No.: EX1-046

Panel No.: 046, Session: EX1

#### Codeless Methodologies in Artificial Intelligence: A Study on Transfer Learning and Automated Machine Learning Applications Within the Ophthalmological Domain

First Author: Suklengmung **BURAGOHAIN**  
Co-Author(s): Harsha **BHATTACHARJEE**, Henal **JAVERI**, Subham **SINHA ROY**

**Purpose:** To make a codeless machine learning model using transfer learning for fundus and optical coherence tomography (OCT) image classification.

**Methods:** Publicly available datasets of over 400 fundus images and 572 OCT scans were utilized for training of machine learning models on automated machine learning (AML) platforms such as Apple's CreateML, Google's AutoML, Clarifai, and Medicmind.

**Results:** Google's AutoML resulted in a model with an average accuracy of 0.979 with a precision and recall of 98.21%. Apple's CreateML showed an accuracy of 64%. Model trained on Clarifai showed an average accuracy of 0.951 with precision of 0.72 and recall of 0.56. Model trained on Medicmind for diabetic retinopathy grading with inception v3 architecture showed a receiver operating characteristic (ROC) area under the curve (AUC) of 0.75.

**Conclusions:** Utilizing a codeless approach or leveraging automated machine learning

(AML) in conjunction with transfer learning manifests the capacity to yield proficient artificial intelligence (AI) models. The strategic integration of transfer learning holds the potential to substantially curtail the time investment required for the training of AI models. This facet also holds promising implications for AI research, particularly catering to clinicians devoid of programming expertise.

**Poster No.:** EX1-047

**Panel No.:** 047, **Session:** EX1  
**Comparison of Different Topical Anesthetics for Intravitreal Injections: A Randomized Crossover Clinical Trial**

*First Author:* Jeffrey **LO**  
*Co-Author(s):* Christopher **GO**, Wai-ching **LAM**, Veronica **LI**

**Purpose:** To evaluate the analgesic effect of topical proparacaine applied in a droplet form versus a pledget form in patients undergoing intravitreal injections (IVI).

**Methods:** This is a single-center, prospective, randomized, double-blind crossover study. Sixty patients were included. Patients were randomized in a 1:1 ratio to receive 0.5% proparacaine soaked pledget, or placebo with normal saline soaked pledget. The patients would later be crossed over to receive the alternative intervention. Pain was assessed with a visual analog scale and questionnaire immediately afterwards, 10 minutes, and 20 minutes after injection.

**Results:** Pain intensity as assessed on the visual analog scale was lower for the droplet group compared to the pledget group immediately (2.24 cm vs 2.60 cm), 10 minutes (1.57 cm vs 2.03 cm), and 20 minutes (1.08 cm vs 1.60 cm) after injection; however this was not statistically significant ( $p = 0.48$ ,  $p = 0.43$ ,  $p = 0.24$ , respectively).

**Conclusions:** Topical proparacaine applied in a pledget form does not enhance anesthesia compared to a droplet form for IVI.

**Poster No.:** EX1-048

**Panel No.:** 048, **Session:** EX1  
**Comparison of Visual Field 24-2 and 24-2C Test Grids for Chloroquine/ Hydroxychloroquine Retinopathy Patients and High-risk Patients**

*First Author:* Chananchida **WONGWACHIRA**  
*Co-Author(s):* Sunee **CHANSANGPETCH**, Wijak **KONGWATTANON**, Anita **MANASSAKORN**, Kitiya **RATANAWONGPHAIBUL**, Disorn **SUWAJANAKORN**

**Purpose:** To compare SITA standard 24-2 and SITA faster 24-2C tests in chloroquine/hydroxychloroquine (CQ/HCQ) retinopathy patients and high-risk patients.

**Methods:** A prospective, cross-sectional study of 63 participants who underwent CQ/HCQ retinopathy screening using SITA standard 24-2, SITA faster 24-2C, optical coherence tomography, fundus autofluorescence, and complete eye examination in dilated eyes on the same day. All participants were categorized into retinopathy and non-retinopathy groups by graders. Wilcoxon signed-rank tests were used to assess the differences in visual field (VF) parameters between both VF tests.

**Results:** Among 63 participants, 24 (38.1%) were diagnosed with CQ/HCQ retinopathy. With regards to VF parameters, i.e., median deviation (MD), pattern standard deviation (PSD), central mean sensitivity, and number of flagged pattern deviation points at  $P < 1\%$  in the central 10-degree, there were statistically significant differences in the retinopathy group compared to the non-retinopathy group in both VF tests ( $P < 0.03$ ), but there were comparable between both VF tests in each group ( $P = 0.30-0.93$ ) except for PSD in the retinopathy group (2.16 dB in 24-2 versus 1.93 dB in 24-2C;  $P = 0.03$ ) and MD in the non-retinopathy group (-0.65 dB in 24-2 versus -0.90 dB in 24-2C;  $P = 0.02$ ). Both VF tests had a strong positive correlation with a coefficient of 0.93. Duration of testing in 24-2C was shorter than 24-2 (2.2 versus 4.5 minutes;  $P < 0.001$ ).

**Conclusions:** Both SITA standard 24-2 and SITA faster 24-2C tests are similar in CQ/HCQ

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retinopathy screening but SITA faster 24-2C minimizes test duration. Adding testing points in the central 10-degree does not increase the ability of CQ/HCC retinopathy detection in Asian populations.

**Poster No.:** EX1-049

**Panel No.:** 049, **Session:** EX1

**Learnings and Challenges in Smartphone Fundus Photography! 2-year Journey of a New VR Surgeon**

**First Author:** Harshit **VAIDYA**

**Purpose:** To highlight the practical implications, difficulties, and learnings of smartphone fundus imaging.

**Methods:** Observational case series of 850 patients examined over a period of 2 years. A single vitreo-retina surgeon captured the images using Samsung M21 and Vivo Y100 and a 20 D volk lens in an outpatient setting across multiple clinics and hospitals in the city of Mumbai, India.

**Results:** The image quality of the initial 100 photographs was poor due to the learning curve of the procedure. Portability and the low cost of the smartphone make it a viable option for ophthalmologists who have joined the practice recently, those working in remote areas with lesser access and financial support, for fundus evaluation of bedside patients as well as a telemedicine tool. Reduced field of view and the need for pupillary dilatation is certainly a drawback. The most important difference between the 2 smartphones was the placement of the flashlight with respect to the camera (next to the camera in the Samsung M21 vs below the camera in Vivo Y100). Newer smartphones help in acquiring similar to superior quality of images of macular lesions in experienced hands when compared to the more expensive tabletop fundus cameras. Better quality images are obtained by thorough explanation about the procedure to the patients.

**Conclusions:** An economical portable fundus screening and documenting method adds value to ophthalmologists especially those in residency or just starting out their ophthalmic

practice. Choosing an appropriate smartphone with flashlight preferably placed next to the camera provides significantly better images.

**Poster No.:** EX1-050

**Panel No.:** 050, **Session:** EX1

**Practice Profile and Geographical Distribution of Ophthalmologists in the Philippines**

**First Author:** Roland Joseph **TAN**  
**Co-Author(s):** Maria Victoria **RONDARIS**,  
Roseny Mae **SINGSON**

**Purpose:** To determine the practice profile and distribution of ophthalmologists in the country.

**Methods:** Cross-sectional study of Philippine Academy of Ophthalmology (PAO) members, members-in-training, and non-members from August-December 2022.

**Results:** There were 1140 respondents. 636 (58%) were male. Mean age was  $47 \pm 12$  years. 979 (86%) were actively practicing. 563 (57%) held purely private practice. 541 (55%) were general ophthalmologists (GO). The most common subspecialty practiced by actively practicing GO was cataract and refractive surgery. 408 (42%) had active combined practice (GO+ subspecialty). 374 (92%) held purely or predominantly private practice. 134 respondents were still in training. Primary clinic of all respondents were highest in National Capital Region (NCR) (34%), region 4A (11%), and region 3 (10%). 628 (64%) ophthalmologists had secondary clinics in 719 separate areas from primary. 263 (42%) had secondary clinics located in a different region from primary. Location of primary+secondary clinics was highest in the NCR (42%). 80% of all clinics were in Luzon. GO clinics were mostly in the NCR (28%). Ophthalmologists with combined practice were mostly in the NCR (52%) too. Actively practicing ophthalmologists held clinics in only 244 (15%) Philippine municipalities/cities. 70% were in Luzon despite Luzon only having 47% of the municipalities/cities of the Philippines. 22% of all municipalities/cities in Luzon, 9% in Visayas, and 8% in Mindanao had at least 1 ophthalmologist. Most actively practicing ophthalmologists see patients 2-6 times per week in primary clinic (94%).



**Conclusions:** The number of ophthalmologists actively practicing was adequate for the country. However, maldistribution and affordability remained significant challenges as numerous regions only have a few ophthalmologists to attend to large populations and most only/ predominantly hold private practice.

Poster No.: EX1-051

Panel No.: 051, Session: EX1

**Pupillometry Findings in Patients with IgG4-related Ophthalmic Disease: A Case Series Study**

First Author: Pok Yiu Angus **LEUNG**  
Co-Author(s): Kam Lung **CHONG**, Kenneth **LAI**,  
Chen Hui **TANG**, Yifei **YANG**

**Purpose:** IgG4-related ophthalmic disease (IgG4-ROD) is an emerging disease that can affect any part of the ocular adnexa. This study aims to review the pupillometry findings in IgG4-ROD patients compared with healthy controls.

**Methods:** This is a case series of 23 biopsy proven IgG4-ROD patients (16 males aged 38-77 and 7 females aged 28-78). Patients were situated in a dark environment, and light was introduced in 3 stages to test their pupil reactions. Resulting pupillometry data was averaged from both eyes of patients excluding extreme values, and the parameters included resting pupil size, pupil constriction amplitude, average constriction velocity, and average dilation velocity.

**Results:** The resting pupil diameter in darkness was 5.13 mm, and the percentage of pupil constriction amplitude was 37.6%. Besides, the average constriction velocity was 1.06 mm/s, while the average dilation velocity was 0.266 mm/s.

**Conclusions:** By comparison with the pupillometry findings from healthy control data (Tekin et al 2018), the resting pupil diameter and pupil constriction amplitude were considerably lower for IgG4-ROD patients, and both average constriction and dilation velocities were significantly lower as well. Further studies

to observe the involvement of the sympathetic nerve system in IgG4-ROD is warranted.

**Paediatric and Neuro Ophthalmology**

Poster No.: EX1-198

Panel No.: 198, Session: EX1

**Complete Ophthalmoplegia in Herpes Zoster Ophthalmicus**

First Author: Natalie **CHAU**  
Co-Author(s): Stephanie Wing Ki **YUK**

**Purpose:** Herpes zoster ophthalmicus (HZO) is the reactivation of varicella zoster virus (VZV) along the ophthalmic division of the fifth cranial nerve. Previous studies have outlined complications including keratitis, uveitis, scleritis, retinitis, and optic neuritis. However, few reports have described the rare association of HZO and complete ophthalmoplegia.

**Methods:** We report 2 cases of HZO-related optic neuritis with orbital apex syndrome (OAS) and cavernous sinus syndrome (CSS), respectively.

**Results:** Two patients suffered from characteristic cutaneous zoster lesions and superimposed bacterial infection, with complete ophthalmoplegia developing within 2 weeks of cutaneous onset. While one patient had OAS, the other patient had CSS with cavernous sinus thrombosis (CST) diagnosed on magnetic resonance imaging. Neuroimaging also showed optic neuritis in both patients. Lumbar puncture was unremarkable in the patient with OAS, but was positive for VZV in the patient with CST. Both patients were treated with systemic antivirals, antibiotics, and corticosteroids. There was visual improvement in both patients. While there was near-complete resolution of ophthalmoplegia in the patient with OAS, there was no recovery in ocular motility in the patient with CST.

**Conclusions:** HZO may uncommonly result in ocular motor deficits due to inflammation at the orbital apex and cavernous sinus or orbital myositis. In HZO-related ophthalmoplegia, systemic antivirals and corticosteroids may be effective in treating intraocular, optic nerve,

and cranial nerve inflammation. Timely referral, diagnosis, and workup with neuroimaging and systemic evaluation are crucial in ruling out and managing sight and life-threatening conditions in HZO-related optic nerve and ocular motility dysfunction.

**Poster No.:** EX1-199

**Panel No.:** 199, **Session:** EX1

**Walker-Warburg Syndrome: Eye Manifestations, Diagnostic and Management Challenges: A Case Report**

*First Author:* Chun Sum **PANG**

*Co-Author(s):* Connie **LAI**

**Purpose:** We report a case of an infant with congenital muscular dystrophy-dystroglycanopathy (with brain and eye anomalies) type A, also known as Walker-Warburg syndrome (WWS), a rare autosomal recessive disorder characterized by congenital muscular dystrophy, brain, and ocular malformations. We aim to raise awareness amongst ophthalmologists and pediatricians on possible ocular manifestations and challenges in patients with dystroglycanopathies.

**Methods:** Ophthalmology was consulted for eye screening shortly after birth of the infant. At 5 days, there was bilateral mittendorf dot, optic nerve and macular hypoplasia, hypopigmented fundi. Based on MRI brain, muscle biopsy, and genetic study, he was diagnosed with WWS at 1 month. On follow up review at 4 months, ocular exam showed features of glaucoma with left eye buphthalmos, corneal edema, and Haab's striae. He had gradually developed bilateral eye increased intraocular pressure (right eye 26.8 mm Hg, left eye 36.6 mm Hg), high myopia, and posterior subcapsular cataract.

**Results:** Examination under general anesthesia and BE trabeculotomy was performed. Postoperatively both eyes developed hypotony requiring measures to normalize the IOP. A large retinal hole in the right eye was then noted on fundal exam, which was inconspicuous when retrospectively noted in Retcam. Barrier laser was challenging due to poor uptake in a hypopigmented fundus. His right eye then

developed iris bombe with raised IOP, requiring emergency surgical iridectomy.

**Conclusions:** This report highlights that early ocular screening with context is important. Diagnostic and management challenges were also demonstrated. It remains uncertain whether his glaucoma was due to his underlying syndrome or due to steroid use for control of his epilepsy.

Pediatric Retina

**Poster No.:** EX1-052

**Panel No.:** 052, **Session:** EX1

**A Case Report of Late-onset Retinoblastoma Presenting Atypically as Secondary Angle Closure Glaucoma**

*First Author:* Ana Camille **SANCHEZ**

*Co-Author(s):* Ricardo **VENTURA**, Sandra **WORAK**

**Purpose:** To present a case of late onset retinoblastoma with an atypical presentation in a 6-year-old male.

**Methods:** Case report.

**Results:** This is a case report of a 6-year-old Asian male, who came in due to left eye pain. He presented with eye redness, increased intraocular pressure, shallow anterior chamber, and cataract of the left eye, initially managed as a case of secondary angle closure glaucoma of the left eye. On B scan ultrasonography, there were calcifications in the mid-vitreous cavity. On orbital computed tomography scan with contrast, there was a high attenuation density seen in posterior chamber of left orbit and thickening of the left lateral rectus muscle. Urgent evaluation under general anesthesia was done. Ultrasound biomicroscopy of the left eye revealed shallow anterior chamber, hyperechoic deposits on the iris, lens, along the area of the zonules, pars plana, and peripheries of the retina extending to the hyaloid area, indicating tumor infiltration. All ancillaries led to the diagnosis of an atypical presenting retinoblastoma. Proper staging, immediate enucleation with orbital implant, and subsequent chemotherapy was done.

Histopathologic findings revealed presence of Homer Wright rosettes in the previously mentioned structures confirming the diagnosis of retinoblastoma.

**Conclusions:** There should be high clinical suspicion of intraocular tumors in cases of pediatric glaucoma. There is a step ladder approach which includes multimodal imaging and ancillaries that may aid in the diagnosis especially in atypical presenting ophthalmologic conditions. Proper staging of retinoblastoma is vital in order to give achieve best outcomes.

Poster No.: EX1-053

Panel No.: 053, Session: EX1

**Bilateral Total Cataract After Ranibizumab Injection for Aggressive Retinopathy of Prematurity**

First Author: Ayushi **SINHA**

Co-Author(s): Parijat **CHANDRA**, Sindhuja K, Vanathi M

**Purpose:** To describe a rare case of bilateral total cataract development after ranibizumab injection for aggressive retinopathy of prematurity.

**Methods:** A preterm baby born at gestational age 29 weeks with birth weight of 1300 grams presented at 34 weeks postmenstrual age (PMA) for ROP screening. He had a history of NICU stay for 10 days with supplemental oxygen, mechanical ventilation, and sepsis. He was diagnosed with zone 2 posterior aggressive ROP (AROP) in both eyes and was administered intravitreal ranibizumab injection by an experienced surgeon in both eyes under topical anesthesia in the operating theater. On 1 week follow-up, a central nuclear cataract was noted in both eyes, with no inflammation or obvious capsular injury. It progressed to a total white cataract in 2 weeks. At 40 weeks PMA, 4 weeks post-injection, he underwent uneventful cataract surgery.

**Results:** During cataract surgery, no signs of posterior lens capsule injury were observed. This allowed clear fundus examination on follow-up, enabling detection of ROP reactivation in zone 2 anterior at 7 weeks post-

injection. The peripheral avascular retina was lasered and the ROP regressed.

**Conclusions:** Bilateral cataract after anti-VEGF injection is rare, and may not always be due to obvious iatrogenic lens injury. While correct injection technique is important, the possibility of anti-VEGF drug toxicity cannot be ruled out.

Poster No.: EX1-054

Panel No.: 054, Session: EX1

**Clinical Efficacy of Intravitreal Injection of Leizumab in the Treatment of Neonatal Familial Exudative Vitreoretinopathy of Stage 2**

First Author: Li **NAN**

**Purpose:** To observe the clinical effect of intravitreal injection of ranibizumab for the treatment of familial exudative vitreoretinopathy (FEVR) of stage 2.

**Methods:** Retrospective, non-controlled clinical study. Fourteen neonatal patients diagnosed with FEVR of stage 2 were selected from 2021 to 2022 at our hospital. Eight patients (57.14%) were female and 6 patients (42.86%) were male. The regression of retinal neovascularization after intravitreal injection of ranibizumab and the inflammation in the vitreous cavity were evaluated.

**Results:** The mean gestational age was  $39.34 \pm 0.95$  weeks; the average birth mass was  $3.36 \pm 0.32$  kg; the average correct gestational age was  $41.30 \pm 1.45$  weeks. The mean follow-up time was  $62.31 \pm 6.20$  weeks. The neovascularization was completely subsided after single IVR treatment in 24 eyes, accounting for 88.89% of all eyes. IVR or laser treatment was repeated in 3 eyes, accounting for 11.11% of all eyes. Condition of 1 eye was stable after IVR treatment again, accounting for 3.70% of all eyes. After IVR repeated in 2 eyes, angiogenesis and fiber proliferation still occurred in the lesion, accounting for 7.41% of all eyes. None of the eyes advanced to FEVR of stage 2 or greater. During the operation, all the eyes were found to have transient corneal edema related to drug injection, which disappeared after half an hour.

**Conclusions:** Ranibizumab is effective in the treatment FEVR of stage 2, and the Retcam is the key point for early detection and treatment of FEVR. However, long-term efficacy and safety still need further study.

**Poster No.:** EX1-055

**Panel No.:** 055, **Session:** EX1

**Congenital Retinoschisis in Children: Influence of Presenting Age on Anatomical and Visual Outcomes**

*First Author:* Anjali **MAHESHWARI**

*Co-Author(s):* Akash **BELENJE**, Subhadra **JALALI**

**Purpose:** To evaluate differences in the anatomical and visual outcomes of retinoschisis (RS) in children who present early (<5 years of age) versus later (6-18 years of age).

**Methods:** Retrospective analysis of 38 subjects (n = 73 eyes) with congenital RS. They were categorized into group A (<5 years, 15 subjects, n = 30 eyes) and group B (6-18 years, 23 subjects, n = 43 eyes) based on age at presentation.

**Results:** Mean age at presentation for groups A and B were  $2.88 \pm 1.43$  and  $9.6 \pm 4.03$  years, respectively. Gradual blurring of vision was the primary symptom in 33.33% of eyes in group A and 58.4% in group B. Initial BCVA for group A and B was  $1.2 \pm 0.42$  log MAR and  $1.18 \pm 0.75$  log MAR ( $p = 0.93$ ), respectively. Retinal detachment was seen in 14 and 19 in group A and group B, respectively, of which 18 eyes in group A and 19 eyes in group B underwent surgery. There was no significant difference in the final anatomical outcomes between the groups, with group A having good outcomes in 16 eyes and group B in 17 eyes. Topical dorzolamide was prescribed for 13 eyes in group A and 10 eyes in group B. At 1 year follow-up, there was a notable difference in visual outcomes in the 2 groups ( $p = 0.04$ ) but not at 3 years.

**Conclusions:** The younger children ( $\leq 5$  years) underwent surgical intervention more frequently, hence proper dilated fundus evaluation in non-verbal children is critical

to detect RS in asymptomatic eyes. These results emphasize the need for early diagnosis and management and will help in parental counseling regarding outcomes.

**Poster No.:** EX1-056

**Panel No.:** 056, **Session:** EX1

**Heads-up 3-dimensional Visualization System and Integrated Intraoperative Optical Coherence Tomography in Infantile Vitreoretinal Surgeries**

*First Author:* Akash **BELENJE**

*Co-Author(s):* Subhadra **JALALI**, Brijesh **TAKKAR**

**Purpose:** To demonstrate the applications of heads-up 3-dimensional visualization system and integrated intraoperative optical coherence tomography (iOCT) in a spectrum of complex infantile vitreoretinal surgeries.

**Methods:** Two different 3D visualization systems were used during the surgery on a case-to-case basis and iOCT was used as needed. The vitrectomy system used was the same for all the surgeries. Disease spectrum included retinal disorders due to retinopathy of prematurity, familial exudative vitreoretinopathy, and retinitis.

**Results:** A total of 10 eyes of 7 cases were included; out of which 5 eyes of 4 unique cases were operated under 3D visualization system and the remaining 5 eyes of 3 other cases under the conventional microscope. The cases present our initial experience of the 3D visualization and iOCT system over the conventional microscope with appropriate imaging and surgical videos.

**Conclusions:** Infantile vitreoretinal surgeries are difficult to teach, require an ergonomically friendly surgical environment, and unpredictable surgical adjustments, which are the chief advantages of the discussed technologies. Heads-up 3D visualization system and iOCT appeared to be powerful new tools that can be explored further for use in complex infantile vitreoretinal surgeries.



Poster No.: EX1-057

Panel No.: 057, Session: EX1

**Intravitreal Bevacizumab and Laser Treatment of Aggressive Retinopathy of Prematurity: Long-term Study in Eastern India**

First Author: Nilutpal **BORAH**

**Purpose:** A prospective, multicenter study done in Eastern India to evaluate long-term efficacy and safety of treatment (tt) of aggressive retinopathy of prematurity (APROP) with single dose (0.625mg) intravitreal bevacizumab (IVB, 0.625 mg) and deferred green laser (GL) treatment in SNCU/NICU.

**Methods:** Study period: January 2012 to March 2023. M = 34, F = 30. Simultaneous bilateral IVB was given (0.625 mg) and GL to persistent avascular zone after 4-5 weeks. Treatment was given in SNCU or NICU with proper aseptic and antiseptic care. Follow up: weekly for 6 weeks, 3 monthly then 6 monthly up to 12 years. Mean follow up: 6.2 years.

**Results:** Sixty-four (128 eyes) extremely to very preterm, LBW (mean: 1260 g) babies with APROP were treated. Mean gestational age was 30.3 weeks. Retreatment with GL was necessary in 14 eyes. Overall success rate was 91% (11/128). Seven eyes progressed to stage 5, 4 eyes to 4 B requiring vitrectomy. Ocular complications were conjunctival hemorrhage 83, lid swelling 110, and cataract 2 eyes. Late complications were myopia 71%, amblyopia 21%, strabismus 78%, and nystagmus 7%.

**Conclusions:** In zone 1 stage 3 ROP as compared to laser, 1 dose of bevacizumab (0.625 mg) had significantly better results in reducing the recurrence rate (BEATROP study). Long-term study showed that in aggressive ROP (in zone 1 and posterior zone 2), single dose of IVB and deferred GL caused regression of ROP in 91% of eyes. Also early detection and urgent tt (IVB) were very effective in preserving good vision and visual field. Combination treatment in SNCU/NICU along with correction of systemic factors is less expensive and safe in cases of limited manpower and financial resources.

Poster No.: EX1-058

Panel No.: 058, Session: EX1

**Lucky to be Born Premature**

First Author: Haemoglobin **PARIDA**

Co-Author(s): Renu **PUTHENVILAYIL RAJAN**

**Purpose:** To present 2 cases of Coats disease in premature infants detected as a part of retinopathy of prematurity screening.

**Methods:** A 39-week-old infant was found to have unilateral zone 2 dilated and tortuous vessels with mature vessels in the other eye. During the course of 4 weeks he developed exudation with intraretinal cystic lesions. Intravitreal ranibizumab was injected followed by green laser to vessels and avascular retina. A 3-month-old baby was referred with unilateral zone 2 stage 3 ROP post intravitreal ranibizumab and retinal photocoagulation done elsewhere. On examination dilated tortuous vessels with exudation were noted. Intravitreal bevacizumab with green laser photocoagulation to the dilated vessels was done. Exudates resolved over 8 months and the child had good visual behavior at 1 year of age.

**Results:** Both the patients had slow resolution of exudates, reduction in tortuosity, and obliteration of telangiectatic vessels following laser and intravitreal anti-VEGF with stable course.

**Conclusions:** Coats disease is an uncommon condition presenting late in infants with extensive exudation, retinal detachment, or leukocoria. In premature infants it would tend to get detected during routine screening for retinopathy of prematurity. Any abnormal peripheral telangiectasia or early exudation or asymmetric retinopathy of prematurity should be carefully considered as a differential for Coats as it is a fast progressing condition and timely management is essential to preserve visual potential.

**Poster No.:** EX1-059

**Panel No.:** 059, **Session:** EX1

## Retinopathy as an Initial Sign of Hereditary Immunological Diseases

*First Author:* Yingwei **WANG**

*Co-Author(s):* Qingjiong **ZHANG**

**Purpose:** To explore if retinal degenerative or inflammatory changes may present as an initial sign of hereditary immunological disorders in eye clinic.

**Methods:** Variants in 20 genes reported to be associated with hereditary immunological disorders were selected from exome sequencing data. Potential pathogenic variants were evaluated by multi-step bioinformatics, defined according to ACMG/AMP criteria, and confirmed by Sanger sequencing and co-segregation analysis. Clinical data was summarized in detail, especially fundus performance.

**Results:** In our cohort, patients identified with pathogenic variants in 4 of the 20 genes, including nonsense variants in MSN, AIRE, and LAMB2 as well as published pathogenic missense variant in CBL, presented with retinopathy as the initial signs of the disease. Their ocular presentation mimics other forms of hereditary retinal degeneration, such as exudative vitreoretinopathy and retinitis pigmentosa. Neither extraocular symptoms nor extraocular manifestation were recorded at the time of visit to our eye clinic. In the literature, nearly 20 families were identified with variants in these 4 genes and reported to present with retinopathy. Of them, only 1 family with an AIRE homozygous variant had retinopathy as an initial symptom, while the remaining families had systemic abnormalities that preceded retinopathy.

**Conclusions:** For the first time, retinopathy was proposed as the initial and only presenting sign of hereditary immunological disorders, contrary to the previous reports where retinopathy was the accompanying sign of systemic immunological disorders. Recognizing such phenotypes of hereditary immunological

disorders may facilitate the clinical care of these patients.

**Poster No.:** EX1-060

**Panel No.:** 060, **Session:** EX1

## Retinopathy of Prematurity Computerized Screening and Monitoring Systems in a Tertiary Hospital in Ilocos Norte, Philippines

*First Author:* Edlyn **NARAVAL**

*Co-Author(s):* Moida Via **CAYABYAB**, Rocamia **FERMIN**, Maria Fe **NAVARRETE**, Jennifer Joy **SANTOS-RAYOS**

**Purpose:** The objective was to ensure that all premature babies born with any risk factor for ROP receive timely referrals, timely screenings, and no missed screenings for ROP.

**Methods:** A monitoring and screening system for ROP with an automated computer alarm was developed and implemented. Admitted babies with risk factors for ROP were enrolled in the database and monitoring system.

**Results:** The database had a total number of 244 patients enrolled from August 2022 to July 2023. Of these, 241 babies were alive at the initial ROP screening dates, while 3 (1%) died before their screening dates. All 241 (100%) patients enrolled in the monitoring system had ROP screenings, and 15 (6%) were diagnosed with ROP. For timeliness, 234 (97%) and 232 (96%) had timely referrals and screenings, respectively. The most common reason for the delays was waiting to wean patients off from the ventilation support before referring them for ROP screening. No patient enrolled in the database missed ROP screening. However, compared with the total number of admitted patients with risk factors for ROP, 2 (2%) were not enrolled in the database due to the pediatrician's confusion about the ROP referral parameter (born term, but with low birth weight). Problems during the implementation were identified and addressed.

**Conclusions:** The alarm system for screening and monitoring ROP was a helpful tool to guide healthcare workers in ensuring a timely interdepartmental referral and screening.

Poster No.: EX1-061

Panel No.: 061, Session: EX1

**The Clinical and Genetic Characteristics of Chinese Children with Stickler Syndrome Associated with COL2A1 Variants**

First Author: Yi **JIANG**

Co-Author(s): Qingjiong **ZHANG**

**Purpose:** This study aims to elucidate the clinical and genetic features of COL2A1-associated Stickler syndrome.

**Methods:** The COL2A1 variants were detected by exome sequencing in patients recruited from our Pediatric and Genetic Clinic in the last 5 years. Then, the variants were multiple-steps bioinformatics, co-segregation analysis, and finally confirmed by Sanger sequencing. Associated clinical data were analyzed.

**Results:** The 30 potential pathogenic COL2A1 variants were identified in 32 unrelated pedigrees with Stickler syndrome. These patients had a mean age at the first visit of  $5.78 \pm 8.31$  years. The mean axial length and refraction for the right eye were  $-9.39 \pm 4.75$  diopters and  $25.9 \pm 1.7$  mm, respectively, while for the left eye, they were  $-9.2 \pm 4.5$  diopters and  $26.3 \pm 2.1$  mm. The 12 probands were identified with vitreous opacity. Classic myopic fundus C1 (58%) and C2 (25.8%) were observed in most of the probands. Except for 3 probands diagnosed as Stickler syndrome, the referring diagnosis of probands at the first visit was mostly simple high myopia (65.6%). The specific peripheral retinal changes were observed in 47.8% of probands. The extraocular symptoms were only identified in 6 probands including skeletal and facial abnormalities, auditory dysfunction, and cleft palate.

**Conclusions:** This study indicates that the fundus changes and extraocular manifestations observed in children with Stickler syndrome were not as typical or significant as those found in adults. Careful examination of the peripheral retina and genetic screening is warranted for children with high myopia in order to identify signs of risk with retinal detachment.

Poster No.: EX1-062

Panel No.: 062, Session: EX1

**Tsp-1+ Microglia Attenuate Retinal Neovascularization by Maintaining the Expression of Smad3 in Endothelial Cells Through Exosomes with Decreased miR-27a-5p**

First Author: Qian **LUO**

Co-Author(s): Yan **LI**, Jin **QIU**, Keming **YU**, Jing **ZHUANG**, Zihua **JIANG**

**Purpose:** Microglia with a repertoire of functions are critical in pathological regulation of angiogenesis in the retina. However, retinal microglia with beneficial contributions and corresponding mechanisms during pathological neovascularization are poorly understood.

**Methods:** We conducted a bioinformatic comparison of scRNA-seq data between retinal microglia from mice with oxygen-induced retinopathy (OIR) and an antiangiogenic microglial population named MG3 from the spine. The essential beneficial factor Tsp-1 from microglia was discovered and then validated in the retina of mice with OIR at P17. Exosomes were isolated from microglia. HUVEC morphology studies, exosomes miRNA sequencing, luciferase reporter assay, miRNA loss of function studies, and intravitreal injection were applied in this study.

**Results:** Retinal microglia named RMG1 share features with MG3 in regulating wound healing, cell adhesion, and angiogenesis. Tsp-1 was especially expressed in both MG3 and RMG1. However, the scarcity of Tsp-1+ in RMG1 impedes the recovery of retinal neovascularization. Subsequently, we found that exosomes derived from Tsp-1+ microglia inhibit the migration and tube formation of HUVEC. Moreover, Tsp-1 knockout led to the enrichment of miR-27a-5p in exosomes from microglia and promoted angiogenesis in vitro. In addition, Smad3, a receptor-activated Smad protein that is conducive to vascular homeostasis, was defined as a functional target gene of miR-27a-5p. These data were consistently confirmed in the retina of mice with OIR.

**Conclusions:** The Tsp-1/miR-27a-5p/Smad3 axis is involved in microglia-related and exosome-mediated antiangiogenic regulation of the retina. This study reveals a novel mechanism by which retinal microglia maintain vascular homeostasis, thereby providing a new therapeutic target for pathological neovascularization.

## Retina (Medical)

**Poster No.:** EX1-063

**Panel No.:** 063, **Session:** EX1

**3 + Treat-and-extend Versus 3 + Pro Re Nata Regimen Intravitreal Conbercept Injections for Neovascular Age-related Macular Degeneration: Results from COCOA, a Prospective, Open-label, Multicenter, Randomized Phase IV Clinical Trial**

*First Author:* Mingwei **ZHAO**

*Co-Author(s):* Yaoyao **SUN**

**Purpose:** To compare the efficacy and safety of conbercept using a 3 + treat-and-extend (T&E) vs a 3 + pro re nata (PRN) regimen in Chinese patients with neovascular age-related macular degeneration (nAMD).

**Methods:** Patients who had not received anti-VEGF intraocular injection within 3 months prior to enrollment were randomized into 2 groups: 3 + PRN or 3 + T&E group. The 3 + T&E patients were treated monthly for at least 3 doses, until resolution of clinical and spectral-domain optical coherence tomography evidence of exudative disease activity; the interval between visits then was individualized according to a strict prospective protocol. The primary outcome was the mean change in best-corrected visual acuity (BCVA) from baseline to 48 weeks, with a prespecified non-inferiority limit of -4 letters.

**Results:** 493 participants were enrolled (248 patients in the 3 + T&E group and 245 patients in the 3 + PRN group). At 48 weeks, mean BCVA letter improvement was +9.9 in the 3 + PRN group vs +8.6 in the 3 + T&E group ( $P = 0.208$ ). The percentage of BCVA improvement greater than 15 letters in the 3 + PRN group

and 3 + T&E group were 32.12% and 30.77% ( $P = 0.827$ ). The mean number of injections administered through week 48 were 6.4 and 6.9 in the 3 + PRN and 3 + T&E group ( $P = 0.028$ ). Twenty-five patients (5%) experienced drug-related adverse events, including 14 (2.8%) ocular adverse events, 7 cases for each group, respectively, and 2 (0.4%) cardiovascular adverse events.

**Conclusions:** Conbercept administered according to a 3 + T&E regimen was statistically noninferior and clinically comparable with a 3 + PRN regimen in improving BCVA from baseline to the end of study.

**Poster No.:** EX1-064

**Panel No.:** 064, **Session:** EX1

**3-year Follow-up of Intravitreal Bevacizumab for Vitreous Hemorrhage in Proliferative Diabetic Retinopathy**

*First Author:* Junwoo **LEE**

*Co-Author(s):* Kiyoung **KIM**, Jong Beom **PARK**, Seung-young **YU**

**Purpose:** To evaluate the outcomes of intravitreal bevacizumab (IVB) injection for vitreous hemorrhage (VH) in patients with proliferative diabetic retinopathy (PDR).

**Methods:** This retrospective study included 99 eyes with a new VH secondary to PDR treated with IVB injection. Prior IVB injection, history of pars plana vitrectomy (PPV), clinically significant macular edema during follow-up, and follow-up less than 3 years were excluded. Visual acuity, the number of injections, the number of new hemorrhages, and the rate of PPV were evaluated.

**Results:** At baseline, 37.4% of eyes had previously received panretinal photocoagulation (PRP). During the follow-up period, new VH was observed in 43 eyes in the first year, 27 eyes in the second year, and 21 eyes in the third year. The eyes that underwent PPV numbered 14 in the first year, 5 in the second year and 6 in the third year. At year 3, 18 eyes (18.2%) were managed with injections alone, 83 eyes (83.8%) had received PRP, and 25 (25.3%) eyes were treated with PPV.



**Conclusions:** During the 3-year follow-up, VH due to PDR, managed with IVB, exhibited a 25.3% rate of subsequent PPV, with the majority of patients undergoing non-surgical treatment.

Poster No.: EX1-065

Panel No.: 065, Session: EX1

### 3-year Outcomes of Polypoidal Choroidal Vasculopathy Treatment According to Early Polypoidal Regression: Characteristics of Polypoidal Lesions on Swept-source Optical Coherence Tomography Angiography

First Author: Jong Beom **PARK**  
Co-Author(s): Eung-suk **KIM**, Kiyoung **KIM**, Junwoo **LEE**, Seung-young **YU**

**Purpose:** To evaluate the 3-year visual and anatomical outcomes of polypoidal choroidal vasculopathy (PCV) treatment according to polypoidal regression after a loading dose and to determine the characteristics of polypoidal lesions (PLs) for early complete regression on swept-source optical coherence tomography angiography (SS-OCTA).

**Methods:** Medical records and imaging data of 35 PLs of 22 patients with PCV with more than 3 years of follow-up were reviewed retrospectively. En face and cross-sectional B-scan images of swept-source optical coherence tomography angiography (SS-OCTA), and images of ICGA, were analyzed to detect microvascular and structural changes in PLs. According to SS-OCTA-defined polypoidal regression at 3 months after the first intravitreal injection or photodynamic therapy, patients and PLs were divided into 2 groups: the regression group and the persistent group.

**Results:** Patients in the persistent group had significantly more hypertension than the regression group ( $p = 0.017$ ). BCVA was significantly different in the regression group (15 eyes) compared with the persistent group (7 eyes) after treatment in the first ( $p = 0.000$ ) and third years ( $p = 0.039$ ). In comparison between 35 PLs, the complete regression group (13 PLs) showed smaller hyperreflective round lesions in PED height ( $p = 0.012$ ), width ( $p = 0.008$ ), and intense signal flow in the hyperreflective lesion

( $p = 0.041$ ) than the non-complete regression group.

**Conclusions:** Eyes with early polypoidal regression detected on SS-OCTA showed better long-term visual outcomes. PLs that showed intense signal flow in the hyperreflective lesion and a small area ratio of the hyperreflective round lesion demonstrated better early polypoidal regression.

Poster No.: EX1-066

Panel No.: 066, Session: EX1

### A Large Case Series of Hemi-retinal Vein Occlusion: Profile of a Rare Condition with Associated Morbidities

First Author: Brijesh **TAKKAR**  
Co-Author(s): Anthony Vipin **DAS**, Yogita **KADAM**, Raja **NARAYANAN**, Sirisha **SENTHIL**, Pratima **THAKUR**

**Purpose:** To characterize hemi-retinal vein occlusion (HRVO) in patients presenting to a multi-tier ophthalmology hospital network.

**Methods:** This cross-sectional hospital-based study analyzed 2,834,616 new patients between August 2010 and June 2021. Patients with a clinical diagnosis of hemi-retinal vein occlusion (HRVO) in at least 1 eye were included as cases. The data were collected using an electronic medical record system. Data were compared to findings noted in branch RVO (BRVO) and central RVO (CRVO).

**Results:** HRVO constituted 0.9% ( $n = 191$ ) of all the retinal vein occlusions, mean age being  $60.55 \pm 10.14$  years. Most patients were male 125 (65.45%) with unilateral (92.67%) affliction. Majority presented during the sixth (31.41%) or seventh decade of life (32.46%). Most patients reported mild (37.07%) or moderate (27.32%) visual impairment, vision  $< 20/200$  being less common in HRVO (25.8%) and BRVO (17.2%) as compared to CRVO (44.1%) ( $p < 0.00001$ ). Glaucoma was diagnosed and treated in 49 (23.90%) eyes, much higher than CRVO (11.45%) and BRVO (5.04%) ( $p < 0.001$ ), though neovascular glaucoma was much less frequent than CRVO (2.9% vs 9.2%) ( $p = 0.0037$ ). On follow-up, HRVO (12.2%) eyes had lesser vision

loss as compared to CRVO (13.7%), though BRVO had the least (9.1%) vision loss.

**Conclusions:** HRVO is a rare RVO, presenting more in males. It causes less severe visual impairment compared to CRVO. A large majority of patients with HRVO do not have identifiable systemic risk factors other than age. Pre-existing glaucoma was more associated with HRVO as compared to other RVOs.

**Poster No.:** EX1-067

**Panel No.:** 067, **Session:** EX1

### **A New Systemic Marker for Diabetic Retinopathy: Serum VEGF**

*First Author:* Gaurang **SEHGAL**  
*Co-Author(s):* Nikhil **GOPALAKRISHNAN**,  
Chaitra **JAYADEV**, Priyanka **GANDHI**

**Purpose:** Vascular endothelial growth factor (VEGF), a glycoprotein secreted by vascular endothelial cells, is a novel biomarker related to the pathogenesis of onset and progression of diabetic retinopathy (DR). Though ocular VEGF levels have been quantified and studied, usage of serum VEGF as a systemic biomarker is yet to be evaluated.

**Methods:** 180 consecutive diabetic patients and 180 healthy matched controls were taken. Patients were classified based on the Early Treatment of Diabetic Retinopathy Study (ETDRS). Serum VEGF values were evaluated by enzyme linked immunosorbent assay (ELISA) and central macular thickness was assessed by NIDEK optical coherence tomography (OCT).

**Results:** Serum VEGF levels showed an incremental trend from no DR ( $275.6 \pm 28.60$  pg/mL) to mild NPDR ( $298 \pm 22.2$  pg/mL), moderate NPDR ( $301 \pm 24.6$  pg/mL), severe NPDR ( $310 \pm 28.5$  pg/mL) to PDR group ( $356.6 \pm 58.1$  pg/mL) with NPDR/PDR with CSME ( $395.2 \pm 21.5$  pg/mL). CMT showed an incremental rise from no DR ( $210.26 \pm 36.3$   $\mu$ m) to NPDR ( $222 \pm 22.65$   $\mu$ m) to PDR ( $279 \pm 31.60$   $\mu$ m) and to NPDR/PDR with CSME ( $356 \pm 30.51$   $\mu$ m). It had positive correlation with serum VEGF.

**Conclusions:** Serum VEGF has the potential to be used as a biomarker in areas with scarcity

of ophthalmologists and it can lead to timely detection and prevention of the progression of diabetic retinopathy.

**Poster No.:** EX1-068

**Panel No.:** 068, **Session:** EX1

### **A Rare Disease with Maculopathy and Multisystem Involvement**

*First Author:* Wei Kiong **NGO**  
*Co-Author(s):* Karen **CHIA**, Graham E.  
**HOLDER**, Adrian **KOH**, Augustinus **LAUDE**,  
Melissa **TIEN**

**Purpose:** To describe multimodal imaging and visual electrophysiology findings in a patient with a rare genetic disorder.

**Methods:** A case report.

**Results:** A 51-year-old woman was referred by her renal physician for ocular assessment. Her medical history included diabetes, renal impairment, sensorineural hearing impairment, stroke-like episodes, and mixed connective tissue disease. She had a significant family history of renal impairment with her mother and 2 sisters affected. Visual acuity was 6/7.5 bilaterally. Color fundus photograph showed bilateral patchy macular atrophy. Short-wavelength autofluorescence (FAF) found bilateral speckled hyperautofluorescence skirting areas of atrophy with radiating fronds resulting in "sunburst" appearances. Multifocal electroretinograms showed mid-peripheral decrease in waveform amplitudes with patchy asymmetrical sparing bilaterally. Her serum lactate was mildly elevated. She underwent genetic sequencing which revealed a point mutation (m.3243A>G) in the MTTL1 mitochondrial gene, which was consistent with the diagnosis of mitochondrial encephalomyopathy, lactic acidosis, and stroke-like episodes (MELAS). The geneticist prescribed a mitochondrial cocktail comprising oral arginine, coenzyme Q10, carnitine, and riboflavin. She was also taught to recognize signs and symptoms of a metabolic stroke and given an emergency memo to show to the emergency department should she present with an acute neurological event to start intravenous arginine. She subsequently underwent an

MRI scan of the brain at baseline to screen for subclinical neurological deficits.

**Conclusions:** Early recognition of the classic phenotypic characteristics of MELAS on multimodal imaging and visual electrophysiology allows for early genetic testing and diagnosis, thereby shortening the diagnostic odyssey and preventing premature morbidity and mortality for the patient.

Poster No.: EX1-069

Panel No.: 069, Session: EX1

**Assessing the Efficacy and Durability of Faricimab in Patients Currently Treated for Neovascular Age-related Macular Degeneration: The FURGGHORN Study**

First Author: Thomas **HONG**

Co-Author(s): Andrew **CHANG**, Gerald **LIEW**, Hemal **MEHTA**, Long **PHAN**, James **WONG**

**Purpose:** Intravitreal anti-VEGF therapeutics have revolutionized the treatment of neovascular age-related macular degeneration (nAMD). However, not all patients respond equally and do not achieve complete fluid resolution and/or experience significant visual acuity loss despite being treated in a timely manner. The FURGGHORN study is a prospective, single-arm, interventional study designed to evaluate anatomical and functional outcomes in patients with previously treated nAMD switching to faricimab from another anti-VEGF.

**Methods:** The FURGGHORN study is a multicenter cohort study, conducted across 10 clinics across Australia. 150 participants will be recruited across all sites and followed for 52 weeks. All participants will receive 4 initial loading doses of faricimab 6.0 mg every 4 weeks in accordance with the approved labelled recommendation. After week 12, a treat-and-extend treatment regime begins according to a predetermined disease activity assessment of functional and anatomical criteria. The primary endpoint is change from baseline in BCVA at weeks 12, 24, and 52. Key secondary endpoints include change from baseline in central macular thickness, retinal fluid status, and the

proportion of patients on different treatment intervals over the study period.

**Results:** The FURGGHORN study started enrolling patients in March 2023 with a 12-month recruitment period. The first pre-specified interim analysis is planned when all 150 patients have completed weeks 4, 12, and 24. Study rationale and methods will be presented at the meeting.

**Conclusions:** This is the first prospective study in Australia to provide data on the efficacy and durability of faricimab among patients with nAMD previously treated with another anti-VEGF.

Poster No.: EX1-070

Panel No.: 070, Session: EX1

**Baseline Demographic, Clinical, and Multimodal Imaging Features of Young Patients with Type 2 Macular Telangiectasia**

First Author: Nikitha **GURRAM**

Co-Author(s): Raja **NARAYANAN**, Ramesh **VENKATESH**, Sumant Vinayak **SHARMA**

**Purpose:** To report prevalence, baseline clinical, multimodal imaging, and spectral domain optical coherence tomography (SDOCT) findings in patients under 40 years of age with type 2 macular telangiectasia (MacTel).

**Methods:** This was a hospital-based, multicenter, retrospective, cross-sectional study of patients seen between 2011 and 2023. Color fundus photographs and macular SDOCT images were analyzed. Imaging characteristics were correlated with clinical stages and visual acuity.

**Results:** Sixty-two eyes of 32 patients were included in the study. Among all MacTel patients seen, the prevalence in patients under 40 years of age was 1.77%. The youngest participant in this study was 34 years old, while the median age of all participants was 39. Perifoveal graying (n = 56, 90%) was the most prevalent clinical finding and perifoveal hyperreflective middle retinal layers (n = 47, 76%) were the most prevalent SDOCT imaging finding. Less than 10% (n = 6) of the eyes presented with a proliferative disease. The

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presence of retinal pigment clumps (7% vs 67%;  $p = 0.002$ ) coincided with the presence of a proliferative disease stage. Poor visual acuity was significantly associated with the presence of outer retinal layer findings on SDOCT, including outward bending of the inner retinal layers ( $p = 0.047$ ), retinal pigment clumps ( $p = 0.007$ ), subfoveal neurosensory detachment ( $p = 0.048$ ), and subretinal neovascular membrane ( $p = 0.001$ ).

**Conclusions:** Type 2 MacTel before age 40 is uncommon. It is associated with a high prevalence of diabetes, and affects vision only in late stages.

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**Poster No.:** EX1-071

**Panel No.:** 071, **Session:** EX1  
**Central Retinal Artery Occlusion After COVID-19 Vaccination: A Multicenter Retrospective Cohort Study**

*First Author:* Paul Ho Man **LEUNG**  
*Co-Author(s):* Chi Lik **AU**

**Purpose:** COVID-19 vaccines are associated with several ocular manifestations, emerging evidence of which has been reported, whereas the causality between both is debated. We aim to investigate the risk of central retinal artery occlusion (CRAO) after COVID-19 vaccination.

**Methods:** This retrospective cohort study used the TriNetX global network, a large federated research network based in the USA, which obtained a waiver from Western institutional review board. Individuals with COVID-19 vaccination from 1/1/2020-31/12/2021 were included in the analysis. CRAO was examined by ICD-10-CM codes H34.1. Participants who received any COVID-19 vaccines were included. The control group were individuals who had not been vaccinated. Participants with history of COVID-19 infection were excluded. Only individuals with a first-time diagnosis of CRAO were included in both the case and control groups. Patients were excluded if they had suffered from any other retinal vascular occlusions, or with thrombo-embolic risk factors.

**Results:** A total of 583,681 individuals who fit the criteria were analyzed. After matching, the average age of the vaccinated group was  $53.4 \pm 18.2$  years old, whereas that of the unvaccinated group was  $53.3 \pm 18.1$  years old. There was no difference of all variables between 2 cohorts. Risk of CRAO does not change significantly in 12 weeks' follow-up, except for 6–8 weeks after vaccination (hazard ratio, 2.58 (95% CI 1.01–6.54)). The risk of CRAO in the vaccinated cohort was 1.33 times higher than in the unvaccinated cohort at 2 years (95% CI 1.01–1.74).

**Conclusions:** Using big data analysis with TriNetX, we found a potential risk of CRAO at 6–8 weeks, and at 2 years after COVID-19 vaccination.

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**Poster No.:** EX1-072

**Panel No.:** 072, **Session:** EX1  
**Clinical Characteristics of Peripheral Exudative Hemorrhagic Chorioretinopathy in Asian Patients**

*First Author:* Min **KIM**  
*Co-Author(s):* Youngje **CHOI**, Hansang **LEE**

**Purpose:** Because of its low prevalence in Asian patients, few studies have comprehensively analyzed the clinical features of peripheral exudative hemorrhagic chorioretinopathy (PEHCR) in this population. Thus, this study examined its clinical characteristics among patients diagnosed with PEHCR at tertiary referral centers in Asia.

**Methods:** We reviewed the records of patients diagnosed with PEHCR between November 1, 2005, and December 31, 2020, and analyzed their demographics, comorbidities, and ocular symptoms, findings, diagnosis, and treatment.

**Results:** Among the 36 patients (43 eyes) with a mean age of  $70 \pm 13$  (range, 18–87) years, the majority were women (67%), the mean time to disease diagnosis was  $4.0 \pm 8.1$  months, and the most frequent comorbidities were hypertension (67%), diabetes (25%), and systemic malignancy (22%). Decreased visual acuity was the most common initial symptom, followed by floaters and visual field defects,



while 26% of patients had no ocular symptoms at the first visit. Most lesions were located in the inferotemporal (58%) and superotemporal (51%) quadrants, with exudations being the most prevalent finding (65%), followed by subretinal pigment epithelium hemorrhage (54%), vitreous hemorrhage (42%), and subretinal fluid (26%). Among 37 eyes (86%) that received treatment, anti-vascular endothelial growth factor injections were administered in 21 eyes (57%), while vitrectomy was performed only in 7 (19%) eyes.

**Conclusions:** Ocular findings in PEHCR are diverse, and patients are often asymptomatic, commonly resulting in delayed or misdiagnosis and inappropriate treatment. Therefore, patients with PEHCR require close follow-up and proper management.

Poster No.: EX1-073

Panel No.: 073, Session: EX1  
**Clinical Features of Retinopathy After Cardiopulmonary Resuscitation**

First Author: Su Hwan **PARK**  
 Co-Author(s): Seung Min **LEE**

**Purpose:** To evaluate the clinical patterns of retinopathy in patients who received cardiopulmonary resuscitation (CPR) using wide-field fundus photography and slit-lamp fundus examination.

**Methods:** The medical records of patients aged  $\geq 18$  years who survived after receiving CPR and underwent wide-field fundus photography and slit-lamp fundus examination within 3 months were retrospectively analyzed. Fundus findings, including retinal hemorrhage and cotton wool spots, were investigated. The subjects were categorized into the retinopathy and non-retinopathy groups based on the presence of fundus findings. Systemic and CPR-related factors were analyzed to compare the 2 groups.

**Results:** Twenty eyes (10 patients) and 28 eyes (14 patients) were included in the retinopathy and non-retinopathy groups, respectively. The retinopathy group had longer CPR time than the non-retinopathy group ( $15 \pm 11$  min vs  $6 \pm 5$  min,  $p = 0.027$ ). In the retinopathy

group, retinal nerve fiber layer hemorrhage was observed in all eyes, and intraretinal hemorrhage was observed in 55% of the eyes. Eighty percent of hemorrhages were located in the peripapillary or posterior pole. There were no interval changes in visual acuity, intraocular pressure, and central retinal thickness for 6 months. The average remission periods of retinal hemorrhage and cotton wool spots were  $6.8 \pm 2.6$  months and  $5.6 \pm 2.1$  months, respectively. No retinopathy progression was observed.

**Conclusions:** The signs of retinopathy, such as retinal hemorrhages and cotton wool spots, which are found after CPR, mainly occur in patients who receive CPR for a longer time and improve over time.

Poster No.: EX1-074

Panel No.: 074, Session: EX1  
**Endogenous Endophthalmitis Following Methicillin-sensitive Staphylococcus aureus Recurrent Psoas Abscess: Pars Plana Vitrectomy or Conservative Management?**

First Author: Reema **BANSAL**  
 Co-Author(s): Uday **TEKCHANDANI**

**Purpose:** To report the therapeutic challenges in a patient with endogenous endophthalmitis following methicillin-sensitive Staphylococcus aureus (MSSA) psoas abscess.

**Methods:** A 60-year-old male (pseudophakic in both eyes for 1 year) presented with left eye decreased vision and pain for 10 days. Recently detected diabetic, he underwent drainage of right and left psoas abscesses, 4 months and 7 weeks prior, respectively. Pus aspirate from psoas abscess grew MSSA, sensitive to all cephalosporins and carbapenems. Left eye had hand motions vision, intraocular pressure 9 mm Hg, hypopyon, exudative retinal detachment (RD), choroidal detachment (upper nasal quadrant), and subretinal abscess. Vitreous biopsy and intravitreal injection were avoided due to choroidal detachment. Blood, urine, and aqueous cultures were sterile. Intravenous vancomycin 1 g 12 hourly was started.

Following no improvement over 3 days, he was switched to intravenous cloxacillin 1 g QID.

**Results:** Following 2 weeks of intravenous cloxacillin, hypopyon and choroidal detachment resolved and the abscess decreased. He received oral cloxacillin 250 mg QID for next 2 weeks. At 2 months, left eye vision improved to 20/60 with complete resolution of hypopyon, choroidal detachment, exudative RD, and subretinal abscess.

**Conclusions:** The first therapeutic challenge in MSSA endogenous endophthalmitis was surgical versus conservative, due to choroidal detachment and subretinal abscess. Conservative management alone provided a favorable outcome (anatomical as well as functional), though gradual. The second challenge was the choice of antibiotics. Cloxacillin may be preferred to vancomycin in the empirical treatment of MSSA endophthalmitis.

**Poster No.:** EX1-075

**Panel No.:** 075, **Session:** EX1

**Evaluation of Peripheral Visual Field in Late-stage Retinal Degenerative Diseases Using Goldmann Perimetry and Full-field Stimulus Testing**

*First Author:* Daiki **SAKAI**

*Co-Author(s):* Yasuhiko **HIRAMI**, Yasuo **KURIMOTO**, Tadao **MAEDA**, Michiko **MANDAI**, Midori **YAMAMOTO**

**Purpose:** To investigate how the remaining peripheral visual field (VF) contributes to retinal sensitivity detected using full-field stimulus testing (FST) in patients with late-stage inherited retinal diseases (IRDs).

**Methods:** We reviewed the results of Goldmann perimetry and FST from the medical records of patients with IRDs whose VF represents central (within 10°) and/or peripheral islands, or undetectable.

**Results:** In total, 19 patients (19 eyes) were analyzed in this study. The median value of residual VF area was 1.38%. The median values of rod and cone sensitivities were -14.9 dB and 7.4 dB, respectively. Patients with only the

peripheral island (-33.9 dB) had better median rod sensitivity than other groups (only central, -18.9 dB; both, -3.6 dB). VF area significantly correlated with rod sensitivity ( $r = -0.943$ ,  $p = 0.005$ ) in patients with only peripheral island, but not with cone sensitivity.

**Conclusions:** Peripheral VF islands were significant contributors to FST results, especially rod sensitivity. With reduced or loss of central vision, the extent of residual peripheral VF significantly affected rod sensitivity, suggesting that FST can be useful in quantitatively estimating the remaining peripheral vision in patients with late-stage IRDs.

**Poster No.:** EX1-076

**Panel No.:** 076, **Session:** EX1

**Evaluation of Treatment Outcomes of Polypoidal Choroidal Vasculopathy Subtypes in a Multicenter Randomized Controlled Clinical Trial**

*First Author:* Colin **TAN**

**Purpose:** To evaluate the treatment outcomes of polypoidal choroidal vasculopathy (PCV) subtypes among patients from a multicenter randomized controlled trial.

**Methods:** Sixty patients with macular PCV were analyzed. The diagnosis of PCV was confirmed by a central reading center using standardized indocyanine green (ICGA) and fluorescein angiography (FA). Type A PCV had polyps with interconnecting channels, type B had polyps with branching vascular networks with no leakage on FA, and type C had polyps with branching vascular networks with significant leakage on FA. The visual acuity (VA) and central retinal thickness (CRT) of the PCV subtypes were evaluated.

**Results:** Of the 54 patients who were gradable for PCV subtype, 8 had type A PCV (14.8%), 27 had type B (50%), and 19 had type C (35.2%). Both VA and reduction in retinal thickness varied significantly with PCV subtype. At month 6, type A PCV had the best VA compared to types B and C (80.1 letters vs 67.2 vs 50.4, respectively,  $p < 0.001$ ). Type A PCV gained 13 letters vs 8.5 (type B) and 6.9 (type C) (p

< 0.001). The proportion of patients with VA  $\geq 20/40$  was highest for type A compared to types B and C (100% vs 51.9% vs 10.5%,  $p < 0.001$ ). Post-treatment, the CRT was thickest for type C PCV.

**Conclusions:** The PCV subtype affects visual outcomes following treatment. This PCV subtype classification is useful in prognosticating patients presenting with PCV.

Poster No.: EX1-077

Panel No.: 077, Session: EX1

**Factors Determining Timing of First Recurrence After 3 Loading Aflibercept Injections in Newly Diagnosed Neovascular Age-related Macular Degeneration**

First Author: Sang Hyeok **LEE**

Co-Author(s): Mee Yon **LEE**

**Purpose:** To investigate factors determining timing of first recurrence after 3 loading aflibercept injections in newly diagnosed neovascular age-related macular degeneration (NAMd).

**Methods:** A retrospective study conducted on 193 eyes from 193 patients who were newly diagnosed with NAMd and received 3 monthly loading aflibercept injections, and who received a fourth injection by pro-re-nata therapy regimen for recurrence between January 2016 and May 2023. Recurrence was defined as reaccumulation of subretinal or intraretinal fluid or new or increased retinal or subretinal hemorrhage. Patients were divided into 2 groups: one group received a fourth injection within 12 weeks after the third dose of aflibercept (group A), and the other group received a fourth injection after 12 weeks (group B).

**Results:** In group A (65 eyes) compared to group B (128 eyes), the frequency of polypoidal choroidal vasculopathy (PCV) was higher (60.0% vs 36.7%), the frequency of retinal angiomatous proliferation was lower (6.2% vs 18.0%), and the optical coherence tomography (OCT) findings showed pigment epithelial detachment (PED) of solid type compared to hollow type (OR = 3.14,  $p = 0.013$ ) or mixed type (OR = 3.67,  $p$

= 0.003) were more likely to be observed, and sharply peaked PED was more common (OR = 2.05,  $p = 0.045$ ) and less likely to be female (OR = 0.46,  $p = 0.034$ ).

**Conclusions:** In patients with newly diagnosed NAMd who received 3 injection loading doses of aflibercept, earlier recurrence was predicted when PCV was present, when a hollow type of PED was observed on OCT, and when the patient was male.

Poster No.: EX1-078

Panel No.: 078, Session: EX1

**Faricimab in Neovascular Age-related Macular Degeneration: Malaysian Real-world Experience: The FAME Study**

First Author: Manoharan **SHUNMUGAM**

Co-Author(s): Kenneth **FONG**, Ling **KIET PHANG**, Jun Quan **LEONG**, Hon Seng **WONG**, Wilson **WONG JUN JIE**

**Purpose:** This study aims to present the early real-world experience of faricimab in managing neovascular age-related macular degeneration (nAMD) within the Malaysian population.

**Methods:** We conducted a retrospective chart review at a single center, analyzing 28 eyes of 28 patients with nAMD who received at least 1 intravitreal faricimab injection with at least 1 month of follow-up.

**Results:** The study included 28 patients with a mean age of  $64.79 \pm 9.43$  years. Patients received a mean of  $7.42 \pm 4.45$  injections before switching to faricimab. After the first faricimab injection, BCVA improved from  $61.43 \pm 19.47$  ETDRS letters to  $65.18 \pm 14.62$  ETDRS letters (improvement in BCVA = 3.75 ETDRS letters,  $p = 0.09$ ), and mean central subfield thickness improved from  $422.5 \pm 197.37$   $\mu\text{m}$  at baseline to  $292.4 \pm 152.8$   $\mu\text{m}$  (CST reduction =  $-130.1$   $\mu\text{m}$ ,  $p < 0.01$ ) at the end of the follow-up period. At baseline presence of IRF, SRF, and PED was noted in 85.7% (24), 85.7% (24), and 50% (14) of patients, respectively, and after 1 faricimab injection, presence of IRF, SRF, and PED decreased to 67.8% (19), 64.2% (18), and 39.2% (11), respectively. Among patients who received 2 injections (25%) without loading,

the treatment interval was  $53 \pm 10.14$  days. No serious safety reactions were reported in our study.

**Conclusions:** In a real-world setting, patients with nAMD who were switched from other anti-VEGFs to faricimab showed good improvement in vision and rapid anatomical improvement after 1 faricimab injection which also demonstrated a good safety profile.

Poster No.: EX1-079

Panel No.: 079, Session: EX1

### Features of Diabetic Choroidopathy and Risk Factor Analysis

First Author: Sungyeon **JUN**

Co-Author(s): Don Il **HAM**

**Purpose:** To investigate the correlation between the diabetic choroidopathy (DMC) features observed in ultrawide-field indocyanine green angiography (UWICGA) and analyze the risk factors of each feature.

**Methods:** UWICGA was performed on 34 eyes of 17 patients with diabetic retinopathy. In the early phase UWICGA image, features of small hyper-cyanescent lesion and small hypo-cyanescent lesion were counted as the numbers of invaded area, and large hyper-cyanescent, large hypo-cyanescent, and vortex vein anastomosis (VVA) were counted as its total number of lesions identified in the entire area. The HbA1c, duration of diabetes, and whether using insulin were classified as risk factors.

**Results:** In UWICGA, small hyper-cyanescent lesion, small hypo-cyanescent lesion, large hyper-cyanescent lesion, large hypo-cyanescent lesion, and VVA were identified in 19 eyes (55%), 34 eyes (100%), 28 eyes (82%), 18 eyes (52%), and 23 eyes (67%), respectively. The number of small hyper-cyanescent lesion invaded area was correlated with the number of small hypo-cyanescent lesion invaded area ( $r = 0.380$ ,  $p = 0.006$ , partial correlation analysis), and the number of large hyper-cyanescent lesions was correlated with the number of large hypo-cyanescent lesions ( $r = 0.436$ ,  $p = 0.016$ , partial correlation analysis). In risk factor analysis, HbA1c was positively correlated with

the number of large hypo-cyanescent lesions ( $r = 0.436$ ,  $p = 0.016$ , partial correlation analysis), and there was a significant difference in the number of small hypo-cyanescent invaded areas and VVA whether using insulin or not ( $p = 0.003$ ,  $0.000$ , paired t-test).

**Conclusions:** DMC features are thought to be progressing organically with each other, and the aspect of DMC may also be different depending on the aspect of diabetes regulation.

Poster No.: EX1-080

Panel No.: 080, Session: EX1

### Fibrinous Central Serous Chorioretinopathy with Serous Retinal Detachment

First Author: Ye **LI**

Co-Author(s): Warren **APEL**

**Purpose:** To present a case and literature review of fibrinous central serous chorioretinopathy (CSCR) with serous retinal detachment.

**Methods:** Case report and literature review.

**Results:** A 54-year-old emmetropic male presented with a 2-week history of left superior field loss. He had a background of poorly controlled rheumatoid arthritis on treatment with long-term oral prednisone and commencement of upadacitinib 3 weeks prior. On examination, visual acuity was 6/7.5 and 6/9 in the right and left eye, respectively. Fundus exam of the left eye demonstrated an ill-defined 2 x 3 disc diameter white extrafoveal lesion at the inferotemporal macula with an associated inferior retinal detachment. There was no vitritis or vasculitis. OCT demonstrated extensive subretinal hyperreflective material with subretinal fluid, a small serous pigment epithelial detachment, thickened choroid, but preservation of the inner retinal layers. Fluorescein angiography showed an area of pinpoint leakage associated with the clinical lesion. Anterior chamber and vitreous tap were performed with empirical intravitreal foscarnet and oral valaciclovir, which was subsequently negative for herpes simplex, varicella zoster, cytomegalovirus, and toxoplasmosis. Serological screen was unremarkable. With the



likely diagnosis of fibrinous CSCR, focal laser was performed to the area of leakage and prednisone was weaned. Four weeks later, there was reduced metamorphopsia, improvement of vision to 6/6, and a decrease in subretinal fluid.

**Conclusions:** Fibrinous CSCR with serous retinal detachment is an uncommon manifestation of pachychoroid disease. Assessment with multimodal imaging and exclusion of infectious and inflammatory causes, particularly in immunosuppressed individuals, is necessary for its diagnosis. Focal laser offered a favorable functional and anatomical outcome.

**Poster No.:** EX1-081

**Panel No.:** 081, **Session:** EX1

**Fixed Quarterly Dosing of Aflibercept After Loading Doses in Neovascular Age-related Macular Degeneration in Hong Kong**

*First Author:* Daniel Ho Tak **WONG**  
*Co-Author(s):* Kenneth Kai Wang **LI**

**Purpose:** We aimed to investigate the success rate of planned fixed quarterly aflibercept injections after 3 loading doses (QDA3L) to achieve stability without recurrence in neovascular age-related macular degeneration (nAMD) at a tertiary eye center.

**Methods:** A retrospective study was conducted by including all consecutive cases of nAMD treated with 3 initial 4-week-apart aflibercept injections followed by 3- to 4-monthly planned injection appointments from week 20 over 5 years (2017-2021). The treatment success was defined as maintenance of an inactive disease at W52 and W104. Anatomical success was defined as no recurrence or reactivation of the AMD on OCT throughout the 2 years. Functional success was defined by a loss of less than 5 ETDRS letters.

**Results:** Forty eyes of 40 patients were included. The overall mean age was 80, with a female preponderance. Preliminary results showed that the overall success rate in our study population was 57% at week 52 and 58% at week 104. The fovea remained dry in 75% at week 52 and 68% at week 104.

**Conclusions:** The quarterly aflibercept injections after 3 initial doses could maintain a dry fovea for 68% of the patients in our locality after 2 years. This can be seen as a trade-off in patients with financial burdens in our locality who do not want so many injections and fit our subsidized programme. While this study does not suggest the superiority of this regimen, the success and failure rates can be used in the counseling process.

**Poster No.:** EX1-082

**Panel No.:** 082, **Session:** EX1

**Internal Limiting Membrane Detachment in Acute Central Retinal Artery Occlusion: A Case Series**

*First Author:* Chitaranjan **MISHRA**  
*Co-Author(s):* Naresh **KANNAN**, Kim **RAMASAMY**

**Purpose:** To report the demography, clinical features, and outcomes of 6 patients of acute CRAO with detachment of the ILM.

**Methods:** A retrospective case series, including all patients with a diagnosis of acute CRAO and a detached ILM. Patients with other retinovascular and macular pathologies were excluded. All the patients underwent OCT (HRA) macula. The minimum follow-up was 3 months.

**Results:** Over 3 years, out of 96 patients of acute CRAO, 6 patients were found to have a detached ILM. All 6 patients had macular edema. The mean (SD) of the central macular thickness (CMT) and the maximum macular thickness of the affected eye were 492 (180) and 687 (115)  $\mu\text{m}$ , respectively. The CMT of the contralateral normal eye was 176 (10)  $\mu\text{m}$ . The patients' mean (SD) age was 42 (16) years and all were male patients. Except for 1 patient with a history of systemic hypertension and CVA, all other patients did not have any systemic illness. Three patients were smokers. Five patients had a presenting vision of either HM or PL, and the final vision was PL in all of them. One patient had a patent cilioretinal artery with a presenting vision of 6/12, which was the same at 3-month follow-up. No patients developed NVG till the last follow-up at 3 months. Two patients developed CVA and stroke.

**Conclusions:** ILM detachment in acute CRAO is associated with macular edema, probably resulting from severe ischemia, presents with poor vision, the visual prognosis is bad, and the patients should be cautioned about CVA and stroke.

**Poster No.:** EX1-083

**Panel No.:** 083, **Session:** EX1

**Intravitreal Anit-vascular Endothelial Growth Factor: Its Effects on Corneal Endothelial Cell Count and Central Corneal Thickness in Phakic and Pseudophakic Eyes in an Indian Population**

*First Author:* Shaibaan **MULLA**

**Purpose:** There has been a paucity of studies to elucidate the possible endothelial toxicity of antiVEGF molecules in the Indian population. This study aims to fill that void.

**Methods:** The study was conducted in 110 eyes selected, as per selection criteria, over a time period of 18 months. At first patient visit, examination included 1. fundus examination; 2. specular microscopy was done to look for endothelial cell count and central corneal thickness. At second visit, injection of 0.5 mg/0.05 mL of ranibizumab was administered. Visits at day 1, day 7, and 1 month were done for endothelial cell density, and central corneal thickness was measured by specular microscope.

**Results:** The mean CCT value in the pseudophakic group was  $502.08 \pm 19.91$ ,  $501.9 \pm 20.31$ , and  $501.72 \pm 21.55$  on day 1, 7, and 30, respectively. The mean CCT value in the phakic group was  $506.53 \pm 22.61$ ,  $505.96 \pm 20.12$ ,  $505.92 \pm 20.3$ , and  $505.69 \pm 21.47$ . The mean value of ECD in pseudophakic eyes on day 1, 7, and 30 were  $2284.24 \pm 299.86$ ,  $2281.39 \pm 289.46$ , and  $2284.06 \pm 312.65$  cells/mm<sup>2</sup>, respectively. The mean value of ECD in phakic eyes on day 1, 7, and 30 were  $2314.51 \pm 212.08$ ,  $2313.92 \pm 212.7$ , and  $2313.63 \pm 216.86$  cells/mm<sup>2</sup>, respectively.

**Conclusions:** There was no significant change in endothelial cell density, central corneal thickness, coefficient of variation, and

intraocular pressure before and after intravitreal injection over 1 month of follow-up. The results are similar between phakic and pseudophakic eyes.

**Poster No.:** EX1-084

**Panel No.:** 084, **Session:** EX1

**Normative Data for Perfusion Density of the Superficial and Deep Capillary Plexuses Using Optical Coherence Tomography Angiography in Filipino Adults in a Tertiary Hospital**

*First Author:* Anne Therese **ESTANISLAO**

*Co-Author(s):* Ricardo Tobias **PAPA**, John Philip **UY**

**Purpose:** To establish a normative database of the superficial (SCP) and deep capillary plexus (DCP) perfusion density (PD) and to determine a range of values of perfusion density of the superficial and deep capillary plexus measured by OCTA among normal Filipino eyes.

**Methods:** Retrospective cross-sectional study of patients with normal fundus exam who underwent OCTA imaging, measuring the PD of SCP and DCP, from March 2022 to November 2022 using the CODAA algorithm on the NAVIS-EX software in the Angioscan system of the Mirante SLO/OCT machine (Nidek Co., Ltd).

**Results:** A total of 113 eyes from patients aged 22-78, 57.6% of which were male, were included in the study. Group 1 (20-39) had 45 eyes, group 2 (40-59) had 32 eyes, and group 3 (>60) had 36 eyes. The mean global PD of the SCP and DCP were 37.33% vs 20.73%, respectively. The inner, outer, and foveal ETDRS sectors of the mean PD of SCP were significantly higher than the DCP ( $P = 0.0001$ ). Age was inversely correlated with PD of the SCP and DCP in the whole, inner, and outer sectors ( $P = 0.0001$ ) and the foveal sectors of the SCP ( $P = 0.4555$ ) and DCP ( $P = 0.2345$ ). No correlation was seen between gender and PD.

**Conclusions:** Our study provided the first normative database of PD in a Filipino population. The SCP PD is significantly higher compared to the DCP PD and is significantly inversely correlated with age as seen in other

studies. Only the foveal PD of the DCP is significantly correlated with gender.

**Poster No.:** EX1-085

**Panel No.:** 085, **Session:** EX1

**OCT Features of Disease Activity After Initial Treatment of Neovascular Age-related Macular Degeneration**

*First Author:* Colin **TAN**

**Purpose:** To determine the anatomic and demographic predictors of early persistent disease activity among patients with neovascular age-related macular degeneration (nAMD).

**Methods:** In a real-world cohort study, 281 consecutive patients with nAMD were reviewed at baseline and after 3 anti-VEGF injections for pre-defined indicators of disease activity. Subretinal fluid, intraretinal cysts, and intraretinal fluid were assessed by reading-center certified graders. Multiple logistic regression was performed on demographic and anatomic factors.

**Results:** At month 3, the best-corrected visual acuity (BCVA) improvement was 0.16 logMAR for those with no disease activity compared to 0 for patients with persistent activity ( $p < 0.001$ ). The significant risk factors for persistent activity at 3 months were male gender (odds ratio [OR] 0.54, 95% confidence interval [CI] 0.32–0.93,  $p = 0.025$ ), intraretinal cysts at baseline (OR 2.95, 95% CI 1.67–5.20,  $p < 0.001$ ), and subretinal fluid at baseline (OR 3.17, 95% CI 1.62–6.18,  $p = 0.002$ ).

**Conclusions:** In a real-world study, 66.1% of nAMD patients have persistent disease activity after the initial loading dose, with poorer BCVA compared to those without. Baseline OCT features (intraretinal cysts and subretinal fluid) are useful predictors of persistent disease activity at month 3.

**Poster No.:** EX1-086

**Panel No.:** 086, **Session:** EX1

**Optic Disc Edema After Injection of Brolucizumab for Polypoidal Choroidal Vasculopathy**

*First Author:* Verghese **JOSEPH**

*Co-Author(s):* Shishir **VERGHESE**

**Purpose:** To report a case of optic disc edema in a patient with polypoidal choroidal vasculopathy after treatment with injection of brolucizumab.

**Methods:** Single center case report.

**Results:** A 47-year-old female patient presented with complaints of decreased vision in the left eye. Best-corrected vision in the right eye was 6/6 and left eye was CF 1m. Anterior segment features were unremarkable. The right eye fundus examination was normal and the left eye revealed subretinal hemorrhage and subretinal fluid with multiple pigment epithelial detachments. Multimodal imaging which included fundus photo and OCT revealed features suggestive of polypoidal choroidal vasculopathy. She was advised left eye intravitreal injection of brolucizumab 3 doses 6 weeks apart. After treatment with 3 doses her best-corrected visual acuity improved to 6/9 in the left eye. However, 2 weeks after the third injection she presented with complaints of mild visual disturbance. Left eye examination revealed vitritis with optic disc edema which was treated with topical and oral steroids and subsided after 1 week. She was advised follow up after 2 weeks.

**Conclusions:** This case highlights a previously unreported finding of optic disc edema post treatment with injection of brolucizumab.

Poster No.: EX1-087

Panel No.: 087, Session: EX1

## Pilot Study Comparing Serum and Vitreous Biomarkers in Type 1 and Type 2 Diabetes Mellitus with Diabetic Retinopathy

First Author: Shorya **AZAD**

Co-Author(s): Vineet **BATWANI**, Rohan **CHAWLA**, Nawazish **SHAIKH**, Pradeep **VENKATESH**

**Purpose:** To assess biomarkers in serum and vitreous of patients with type I and type II diabetes mellitus (DM) with proliferative diabetic retinopathy (PDR) and their correlation with systemic parameters.

**Methods:** Forty patients needing vitrectomy [20 with type II DM, 10 with type I DM, and 10 with idiopathic macular hole] were recruited. Parameters such as hemoglobin (Hb), glycosylated hemoglobin (HbA1c), fasting blood sugar (FBS), post prandial blood sugar (PPBS), and creatinine (Cr) were evaluated. Vitreous and serum samples were analyzed for VEGF-A, TNF-1 $\alpha$ , glutamate, renin, and angiotensin-II.

**Results:** In type I DM patients, serum and vitreous VEGF correlated with HbA1c, FBS, PPBS, and Hb. In type II DM patients, only serum VEGF correlated with Hb, serum glutamate and angiotensin with HbA1c, FBS and PPBS and serum TNF-1 $\alpha$  with all blood parameters. On comparing 2 groups, serum levels of renin, angiotensin, and TNF-1 $\alpha$  were found to be significantly elevated in patients with type II DM compared with type I DM ( $p = 0.021, 0.028, 0.015$ , respectively). However, only vitreous levels of VEGF were significantly elevated in patients with type I DM.

**Conclusions:** HbA1c had good correlation with both serum and vitreous VEGF in type I DM. In addition to VEGF, markers of inflammatory and RAS pathway were raised in type II DM.

Poster No.: EX1-088

Panel No.: 088, Session: EX1

## Ponatinib Induced Bilateral Neurosensory Retinal Detachment in a Patient with Chronic Myelogenous Leukemia

First Author: Katrina Beatriz **MANAS-LIM**

Co-Author(s): Fabian Arnel **DE JESUS**, Darby **SANTIAGO**, Ino Paul Racho **VILLACASTIN**

**Purpose:** To describe a unique case of bilateral neurosensory retinal detachment (NSD) in a patient with chronic myelogenous leukemia (CML) treated with a tyrosine kinase inhibitor, ponatinib.

**Methods:** This is a case report of a 20-year-old man who presented with blurring of vision and metamorphopsia and developed bilateral neurosensory detachment, 3 days after treatment with high-dose ponatinib.

**Results:** Discontinuation of the inciting drug for 2 weeks led to the improvement in visual acuity and NSD. Alternative chemotherapeutics were not an option due the patient's T315I genetic mutation, which is only responsive to ponatinib. Low-dose ponatinib regimen was given for 5 weeks without recurrence of NSD.

**Conclusions:** NSD is a rare manifestation of leukemia. Ocular toxicities are common adverse events resulting from targeted anticancer agents. Ponatinib is a new drug with only a few case reports of ocular side effects, and may play a role in the development of NSD. This case highlights the need for close monitoring in cancer or leukemic patients receiving immunotherapy who develop new visual symptoms and the potential role for screening prior to initiating immunotherapy. Further studies regarding this new drug are warranted.



Poster No.: EX1-089

Panel No.: 089, Session: EX1

**Post Hoc Analysis of Rhine/Yosemite Trials on Macular Leakage in DME with Faricimab vs Aflibercept**

First Author: Nicholas **FUNG**

Co-Author(s): Roger **GOLDBERG**, Florie **MAR**, Eric **NUDLEMAN**, Sobha **SIVAPRASAD**, Tracey **WANG**

**Purpose:** Increased vascular permeability is a hallmark feature of DME (diabetic macular edema). In mouse models, dual Ang-2 (angiopoietin-2)/VEGF-A (vascular endothelial growth factor-A) inhibition was associated with greater vascular leakage reductions vs Ang-2 or VEGF-A inhibition alone, suggesting Ang-2/VEGF-A synergism on vascular instability. This post hoc analysis evaluated whether dual Ang-2/VEGF-A inhibition with faricimab improves macular leakage, a biomarker of vascular stability, vs VEGF inhibition with aflibercept in patients with DME.

**Methods:** In the identical phase 3 YOSEMITE/RHINE (NCT03622580/NCT03622593) trials, patients were randomized to faricimab Q8W (every 8 weeks), faricimab as a personalised T&E (treat-and-extend)-based regimen, or aflibercept Q8W. Data were gathered from the head-to-head dosing period (first 16 weeks) of the trials when patients received faricimab or aflibercept Q4W. Faricimab Q8W and faricimab T&E data were pooled for analysis (faricimab total, n = 1216; aflibercept, n = 593). Macular leakage area on fluorescein angiography and the proportion of patients with resolution of macular leakage (0–1 mm2) were evaluated.

**Results:** Baseline median macular leakage area was similar in the faricimab (24.58 mm2) and aflibercept arms (25.64 mm2; P = 0.7072). At week 16, median macular leakage area was significantly lower with faricimab vs aflibercept (3.59 vs 7.62 mm2; P < 0.0001). A significantly greater proportion of patients showed resolution of macular leakage at week 16 with faricimab (28.4%) vs aflibercept (15.2%; P < 0.0001).

**Conclusions:** In patients with DME, dual Ang-2/VEGF-A inhibition with faricimab resulted in a greater reduction in macular leakage with a larger proportion of patients achieving resolution of macular leakage vs VEGF inhibition with aflibercept.

Poster No.: EX1-090

Panel No.: 090, Session: EX1

**Rarity Redefined: Atypical Optic Neuritis as the Chief Presenting Feature of Testicular Malignancy: Rare Case Report with Review of Literature**

First Author: Shaibaan **MULLA**

**Purpose:** A 23-year-old male presented with unilateral acute onset, painless, progressive diminution of vision. Initial clinical and radiological findings were consistent with optic neuritis. The patient was started on pulse steroids leading to visual recovery. However, the patient relapsed within 1 week. Repeat imaging revealed metastatic lesions near the orbital apex. Orbit is an unusual site of metastasis from testicular tumors and only 3 cases of testicular synovial sarcoma with orbital metastasis have been reported. A thorough systemic evaluation should be done in cases of atypical and relapsing optic neuritis to rule out the causes of optic neuritis (ON) masquerade syndrome.

**Methods:** Case study.

**Results:** Our patient presented with clinical features of typical ON without any radiological evidence of alternative etiologies and improved dramatically on systemic pulse steroids. It was only after the relapse after 10 days of stopping systemic steroids that extensive search for secondary causes was done and the patient was diagnosed with testicular synovial sarcoma with extensive metastasis to lungs, vertebrae, and orbits. Testicular malignancies usually affect adolescents and young adults. Orbit is an unusual site of metastasis from testicular tumors and only 3 cases of testicular synovial sarcoma with orbital metastasis have been reported in literature to date. We believe that this is the first reported case of a primary testicular

synovial sarcoma with secondary metastasis in the orbit.

**Conclusions:** ON may be the initial presenting feature of systemic malignancy, thus constituting optic neuritis masquerade syndrome. Diagnosis in such cases requires clinical precision, a high index of suspicion, and a detailed systemic evaluation.

**Poster No.:** EX1-091

**Panel No.:** 091, **Session:** EX1

**Retina Evaluation of Everest Summiteers to Find Any Retinal Changes in the Highest Altitude on Earth**

*First Author:* Kaushick **BISWAS**

**Purpose:** To find any changes in the retina of Everest summiteers who climbed to the top of the world more than once without oxygen support and to note any retinal vascular or ultraviolet radiation induced retinal changes.

**Methods:** Thirteen Sherpa aged between 22 and 40 years, all male, who climbed Mount Everest multiple times and at least 1 time without oxygen support were chosen for the study. They had no systemic disease or previous ocular ailment. Visual acuity, anterior segment examination, and intraocular pressure were recorded followed by full dilated vitreoretinal evaluation by indirect ophthalmoscopy by a single observer [Author]. Detailed retinal diagram was drawn for each of them.

**Results:** Six summiteers out of 13 had retinal changes. A 40-year-old summiteer who climbed Everest 10 times and 4 times without oxygen had moderate retinal vessel attenuation in both eyes with a macular retinal pigment epithelial scar in the right eye. Three had features suggestive of old branch retinal vein occlusion in 1 eye. Two summiteers who summited without oxygen in the same year of the study had a few round retinal hemorrhages in the midperiphery suggestive of venous stasis. Two summiteers had temporary blindness on descent.

**Conclusions:** 45% of the Everest summiteers of the study group had retinal changes due to

high altitude. Retinal vessel attenuation and branch vein occlusion were notable features. Summiting without oxygen can potentially cause retinal damages. To the best of my knowledge, this is the only study in the world to find retinal changes in Everest summiteers.

**Poster No.:** EX1-092

**Panel No.:** 092, **Session:** EX1

**Retinal Morphological and Choroidal Vascular Characteristics of Dome-shaped Macula and Inferior Staphyloma Complicated by Subretinal Detachment**

*First Author:* Jeeyun **AHN**

*Co-Author(s):* Kwangsic **JOO**, Min Seok **KIM**, Jeong Hyun **LEE**, Joo Young **SHIN**, Se Joon **WOO**

**Purpose:** To investigate retinal morphological and choroidal vascular characteristics of dome-shaped macula (DSM) and inferior staphyloma complicated by subretinal detachment (SRD).

**Methods:** Medical records of patients diagnosed with DSM and inferior staphyloma were retrospectively reviewed. Retinal morphological features including axial length, curvature height, dome orientation, presence of retinal pigment epithelial detachment, and choroidal vascular features including subfoveal choroidal thickness, variations as well as abrupt changes in choroidal thickness. and the presence of large choroidal vessels were comparatively analyzed.

**Results:** Forty eyes of 27 patients were included, in which 23 and 17 eyes were diagnosed as DSM and inferior staphyloma, respectively. SRD was present in 15 eyes (37.5%), with a higher prevalence in inferior staphyloma compared to DSM (n = 11 [64.7%] vs 4 [17.4%], p = 0.002). Dome orientation was not associated with incidence of SRD in DSM (p = 0.324). Higher curvature height (401.6 ± 65.4 μm vs 302.25 ± 76.3 μm, p = 0.024), larger extent of choroidal thickness variation (151.4 ± 81.1 μm vs 52.8 ± 23.0 μm, p = 0.036), and greater subfoveal choroidal thickness (244.5 ± 99.5 μm vs 106.0 ± 38.2 μm, p = 0.024) were factors significantly associated with presence of SRD in the inferior staphyloma compared

to DSM. Abrupt change in choroidal thickness (10/11 [90.9%]) and large choroidal vessel (9/10 [90%]) were mostly located within or at the edge of SRD area.

**Conclusions:** SRD was more prevalent in eyes with inferior staphyloma compared to DSM. Higher variations in choroidal thickness, higher staphyloma curvature, and greater subfoveal choroidal thickness were associated with SRD presence in inferior staphyloma.

Poster No.: EX1-093

Panel No.: 093, Session: EX1

**Safety and Efficacy of a New Intravitreal Ranibizumab Biosimilar in Diabetic Macular Edema and Neovascular Age-related Macular Degeneration Patients: An Indian Study**

First Author: Kaushick **BISWAS**

**Purpose:** The aim of the study is to evaluate the clinical outcome and safety of a new intravitreal ranibizumab biosimilar (IVT RB) made in India, in patients with diabetic macular edema (DME) and neovascular age-related macular degeneration (nAMD). The result of 6 months of study is presented here.

**Methods:** Twenty-six treatment-naive patients with DME (17 male and 9 female, mean age 56.2 years) and 9 patients with nAMD (6 male and 3 female, mean age 72.2 years) were treated with monthly intravitreal injection of ranibizumab biosimilar for 4 months. Primary efficacy end point was the change in the best-corrected visual acuity (BCVA) in Early Treatment Diabetic Retinopathy Study (ETDRS) letters at month 6 from baseline and secondary end point included changes in the central macular thickness (CMT) from baseline and safety of the drug.

**Results:** All patients completed 4 monthly injections and month 6 follow up. Eighteen out of 26 DME patients had a mean BCVA improvement of 6.1 ETDRS letters at month 6 and 4 out of 9 nAMD patients had a mean BCVA gain of 4.2 ETDRS letters at month 6. CMT had reduced in 22 out of 26 DME patients. Average reduction of CMT was -156 µm. Five out of 9 nAMD patients had reduced

subretinal fluid of varying degree at month 6. There was no immediate, intermediate, or delayed intraocular inflammation or infection following the IVTRB and no systemic adverse effects were noted in any patient.

**Conclusions:** The new ranibizumab biosimilar shown promising results in terms of efficacy and safety.

Poster No.: EX1-094

Panel No.: 094, Session: EX1

**Switching to Brolucizumab for Refractory Neovascular Age-related Macular Degeneration in Real-world Experience: A Systematic Review**

First Author: Andi **NADHIRA**

Co-Author(s): Ari **DJATIKUSUMO**, Andi **VICTOR**

**Purpose:** Despite the widespread use of anti-vascular growth factor (anti-VEGF) medications for neovascular AMD (nAMD), reports of poor therapeutic response and injection time limitations persist. According to clinical trials, brolucizumab demonstrated noninferiority to existing anti-VEGF drugs in terms of anatomy and function with longer injection intervals; nonetheless, post-injection inflammatory effects have been documented. The purpose of this review is to assess the efficacy and safety of switching to brolucizumab for refractory nAMD in real-world practice.

**Methods:** We used Science Direct, PubMed, ClinicalKey, and Scopus to conduct systematic searches. This review was open to observational studies and case series that included switch therapy nAMD patients who received intravitreal injection of brolucizumab.

**Results:** We included 8 studies that examined the outcome of brolucizumab in real eyes with refractory nAMD, involving 509 patients and 564 eyes. The average age of the patients was 76.3 years, with 50.49% of them being female. Twenty-eight weeks made up the median follow-up period. Improvement in central macular thickness (with mean change of 72.30 µm), subretinal fluid (SRF), intraretinal fluid (IRF), and pigment epithelial detachment (PED) was

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recorded, although the improvement in visual acuity was statistically insignificant. The longest injection interval reported was 12 weeks. Post-injection inflammation with varied severity was observed in 6.29% of the eyes.

**Conclusions:** Improvements in retinal thickness, decrease in retinal fluid, and extension of injection interval showed that brolocizumab reduced disease activity in real-world nAMD eyes that were previously treated with other anti-VEGF drugs. Treating physicians must monitor patients closely for post-injection inflammatory events.

**Poster No.:** EX1-095

**Panel No.:** 095, **Session:** EX1

**The Effect of Prophylactic Prostaglandin Analogue or Topical Beta Blocker Versus Placebo on Changes in Intraocular Pressure During Repeated Intravitreal Injection**

*First Author:* Nicholas **FUNG**

*Co-Author(s):* Tiffany **CHAN**, Phoebe **LAM**, Wai Ching **LAM**, Stephanie **POON**, Mingming **ZHU**

**Purpose:** A transient rise in intraocular pressure (IOP) is frequently noted during intravitreal injections. In this study, we compare the effectiveness of topical prostaglandin analogues and beta blockers against placebo in controlling the IOP rise post-anti-VEGF injection.

**Methods:** This study is a randomized, prospective, double-blinded, 3-arm crossover study. Consecutive patients who required at least 3 anti-VEGF injections were randomized to receive either topical hypromellose, timolol, or travatan in the first visit, subsequently crossing over to the remaining 2 drugs for each of the following visits. The IOP was measured before administration of eye drops at baseline (T0), immediately before (T1), after (T2), and 30 minutes after injection (T3).

**Results:** Sixty-one eyes from 61 patients were included, with a total of 183 visits. No carryover effect was detected in all groups compared ( $F = 0.14$ ,  $p = 0.87$ ). At T1 and T3, timolol administration demonstrated the lowest IOP out of the 3 ( $p < 0.001$ ). All 3 treatment groups

resulted in significant decrease in IOP at T3 compared to T2 ( $p < 0.001$ ). Regression analysis revealed the number of previous anti-VEGF injections could affect the degree of reduction in IOP, as demonstrated by measurements at timepoints T1 versus T0 ( $p < 0.008$ ) and T3 versus T0 ( $p = 0.020$ ).

**Conclusions:** Application of timolol 1 hour before injections showed significant reduction of IOP while travatan demonstrated a IOP lowering effect when compared to placebo. In conclusion, reduction in aqueous production may be useful for eyes at risk of repeated rise in IOP due to intravitreal injections.

**Poster No.:** EX1-096

**Panel No.:** 096, **Session:** EX1

**Treatment of Polypoidal Choroidal Vasculopathy Using Standard and Reduced-fluence Photodynamic Therapy**

*First Author:* Isaac **CHAY**

*Co-Author(s):* Colin **TAN**

**Purpose:** To evaluate treatment outcomes of polypoidal choroidal vasculopathy (PCV) using reduced-fluence and standard-fluence photodynamic therapy (PDT).

**Methods:** Review of all treatment-naive PCV cases treated with PDT at a tertiary ophthalmology center. Patients treated with reduced (light dose, 50 J/cm<sup>2</sup>; dose rate, 600 mW/cm<sup>2</sup>; wavelength, 689 nm; time, 42 seconds) and standard-duration (light dose, 50 J/cm<sup>2</sup>; dose rate, 600 mW/cm<sup>2</sup>; wavelength, 689 nm; time, 83 seconds) PDT were reviewed.

**Results:** Thirty-seven eyes of 37 patients (24 males and 13 females) with an average age of 69.9 years old (range 50–89 years, SD  $\pm$  8.9) were included. Of these, 29 (78.4%) were treated with standard-fluence PDT while 8 (21.6%) had reduced-fluence PDT. Patients treated using reduced-fluence PDT had better visual acuity (VA) outcomes when compared to standard-fluence PDT at 6 months (mean logMAR 0.22 vs 0.56) and 12 months (mean logMAR 0.23 vs 0.48). Time to quiescence in the standard-fluence group was shorter when compared to the reduced-fluence group (2.8



vs 3.6 months). There was no difference in recurrence of disease activity between the 2 groups (58.6% recurrence in standard-fluence group vs 37.5% in reduced-fluence group). There were no significant adverse events reported in either group.

**Conclusions:** Reduced-fluence PDT showed better VA outcomes while having comparable need for rescue anti-VEGF injections, recurrence rates, and time to disease quiescent when analyzed against standard-fluence PDT in the treatment of PCV.

Poster No.: EX1-097

Panel No.: 097, Session: EX1

**Treatment of Recalcitrant nCNV Using Brolocizumab with a Novel Treat and Extend Protocol: A Randomized Controlled Study**

First Author: Nicholas FUNG

Co-Author(s): Timothy LAI, Wai Ching LAM

**Purpose:** This study aims to explore the safety and efficacy of using brolocizumab (Beovu) in patients with nAMD who respond poorly to the aflibercept treat and extend protocol.

**Methods:** Patients with nAMD recalcitrant to treatment on at least 8 weekly intervals were randomized in a 1:1 ratio to either receive aflibercept (group A) or brolocizumab (group B) for at least 1 year. Patients in the aflibercept group were allowed to switch to brolocizumab if persistent activity was noted after at least 3 additional Eylea monthly injections.

**Results:** Thirty-four eyes in 34 patients were randomized with 14 in group A and 16 in group B completing the study. The injection interval for group A was 5.143 weeks at baseline and 6.31 weeks at rescue visit ( $P = 0.170$ ). The injection interval for group B was 4.81 weeks at baseline and 11.3 weeks at final visit ( $P = 0.003$ ). The central macular thickness (CMT) for group A was 355  $\mu\text{m}$  at baseline and 363  $\mu\text{m}$  at rescue visit ( $P = 0.830$ ). The CMT for group B was 384  $\mu\text{m}$  at baseline and 312  $\mu\text{m}$  at final visit ( $P = 0.015$ ). The BCVA for group A was 0.39 at baseline and 0.34 at rescue visit ( $P = 0.380$ ). The BCVA for group B was 0.31 at baseline and 0.3 at final visit ( $P = 0.857$ ). At the final visit,

100% of the Eylea patients required rescue and received at least 3 Beovu injections. One patient in group B had mild anterior chamber cells which resolved on observation and was required to exit the study.

**Conclusions:** Brolocizumab is a safe and effective option for recalcitrant nAMD to control disease activity and extend treatment interval.

## Retina (Surgical)

Poster No.: EX1-099

Panel No.: 099, Session: EX1

**A Common Surgery for an Uncommon Problem: Surgical Management of Myopic Traction Maculopathy**

First Author: Wai Yan LAM

Co-Author(s): Qing LI, Wai-ching LAM

**Purpose:** To review the outcome of vitrectomy with membrane peeling in patients with myopic traction maculopathy (MTM).

**Methods:** Patients who met the inclusion criteria of MTM with vitrectomy and membrane peeling done from 2018-2022 (5 years) in a tertiary center were included. Baseline demographics, visual acuity (VA), lens status, axial length, and OCT features were extracted. The primary outcome was to analyze factors associated with anatomical success. The secondary outcome was to analyze factors associated with VA improvement.

**Results:** Eighty eyes (from 71 patients) were included. Thirty-four eyes had myopic foveoschisis only, 31 had macular hole, and 34 had macular detachment. 70.6% of myopic foveoschisis only eyes showed postoperative improvement in central retinal thickness (CRT). The median % CRT improvement was 25%. 52.9% had VA improvement (median 7.5-letter gain). Outer schisis group had a median 61% CRT improvement, compared to no improvement in inner schisis only group ( $p = 0.0047$ ). Eyes without lamellar hole had greater % CRT improvement, median 45% versus no improvement in lamellar hole group ( $p = 0.046$ ) and VA improvement, median 15-letter gain versus no gain in lamellar hole

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group ( $p = 0.0067$ ). 42% of macular holes and 53% of macular detachments achieved primary anatomical success. For the latter, the presence of macular hole was associated with reduced chance of anatomical success ( $p = 0.0006$ , odds ratio = 18.2). The final anatomical success rate was 51.7% for macular holes and 55.9% for macular detachment cases. A better baseline VA was associated with VA improvement (median pre-VA = 1.0 logMAR, 7.5-letter gain).

**Conclusions:** Vitrectomy with membrane peeling is effective in the management of MTM, especially those with myopic foveoschisis only. Although macular detachment and macular hole are both poor prognostic factors, the final anatomic success was >50%.

**Poster No.:** EX1-100

**Panel No.:** 100, **Session:** EX1

### A Retrospective Study of Risk Factors for Rebleeding After Pars Plana Vitrectomy for Diabetic Vitreous Hemorrhage

*First Author:* Jennifer **HUNG**

**Purpose:** To assess the risk factors for rebleeding after pars plana vitrectomy for diabetic vitreous hemorrhage.

**Methods:** A retrospective study of consecutive cases of pars plana vitrectomy for diabetic vitreous hemorrhage in a tertiary eye center in Hong Kong from January 2021 to January 2023. Patients' baseline characteristics, surgical details, and postoperative outcomes were recorded. Possible risk factors for rebleeding were statistically analyzed (T-test, Fisher's exact test, logistic regression). Further management of rebleeding cases were also assessed.

**Results:** Forty-six eyes were included in the review. Even eyes experienced rebleed postoperatively (23.9%) at a range of 1-217 days (mean, 76 days). Seven cases of rebleed (63.6%) resolved with observation, whereas 4 patients (36.3%) required a second vitrectomy for washout. Among the assessed risk factors, hypertension ( $p = 0.043$ ) and the presence of active bleeding ( $p = 0.010$ ) were significantly associated with rebleeding.

**Conclusions:** Hypertension and the presence of active bleeding during vitrectomy for diabetic vitreous hemorrhage are significantly associated with postoperative rebleeding. Most cases of rebleed resolved with observation only.

**Poster No.:** EX1-101

**Panel No.:** 101, **Session:** EX1

### Assessing the Effectiveness and Outcomes of Nd:Yag Laser Hyaloidotomy for Premacular Subhyaloid Hemorrhage: Insights from a Study of 41 Eyes

*First Author:* Deepak **KHADKA**

*Co-Author(s):* Sanyam **BAJIMAYA**, Bijay **KHATRI**, Eli **PRADHAN**, Anand Kumar Sharma **SHARMA**, Raba **THAPA**

**Purpose:** The study aimed to evaluate the effectiveness of Nd:YAG laser hyaloidotomy as a treatment option for premacular subhyaloid hemorrhage originating from diverse causes, while also examining its impact on visual improvements and potential complications.

**Methods:** This study involved 34 patients (41 eyes), who exhibited subhyaloid hemorrhage exceeding 3 disc areas. A thorough ocular evaluation coupled with fundus photograph and macular optical coherence tomography scans were done before and after the procedure. Q-switched Nd:YAG laser was applied specifically to the inferior region to create an aperture in the posterior subhyaloid membrane, enabling drainage of subhyaloid hemorrhage into the vitreous cavity. Key metrics evaluating the outcome of the procedure included the successful drainage of blood into vitreous cavity, enhancement of visual acuity, necessity of subsequent intervention, and the occurrence of complications.

**Results:** The study encompassed 41 eyes of 34 patients, with 73.5% male and 26.5% female. Seven (20.5%) had bilateral presentation. Mean age of presentation was  $35.74 \pm 20.63$  years and mean pretreatment subhyaloid hemorrhage area was  $6.71 \pm 2.11$  disc areas. The most common etiology was leukemia at 36.6%. Nd:YAG laser hyaloidotomy yielded an 85.3% success rate. Pars plana vitrectomy was required in 12%. Epiretinal membrane and

tractional detachment at the macula were the complications of the procedure.

**Conclusions:** Nd:YAG laser hyaloidotomy is a safe and effective outpatient procedure in the management of premacular subhyaloid hemorrhage irrespective of etiology. The process rapidly clears blood, leading to swift visual acuity enhancement and early underlying issue assessment, circumventing complex vitreoretinal procedures.

Poster No.: EX1-102

Panel No.: 102, Session: EX1

**Bidirectional Dimples After Internal Limiting Membrane Peeling for a Macular Hole**

First Author: Jaeryung OH

Co-Author(s): So Min AHN, Youngho KIM, Myung\_sun SONG, Ariunaa TOGLOOM, Cheolmin YUN

**Purpose:** To investigate microstructural changes and prognosis associated with retinal surface dimples after internal limiting membrane (ILM) peeling for macular holes (MHs).

**Methods:** We retrospectively analyzed swept-source optical coherence tomography (SS-OCT) images of patients who underwent surgery for idiopathic MHs. The inner retinal dimples on SS-OCT images were classified into 3 types based on the presence and extent of changes in the underlying deep retinal layers: unidirectional, bidirectional, and complicated bidirectional dimples.

**Results:** Dimples were found in 97.1% of the 69 eyes (69 patients) during a mean follow-up period of  $14.0 \pm 11.9$  months after MH surgery. Of the eyes with dimples, 83.6% had bidirectional dimples. The proportion of eyes with dimples increased from 55.3% at 1 month postsurgery to 95.5% at 3 months and 97.9% at 6 months postsurgery. However, the proportion of eyes with complicated bidirectional dimples gradually increased from 1 month (29.8%) to 3 months (46.3%) and 6 months (64.6%) postsurgery. In the multivariable generalized estimating equation model, complicated bidirectional dimples occurred more frequently in eyes with shorter axial length ( $P = 0.039$ )

and longer follow-up duration ( $\geq 6$  months; at 6 months:  $P = 0.001$ ; at 12 months:  $P = 0.009$ ).

**Conclusions:** Changes in retinal layers associated with retinal surface dimples after ILM peeling can occur at different retinal depths and over different time courses. These findings suggest the progression of dimple-associated remodeling of the underlying retinal layer.

Poster No.: EX1-103

Panel No.: 103, Session: EX1

**Clareon Intraocular Lens Stability in Vitrectomy Patients: Clove Study**

First Author: Jeffrey LO

Co-Author(s): Nicholas FUNG, Mehnaz QUDDUS, Stephanie Wing Ki YUK

**Purpose:** This study aimed to compare the stability of the Clareon CNA0T0 IOL and TECNIS ZCB00 IOL in patients who underwent simultaneous phacoemulsification with posterior vitrectomy and membrane peeling for epiretinal membrane.

**Methods:** Forty eyes were randomized into 2 groups in a 1:1 allocation ratio. Either Clareon or ZCB00 was implanted in the same session with pars plana vitrectomy and membrane peel. Best-corrected visual acuity (BCVA), horizontal and vertical optic tilt, anterior chamber distance, horizontal and vertical decentration were assessed at 1 week, 1 month, and 6 months postoperatively.

**Results:** At baseline, the 2 groups did not differ with respect to age and BCVA. BCVA at 1 month were similar at 0.63 vs 0.56 ( $p = 0.459$ ). Anterior chamber depth were similar in both groups and remained unchanged from 1 week ( $P = 0.223$ ) to 1 month postoperatively ( $p = 0.743$ ). The 2 IOLs had similar mean horizontal and vertical optic tilt of  $1.26 \pm 4.03$  and  $-0.92 \pm 2.22$  in the Clareon IOL vs  $-2.00 \pm 5.36$  and  $-0.02 \pm 1.76$  in the ZCB00 IOL ( $P = 0.087$  and  $P = 0.317$ ) 1 month postoperatively. Mean horizontal and vertical decentration were similar at 1 month with  $0.03 \pm 0.08$  mm and  $0.03 \pm 0.10$  mm for Clareon IOL and  $0.04 \pm 0.08$  mm and  $-0.05 \pm 0.10$  mm for ZCB00 IOL ( $P = 0.819$  and  $P = 0.059$ ), respectively. Six month follow

up data is pending and will be reported at the conference.

**Conclusions:** The Clareon IOL had a lower but not significantly different horizontal tilt compared to the ZCB00 IOL. Both offered similarly excellent lens stability and centration.

**Poster No.: EX1-104**

**Panel No.: 104, Session: EX1**

**Clinical Outcome of Tractional Lamellar Macular Hole Treated by Pars Plana Vitrectomy**

*First Author: Xien LU*

*Co-Author(s): Makoto INOUE, Tomoka ISHIDA, Akira KANAI, Takashi KOTO, Jun TAKEUCHI*

**Purpose:** Tractional lamellar macular hole (LMH) shows a retinoschisis associated with tractional epiretinal membrane. This study investigated the surgical outcome of tractional LMH treated by pars plana vitrectomy (PPV) by comparing the improvement in visual acuity and the foveal microstructures.

**Methods:** Forty-seven eyes of 46 patients with tractional LMH who underwent 25- or 27-gauge PPV with peeling of internal limiting membrane between February 2018 and March 2023 at Kyorin University Hospital by a single surgeon (MI) were included in this retrospective study. Tractional LMH was identified based on optical coherence tomography (OCT) findings. Degenerative LMH and epiretinal membrane foveoschisis were excluded. Best-corrected visual acuity (BCVA) in logMAR units and the minimum foveal thickness (MFT) measured from OCT images were compared preoperatively and at postoperative 1 and 2 months.

**Results:** The mean age was  $69.5 \pm 7.9$  years, and mean axial length was  $25.7 \pm 2.2$  mm. Thirty-nine eyes (62%) underwent cataract surgery combined with PPV. BCVA improved from  $0.19 \pm 0.16$  at baseline to  $0.03 \pm 0.12$  at postoperative 1 month ( $P < 0.001$ ), and  $0.00 \pm 0.10$  at 2 months ( $P < 0.001$ ). MFT was restored from  $176.5 \pm 39.1$   $\mu$ m at baseline to  $244.6 \pm 58.6$   $\mu$ m at postoperative 1 month ( $P < 0.001$ ), and  $235.4 \pm 63.0$   $\mu$ m at 2 months ( $P < 0.001$ ). The extrafoveal retinoschisis was detected in

all eyes preoperatively and decreased to 85% postoperatively at 10 days, 75% at 1 month ( $P < 0.001$ ), and 57% at 2 months ( $P < 0.001$ ).

**Conclusions:** This study revealed visual improvement may be expected after PPV for tractional LMH with an increase of MFT and resolution of extrafoveal retinoschisis.

**Poster No.: EX1-105**

**Panel No.: 105, Session: EX1**

**Clinical Outcomes of Flowchart-based Treatment Algorithm of Submacular Hemorrhage**

*First Author: Kshitiz KUMAR*

**Purpose:** Submacular hemorrhage (SMH) is one of the most severe complications affecting the macula due to various retinal pathologies. The aim of the study was to compare the anatomical and functional outcomes of practically selected treatment modalities depending on the hemorrhage size and duration in patients complicated by SMH.

**Methods:** Retrospective, interventional case series of consecutive cases with submacular hemorrhage. The hemorrhage was characterized based on duration (fresh or old), size of hematoma (small, medium, large), and etiology. Based on the above, patients were assigned to 1 of the 3 treatment arms. Primary outcome measure was the degree of displacement of SMH.

**Results:** Twenty-two eyes with SMH were analyzed. Mean age was  $60.8 \pm 15.48$  years with 64% female patients. PCV (13) followed by CNVM (3) and trauma (3) were the most common etiologies. Fourteen eyes had small size (1-4 DD) SMH and 6 patients had large size (>5 DD) SMH. Pneumatic displacement (PD) (arm A) with intravitreal gas (100% C3F8)  $\pm$  intravitreal ranibizumab (IVR) was used in 11 patients, PD with intravitreal recombinant tissue plasminogen activator (r-tpa)  $\pm$  IVR (arm B) was used in 7 eyes, and vitrectomy with subretinal cocktail mixture (r-tpa  $\pm$  IVR+air) (arm C) was used in 4 eyes. 77% (17) of eyes achieved complete displacement of SMH. Overall BCVA improved from 1.06 logMAR to 0.6 logMAR.



More than 2-line improvement in vision happened in 16 patients.

**Conclusions:** This study demonstrated that favorable outcome can be expected through an appropriate treatment strategy for SMH using a simplified flowchart-based treatment algorithm.

**Poster No.:** EX1-106

**Panel No.:** 106, **Session:** EX1

**Comparison of Clinical Outcomes of 10,000 Versus 20,000 Cuts-per-minute, 25-gauge, Beveled-tip Vitrectomy Probes**

*First Author:* Harvey **UY**

*Co-Author(s):* Jose Carlo **ARTIAGA**, Pik Sha **CHAN**

**Purpose:** To compare the clinical outcomes, surgical efficiency, and instrument performance of 10,000 versus 20,000 cuts-per-minute (cpm), 25-gauge, beveled-tip vitrectomy cutter probes among eyes undergoing pars plana vitrectomy.

**Methods:** We compared data sets of 2 similar groups of eyes that prospectively underwent pars plana vitrectomy (PPV), by the same set of surgeons, using cutter probes of similar size but different cutting speeds. The main parameters compared included rate of surgical success, number of surgical steps, total operative times (TOT), change in corrected distance visual acuity (CDVA) at 3 months, use of ancillary instruments, and adverse events (AE).

**Results:** PPV was performed in 50 eyes using 10,000 cpm and in 55 eyes using 20,000 cpm instrumentation. The surgical objectives were attained in all eyes from both groups. The mean number of surgical steps ( $P = 0.542$ ), total operative time ( $P = 0.605$ ), and 3-month change in CDVA ( $P = 0.670$ ) were similar in both groups. Fewer ancillary instruments ( $P < 0.001$ ) were utilized and fewer AE ( $P = 0.044$ ) were observed in the 20,000 cpm group.

**Conclusions:** Both 10,000 and 20,000 cpm cutter probe systems were effective and safe when performing VR surgery for various indications. The potential advantages of the higher cut rate system include reduced usage of ancillary instrumentation and lower AE rates.

**Poster No.:** EX1-098

**Panel No.:** 098, **Session:** EX1

**Comparison of Surgical Performances and Ergonomics between using Digitally Assisted Vitreoretinal Surgery System and Standard Operating Microscope**

*First Author:* Jin Young **KIM**

*Co-Author(s):* Jae Rock **DO**, Yong Koo **KANG**, Yumin **KIM**, Dong Ho **PARK**, Jae Pil **SHIN**

**Purpose:** To compare surgical performances and ergonomics of digitally assisted vitreoretinal surgery (DAVS) with standard operating microscope (SOM) during pars plana vitrectomy (PPV)

**Methods:** This was a prospective comparative study. A single surgeon conducted the procedure on 104 patients; 50 patients underwent PPV using DAVS and the other 54 patients underwent PPV using SOM. The surgeon's muscle tone and stiffness of the sternocleidomastoid (SCM) and the two locations of the upper trapezius (UT1, UT2) were measured at preoperative, intraoperative, and postoperative time points. The macular color contrast ratio (CCR), total surgical time, the surgical time required to complete internal limiting membrane (ILM) peeling, and the total number of surgical attempts for ILM peeling were analyzed between DAVS and SOM with different indocyanine green (ICG) concentrations. All patients underwent ophthalmologic examinations including best-corrected visual acuity (BCVA) at baseline and at 3 months postoperatively.

**Results:** In SOM group, intraoperative muscle tone and stiffness were higher than preoperative and postoperative values in the SCM, UT1, and UT2. By contrast, when the surgeon used the DAVS, there were no differences in muscle properties between any measurement site or time point. The macular CCR was higher in DAVS compared to SOM in 0.05% and 0.025% ICG groups. There was no significant difference in the total surgical time, ILM peeling time, and ILM grasps attempts between DAVS and SOM. There was no

significant difference in the postoperative BCVA and complications.

**Conclusions:** This study shows that DAVS can reduce surgeon's muscular fatigue and enables surgeons to use lower ICG concentration.

**Poster No.:** EX1-107

**Panel No.:** 107, **Session:** EX1

### **Cryotherapy Versus Laser Photocoagulation for Retinopathy in Scleral Buckle Surgery: A Systematic Review**

*First Author:* Richardo **RUSLI**

*Co-Author(s):* Graecia **BUNGARAN**, Beatrice **POLUAN**, Eugeni Jr **SUMANTI**, Salam **SURBAKTI**

**Purpose:** To compare the visual acuity and rate of reattachment in uncomplicated rhegmatogenous retinal detachment operated on by scleral buckle with retinopathy with intraoperative cryotherapy versus laser photocoagulation.

**Methods:** Searches were conducted in a structured way using keywords across several data sources, including Pubmed, Science Direct, and Cochrane library. The keywords used for searching were "cryotherapy", "laser photocoagulation", and "scleral buckle". The reviewed articles were randomized controlled trials in English, conducted on humans in the last 25 years. The review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

**Results:** From a total of 340 articles, there were 2 studies with 134 eyes of 134 patients that were evaluated. The primary outcome of all articles was the assessment of BCVA after scleral buckle surgery. All studies obtained the best-corrected visual acuity in both groups, which were not significantly different even at 10 weeks, but recovery of visual acuity was faster in patients in the laser photocoagulation group. All studies obtained more than 93% anatomical success rate in both groups. One study reported the increase in postoperative flare was significantly higher in the cryotherapy group at

each time measurement point (1 day, 7 days, 4 weeks, and 10 weeks).

**Conclusions:** In uncomplicated retinal detachment, both techniques of retinopathy provide satisfactory anatomical and functional success. However, laser photocoagulation offers a faster visual acuity recuperation.

**Poster No.:** EX1-108

**Panel No.:** 108, **Session:** EX1

### **Different Outcome of Chronic Central Serous Chorioretinopathy After Novel Low Power Mode Laser: Fundus Fluorescein Angiography Evaluation, A Case Series**

*First Author:* Annisak **FITRIYANA**

*Co-Author(s):* Grimaldi **IHSAN**, Arief **KARTASASMITA**, Rova **VIRGANA**, Made Indra **WIDYANATHA**, Erwin **ISKANDAR**

**Purpose:** To evaluate the different outcomes and distinctive features on fundus fluorescein angiography (FFA) findings of central serous chorioretinopathy (CSCR) patients after treatment with novel low power mode (LPM) laser.

**Methods:** A prospective case series of 2 patients diagnosed with chronic CSCR treated with novel LPM laser. Visual acuity (VA), macular optical coherence tomography (OCT), and FFA were obtained.

**Results:** A total of 2 eyes with chronic CSCR of the right eye (RE) who presented with persistent blurred vision after a month of oral spironolactone were included. Baseline VA of both patients were 1/60 and the macular OCT showed persistent large subretinal hyporeflective appearance. FFA demonstrated hyperfluorescent "ink blot" appearance that was increased in both size and brightness in the subsequent phase corresponding to the active leaking points in the inferior extrafoveal region of the first case and in the superior parafoveal region of the second case. Both patients received LPM laser with the same parameters as follows: 100 µm spot size, 0.04 second exposure time, 0.25-0.5 spacing, and 30% LPM ratio. One month after the LPM laser, FFA of the first patient showed complete

disappearance of «ink blot» appearance and his VA was improved to 0.4 log 35. Meanwhile the second patient was without improvement of VA and FFA showed persistent «ink blot» appearance as seen before the LPM laser, with new multifocal leaking points in the superior and inferior parafoveal regions.

**Conclusions:** New leaking points as identified on FFA was the reason behind persistent CSCRC after LPM laser treatment.

Poster No.: EX1-109

Panel No.: 109, Session: EX1

**Efficacy of Scleral Patch Graft in Optic Disc Pit Maculopathy: A Retrospective Analysis**

First Author: Muthukrishnan **VALLINAYAGAM**  
Co-Author(s): Avik **DEY SARKAR**, Naresh **KANNAN**

**Purpose:** Optic disc pit (ODP) is a rare congenital anomaly of the optic nerve head and is associated with maculopathy. Scleral patch graft (SPG) as a therapeutic option is recently advocated.

**Methods:** This is a retrospective analysis of 39 patients with ODP maculopathy who were followed up for 6 months postoperatively. Patients aged above 18 years presenting with subretinal fluid (SRF) and/or cystoid macular edema (CME) secondary to ODP have been included. The parameters assessed included best-corrected visual acuity (BCVA) in logMAR chart and central macular thickness (CMT) at baseline and at 1, 3, and 6 months post-surgery.

**Results:** The mean age of presentation was  $33.37 \pm 15.12$  years. 53.33% were male. 50% were operated on in the right eye. All patients but one were phakic. 63.33% presented with subretinal fluid over the macula while the rest manifested cystoid macular edema. The mean presenting BCVA in logMAR chart was  $0.68 \pm 0.22$  and average CMT was  $718.5 \mu\text{m}$ . On follow up over 1, 3, and 6 months, average BCVA was 0.68, 0.53, and 0.4 logMAR, respectively. The improvement in final BCVA was statistically significant ( $p = 0.0004$ ). Average CMT in the aforementioned follow-ups were  $443.3 \mu\text{m}$ ,

$374.9 \mu\text{m}$ , and  $307.3 \mu\text{m}$ . Decrease in CMT was significant at all follow up visits ( $p = 0.0002$ ). Two patients developed full thickness macular hole and 1 patient required repeat grafting.

**Conclusions:** Scleral patch graft (SPG) is considered the gold standard surgery in this enigmatic entity. This study represents the largest series on ODP maculopathy managed with SPG.

Poster No.: EX1-110

Panel No.: 110, Session: EX1

**Epiretinal Membrane Removal with Foveal-sparing Internal Limiting Membrane Peeling vs Complete Internal Limiting Membrane Peeling (Preliminary Study)**

First Author: Alexey **ZHURAVLEV**  
Co-Author(s): Anton **KOLESNIK**, Svetlana **KOLESNIK**, Alexander **SHPAK**, Elena **ZINYCH**

**Purpose:** To compare the subjective and objective parameters after complete internal limiting membrane peeling (CP group) with that after foveal-sparing internal limiting membrane peeling (FS group) during vitrectomy for idiopathic epiretinal membrane. We also evaluated novel optical coherence tomography (OCT) related prognostic factors (for retinal and visual recovery) in this study.

**Methods:** This was a prospective, randomized, comparative study. Thirty eyes were randomized to undergo complete peeling of the ILM or peeling with foveal sparing. The main outcome measures were foveal and perifoveal retinal sensitivity, visual acuity, and central retinal thickness. OCT-related prognostic factors were also evaluated, such as inner retinal irregularity index, outer plexiform layer angle, and cone outer segment tips.

**Results:** Preliminary data show that foveal retinal sensitivity and best-corrected visual acuity showed an improvement in the foveal-sparing group versus a slight drop in the CP group. Significant improvements were observed in central retinal thickness in both groups. No cases of epiretinal membrane recurrence were observed in the FS group. OCT-related

prognostic factors were found to correlate with postoperative best-corrected visual acuity.

**Conclusions:** Preliminary data show that foveal-sparing internal limiting membrane peeling may improve retinal sensitivity and best-corrected visual acuity. OCT-related prognostic factors may be beneficial in preoperative evaluation of future surgery outcomes. Further studies must be conducted to determine if it is safe to leave a portion of the ILM in front of the fovea.

**Poster No.:** EX1-111

**Panel No.:** 111, **Session:** EX1

**Exploring Diversity in Clinical Presentation and Difficulties in Treating Symptomatic Retinal Artery Macroaneurysm: An Experience with 21 Eyes**

*First Author:* Deepak **KHADKA**  
*Co-Author(s):* Bijay **KHATRI**

**Purpose:** To find out the clinical traits, treatment options, and visual outcome among individuals with symptomatic retinal artery macroaneurysm.

**Methods:** The study focused on newly diagnosed cases of symptomatic retinal artery macroaneurysm between January 2015 and July 2021. Inclusion criteria were met by 21 patients, each with an affected eye. Eyes were divided into 4 groups according to treatment modalities used: 1) Nd:YAG laser hyaloidotomy, 2) focal laser, 3) intravitreal bevacizumab plus focal laser, 4) pars plans vitrectomy group.

**Results:** The average age of patients was  $65.14 \pm 14.65$  years, with 31% being male and 71.4% having hypertension. Among the cases, 61.9% were in the right eye, and 81% of macroaneurysms occurred in the superotemporal quadrant. Hemorrhagic presentation was predominant in 52.3% of cases. Upon initial presentation, the average visual acuity (VA) improved from  $1.38 \pm 0.73$  logMar to  $0.47 \pm 0.55$  logMar after treatment, with a mean improvement that was statistically significant ( $p < 0.05$ ) in the pars plana vitrectomy group compared to subgroups.

**Conclusions:** The findings underscore the importance of individualized treatment

due to the vague nature of macroaneurysm presentation and the lack of established guidelines. This reinforces the need for the development of treatment guidelines tailored to each patient's unique condition.

**Poster No.:** EX1-112

**Panel No.:** 112, **Session:** EX1

**Human Amniotic Membranes in the Management of Postoperative Suprachoroidal Silicone Oil Migration with Severe Proliferative Vitreoretinopathy: A Novel Approach**

*First Author:* Shu-chun **KUO**

*Co-Author(s):* Chia-yi **LEE**, Chenghao **SUNG**

**Purpose:** The occurrence of postoperative suprachoroidal SO migration has been recognized as a complication of retinal surgery. Drainage of the SO through a sclerotomy may be considered as an option. However, the management becomes more challenging when it coexists with severe proliferative vitreoretinopathy (PVR). In this study, we propose a novel approach utilizing human amniotic membranes (hAM) in conjunction with the retinectomy technique.

**Methods:** Retrospective observational case report. A 39-year-old female patient who presented with recurrence of RD with PVR grade C underwent pars plana vitrectomy. Unfortunately, a localized inferior choroid elevation followed by a recurrence of RD and PVR was noted weeks after surgery.

**Results:** A repeat pars plana vitrectomy was scheduled. The choroid elevation was confirmed to be a result of SO migration into the suprachoroidal space. A fan-shaped retinectomy was performed to remove rigid retina/choroid complex and drain the trapped suprachoroidal SO. Amniotic membranes were strategically positioned to cover the exposed sclera, with their borders embedded under the margins of the intact retina. After a follow-up period of 3 months, both anatomical and functional outcomes were found to be encouraging.



**Conclusions:** We hypothesized that the inherent properties of hAMs could enhance the integrity of the remaining retinal tissue and reduce the risk of PVR recurrence. Furthermore, hAMs were found to act as a protective barrier, effectively preventing the migration of SO or air into suprachoroidal space. To the best of our knowledge, this study is the first of its kind to discuss the application of the above-mentioned technique.

Poster No.: EX1-113

Panel No.: 113, Session: EX1

**Investigation of Perfluorocarbon Liquid Evaporation Rate by Air Infusion in an In-vitro Vitrectomy Model**

First Author: Wang Yee **CHU**

Co-Author(s): Joseph Yau Kei **CHAN**, Ying **CHEN**, Zhongdui **LONG**

**Purpose:** Perfluorocarbon liquids (PFCLs) are commonly used in vitrectomy surgeries to stabilize detached retina. Subretinal PFCL retention occurred in 11.1% of vitrectomies, impeding visual acuity. Air infusion has been widely used to accelerate PFCL extraction. However, the choice of air infusion pressure is highly individualized. Therefore, there lies a need for optimization of this parameter to promote efficient PFCL removal. The present study investigates the optimum air infusion pressure in accelerating PFCL evaporation, utilizing an in-vitro eye model.

**Methods:** 3D printed artificial eyeballs 24 mm in diameter internally coated with 5% bovine serum albumin were inserted with 3 25-gauge needles to simulate vitrectomy setup (n = 3). 100  $\mu$ L of perfluoro-octane (PFO) was injected, and its evaporation profile was investigated under different air infusion pressures from 10 mm Hg to 40 mm Hg, at 5 mm Hg intervals. Mass of intraocular PFO was measured at 5-second intervals for 90 seconds, with evaporation rate calculated as  $\mu$ L per second.

**Results:** Based on current data, the evaporation rate of PFO increased from 0.92  $\mu$ L/s to 2.03  $\mu$ L/s with an increase in air infusion pressure from 10 mm Hg to 30 mm Hg. However, the evaporation rate decreased to 1.63  $\mu$ L/

s and 1.55  $\mu$ L/s when the infusion air pressure increased to 35 mm Hg and 40 mm Hg, respectively.

**Conclusions:** We have established that the optimum air infusion pressure with the highest PFO evaporation rate is 30 mm Hg. This reaffirmed the current approach in air infusion assisted PFCL removal. Further investigations with wider infusion pressure range and larger sample size are needed to further delineate efficacy.

Poster No.: EX1-114

Panel No.: 114, Session: EX1

**Long-term Surgical Outcomes of 25-gauge Microincision Vitrectomy Surgery in Eyes with Coloboma Associated Retinal Detachment**

First Author: Sravani **YARRARAPU**

Co-Author(s): Shorya **AZAD**, Rohan **CHAWLA**, Nawazish **SHAIKH**, Pradeep **VENKATESH**

**Purpose:** To study the long-term anatomical and functional outcomes of 25-gauge (25G) microincision vitrectomy surgery (MIVS) in fundal coloboma with retinal detachment (RD).

**Methods:** This was an ambispective interventional pilot study of eyes with coloboma associated RD undergoing 25G MIVS with silicone oil tamponade. All surgeries were done by a single experienced surgeon at a tertiary eye center.

**Results:** We evaluated 60 eyes of 58 patients with 30 eyes each in the retrospective and prospective group. The mean age of presentation was  $18.45 \pm 8.92$  years (range: 5-50 years) and the mean follow-up duration was  $31.56 \pm 28.05$  months (range: 6-77 months). The single operation success rate was 80% (48 eyes), with an overall successful outcome achieved in 90% (54 eyes). Recurrence of RD occurred in 12 eyes (20%). A statistically significant improvement in vision was noted in the majority of cases from logMAR  $1.95 \pm 0.27$  preoperatively to logMAR  $1.42 \pm 0.55$  post-surgery ( $P < 0.001$ ). Commonly associated ocular features in these patients were iris coloboma in 56 eyes (93.33%), microcornea in 45 eyes (75%), and cataract in 39 eyes (65%).

Post-surgery complications were raised IOP in 17 eyes (28.33%), cataract in 18 eyes (30%), and silicone oil emulsification in 15 eyes (25%).

**Conclusions:** 25G MIVS provided an anatomical success rate of 90% in eyes with coloboma RD with a significant improvement in visual acuity. 25G MIVS is effective for vitrectomy in coloboma associated RD and comparable to other larger gauge vitrectomy systems.

Poster No.: EX1-115

Panel No.: 115, Session: EX1

### Novel Low Power Mode Laser in the Management of Chronic Central Serous Chorioretinopathy: Time to Gain Momentum

First Author: Annisak **FITRIYANA**

Co-Author(s): Grimaldi **IHSAN**, Arief **KARTASASMITA**, Rova **VIRGANA**, Made Indra **WIDYANATHA**, Erwin **ISKANDAR**

**Purpose:** To report complete resolution of chronic central serous chorioretinopathy (CSCR) treated with low power mode (LPM) laser.

**Methods:** A case report.

**Results:** A 45-year-old male presented with the chief complaint of gradually painless blurred vision in his right eye (RE) since 2 months prior to examination. Visual acuity (VA) of the RE was 1/60. Macular OCT of the RE suggested CSCR. He was given oral spironolactone 1 x 50 mg for a month. One month after spironolactone treatment VA of the RE was not improved and the macular OCT revealed no reduction of hyporeflective appearance indicating no complete resolution of the CSCR. FFA of the RE showed hyperfluorescence ink blot appearance in the inferior region corresponding to the active leaking points that were increased in both size and brightness in the subsequent phase. The patient was diagnosed with chronic CSCR of the RE. The patient was then treated with novel LPM laser using 577  $\mu$ m yellow laser with the given laser parameters of 100  $\mu$ m spot size, 0.04 second exposure time, 0.25-0.5 spacing, and 30% LPM ratio. One month after LPM laser, macular OCT showed complete disappearance of the hyporeflective appearance in the inner retina and the VA of his

RE was improved to 0.4 log 35. Three months after the treatment, FFA of his right eye showed complete disappearance of ink blot appearance and his VA was improved to 0.2 log 10.

**Conclusions:** The mainstay treatment for chronic CSCR is currently photodynamic therapy. However, LPM laser can provide favorable treatment efficacy for persistent CSCR.

Poster No.: EX1-116

Panel No.: 116, Session: EX1

### Outcomes of Microincision Pars Plana Vitrectomy in Rhegmatogenous Retinal Detachment at a Tertiary Eye Care Centre in Nepal

First Author: Santosh **SUBEDI**

Co-Author(s): Sanyam **BAJIMAYA**, Govinda **PAUDYAL**, Eli **PRADHAN**, Sanjita **SHARMA**, Raba **THAPA**

**Purpose:** To evaluate the anatomical and visual outcomes of microincision pars plana vitrectomy (PPV) in eyes with rhegmatogenous retinal detachment (RRD).

**Methods:** This was a hospital-based prospective observational study. All consecutive cases of RRD who underwent primary microincision PPV from October 2020 to March 2021 were included in the study. Patients were evaluated at baseline, postoperative day 1, 1 week, 6 weeks, and 3 months. Outcome measures evaluated were anatomical results, visual outcomes, and complications of the surgery.

**Results:** Forty-nine eyes with RRD treated with primary microincision PPV with minimum follow up of at least 3 months were evaluated. Anatomical success was achieved in 91.8% of cases (45/49). Baseline mean best-corrected visual acuity (BCVA) was logMAR 1.63  $\pm$  0.88 and median BCVA was 2.00 (range, 0.00 to 2.70) while at 3 months follow up mean BCVA was logMAR 1.22  $\pm$  0.66 and median BCVA was 1.00 (range, 0.00 to 2.70). There was significant improvement in median BCVA ( $p = 0.005$ ). There were no cases of postoperative hypotony and endophthalmitis. Other complications were

also minimal such as silicone oil in anterior chamber in 1 eye, epiretinal membrane in 3 eyes, and macular hole in 2 eyes.

**Conclusions:** Microincision PPV is an effective surgical method of primary treatment for RRD with good anatomical and visual outcomes with minimal complications.

**Poster No.:** EX1-117

**Panel No.:** 117, **Session:** EX1

**Performance, Safety, and Efficiency Comparison Between 20,000 and 10000 Cuts Per Minute Vitrectomy Using a 27G Cutter in Rhegmatogenous Retinal Detachment: A Prospective Randomized Controlled Study**

*First Author:* Yu-te **HUANG**

*Co-Author(s):* San-ni **CHEN**, Ming-chieh **HSIEH**, I **WANG**

**Purpose:** This study aimed to compare the efficiency and safety of a dual-blade 20,000 cuts per minute (cpm) vitrectomy probe (HYPERVIT, Alcon) with a single-blade 10,000 cpm probe (Advanced ULTRAVIT, Alcon) for primary rhegmatogenous retinal detachment (RRD).

**Methods:** In this prospective, randomized controlled clinical trial, evaluations were conducted preoperatively, intraoperatively, and at 3 months postoperatively. The main outcome focused on the core vitrectomy duration, with secondary outcomes including peripheral vitreous shaving duration, balanced salt solution (BSS) consumption, anatomical and functional outcomes, as well as the incidence of surgical procedure-related complications.

**Results:** Overall, 35 cases in the 20,000 cpm group and 37 cases in the 10,000 cpm group completed the trial without significant differences in baseline demographic characteristics. The 20,000 cpm group demonstrated significantly shorter core vitrectomy duration ( $161.6 \pm 10.4$  vs  $206.8 \pm 10.1$  seconds) ( $P = 0.003$ ) and peripheral vitreous shaving time ( $446.3 \pm 20.3$  vs  $544.2 \pm 22.2$  seconds) ( $P = 0.002$ ) compared to the 10,000 cpm group. However, BSS consumption was not statistically higher in the 20,000 cpm

group ( $P = 0.231$ ). There were no significant differences in the need for scleral sutures and the incidence of iatrogenic retinal breaks ( $P = 0.331$  and  $0.523$ ). At the 3-month follow-up, there were no statistically significant differences in primary success, final anatomical success, or mean CDVA ( $P > 0.9$ ,  $P = 0.326$ ). Rates of complications, including ocular hypertension, epiretinal membrane formation, and endophthalmitis, also showed no statistically significant differences ( $P > 0.6$ ).

**Conclusions:** The utilization of the new-generation 27-gauge system with a 20,000 cpm probe may herald a new paradigm of high-flow, smaller-diameter instrumentation, thereby enhancing the efficiency and safety of the small gauge technique.

**Poster No.:** EX1-118

**Panel No.:** 118, **Session:** EX1

**Residual Silicone Oil Does Exist After Conventional Silicone Oil Removal Procedures**

*First Author:* Anakin Chu Kwan **LAI**

*Co-Author(s):* Yau Kei **CHAN**, Ying **CHEN**, Kenneth Kai Wang **LI**

**Purpose:** Silicone oil (SiOil) is an important agent to manage complicated retinal detachment. Triple fluid/air exchange (FAX) and fluid aspiration (FA) are currently the main approaches to remove residual SiOil after bulk removal. However, there is residual SiOil because SiOil is often trapped in the regions that are difficult to be observed during surgery, e.g., the ciliary body. The residual SiOil can undergo emulsification and induce various sight-threatening complications, including cataract and secondary glaucoma. This study aims to qualify and quantify the efficiency of removing residual SiOil using FAX and FA both in-vitro and ex-vivo.

**Methods:** The process of SiOil slick removal by FA is studied through video capture in-vitro. The efficiency of SiOil removal by either FA or FAX is evaluated using an ex-vivo porcine eye model, based on the amount of emulsified SiOil droplets generated and the amount

of leftover SilOil in the eye after the surgical procedures.

**Results:** The oil slick was difficult to remove by FA, regardless of the position of aspiration. In the ex-vivo porcine eye model, a small amount of SilOil was still trapped around intraocular regions with the removal of bulk SilOil bubble. Both residual liquid SilOil and SilOil droplets were observed in the dissected porcine eye after FA or FAX. No significant difference was detected in the amount of residual SilOil collected in the porcine eyes that underwent FA and FAX ( $P > 0.05$ ).

**Conclusions:** Conventional surgical procedures could not completely remove silicone oil, and new procedures should be developed to reduce the SilOil emulsification-related complications postoperatively.

**Poster No.:** EX1-119

**Panel No.:** 119, **Session:** EX1  
**Soft Peeling for Vitreoretinal Membrane**  
*First Author: Po-kang LIN*

**Purpose:** To develop a novel technique for peeling vitreoretinal membrane without the peeling forceps in certain vitreoretinal conditions.

**Methods:** From 2022 to 2023, cases of vitreoretinal membrane disorder, including dense posterior hyaloid, vitreomacular traction, and epiretinal membrane, were selected to receive 25G pars plana vitrectomy with vitreoretinal membrane peeling without using peeling forceps. A soft tip backflush needle (Alcon) was employed to hold and elevate the vitreoretinal membrane by active suction with appropriate gentle power; then the membrane was removed from the retinal surface by stronger suction and traction towards different direction until completed. After the peeling, tamponade gas SF<sub>6</sub> was applied, and the patient was kept in a prone position for several days.

**Results:** A total of 11 cases were enrolled. The soft peeling procedure could be done smoothly. In all the cases, the peeling was

completed over the entire lesion area within the vascular arcade of the macula. No significant retinal damage was found by OCT.

**Conclusions:** The soft peeling technique could be a useful alternative to peeling forceps, and it resulted in good results in this study. However, it requires accurate control of the suction power and delicate maneuvering.

**Poster No.:** EX1-120

**Panel No.:** 120, **Session:** EX1  
**Surgical Management Under Lincoff Rule of a Retinal Detachment with No Obvious Tear: Case Report**

*First Author: Yuanfei ZHU*  
*Co-Author(s): Tie Ying ZHAO*

**Purpose:** To present surgical management under Lincoff rule in a case of retinal detachment with no obvious preoperative retinal tear.

**Methods:** A 28-year-old male presented with decreased vision for 3 days in his right eye. The patient received thorough preoperative examination including scanning laser ophthalmoscope (SLO), fundus exam, optical coherence tomography (OCT), and 3-mirror examination and B-scan ultrasonography. Rhegmatogenous retinal detachment (RRD) was diagnosed, however, no retinal tear or retinal hole was detected. By analyzing the distribution of subretinal fluid (10-4 o'clock) under the guidance of Lincoff rule, we predicted the retinal hole most likely located along the superonasal ora serrata. A second 3-mirror examination was performed with depression and the patient slightly looking superonasally, and a small retinal hole located at 2 o'clock near the ora serrata was observed. Therefore scleral buckle was performed to reattach retina. Retinal hole was confirmed and marked on the upper edge of the medial rectus muscle, 11 mm posterior to limbus.

**Results:** Scleral buckle was performed successfully and retina re-attached with no complications.

**Conclusions:** Lincoff rule is a useful guidance for no obvious retinal hole in RRD. Scleral



buckle may provide a good surgical option for RRD caused by peripheral retinal hole in young patients.

**Poster No.:** EX1-121

**Panel No.:** 121, **Session:** EX1

### **Surgical Outcome for Degenerative Lamellar Macular Hole**

*First Author:* Akira **KANAI**

*Co-Author(s):* Makoto **INOUE**, Tomoka **ISHIDA**, Takashi **KOTO**, Xien **LU**, Jun **TAKEUCHI**

**Purpose:** We report the outcome of combined vitrectomy for degenerative lamellar macular hole (LMH) to assess the factors affecting postoperative visual acuity and changes in macular structures by optical coherence tomography (OCT) findings.

**Methods:** Seventeen eyes of 16 patients with degenerative LMH who underwent pars plana vitrectomy with inverted epiretinal proliferation (EP) and internal limiting membrane (ILM), and air tamponade between February 2018 and March 2023 at Kyorin University Hospital by a single surgeon (MI) were included in this retrospective study. Degenerative LMH with the presence of intraretinal cavitation and EP was identified based on OCT findings. Tractional LMH and epiretinal membrane foveoschisis were excluded. Best-corrected visual acuity (BCVA) and central retinal thickness (CRT) measured with OCT were compared preoperatively and postoperatively.

**Results:** The mean age was  $68.8 \pm 13.8$  years, mean axial length was  $25.02 \pm 1.74$  mm, and combined cataract surgery was performed in 11 eyes (65%). Postoperative BCVA in logMAR units improved from  $0.32 \pm 0.26$  at baseline to  $0.15 \pm 0.22$  at 1 month ( $P = 0.554$ ) and  $0.14 \pm 0.24$  at 2 months ( $P = 0.050$ ). The improvement of BCVA before and 2 months after surgery was strongly related to younger age ( $R = 0.792$ ,  $P = 0.001$ ) and better preoperative BCVA ( $R = 0.561$ ,  $P = 0.037$ ). The mean CRT increased from  $103.6 \pm 21.7$   $\mu\text{m}$  preoperatively to  $223.7 \pm 47.3$   $\mu\text{m}$  at postoperative 1 month ( $P < 0.01$ ) and  $215.4 \pm 49.4$   $\mu\text{m}$  at 2 months ( $P < 0.05$ ). No eyes developed postoperative full-thickness macular holes.

**Conclusions:** Vitrectomy combined with inverted EP and ILM for degenerative LMH may be effective in improving macular structures. This also suggests that younger patients may have a better postoperative visual prognosis than older patients.

**Poster No.:** EX1-122

**Panel No.:** 122, **Session:** EX1

### **Surgical Removal of Subfoveal Choroidal Neovascular Membrane in Age-related Macular Degeneration: A Retrospective Analysis**

*First Author:* Muthukrishnan **VALLINAYAGAM**

**Purpose:** Scarred choroidal neovascular membrane (CNVM) is not amenable to conventional treatment modalities and submacular surgery offers an exciting option albeit modest functional outcome. This study demonstrates surgical outcome of excision of subfoveal CNVM in age-related macular degeneration (AMD).

**Methods:** This is a retrospective analysis of 16 patients with subfoveal CNVM sized  $>3$  disc diameters (DD) secondary to AMD. The surgery was done in 2 stages to facilitate complete removal in a bloodless field. During pars plana vitrectomy, temporal retinectomy was done and retina was folded over itself. The fibrotic CNVM was meticulously dissected and removed with vitrectomy cutter. The parameters studied included best-corrected visual acuity (BCVA) and optical coherence tomography (OCT).

**Results:** The mean age (SD) was 70.38 years (range, 53-89 years) and male to female ratio was 1:1. BCVA improved in 12 eyes (75%), stabilized in 1 (6%), and deteriorated in 3 eyes (19%). The baseline median BCVA was 2.2 logMAR which improved to 0.77 logMAR at 6 months ( $p = 0.078$ ). At 6 months, the proportion of patients with BCVA of  $>6/60$ ,  $6/60-3/60$ ,  $3/60-1/60$ , and  $<1/60$  were found to be 62.5%, 12.5%, 6.25%, and 18.75%, respectively. 100% patients demonstrated complete removal of CNVM on OCT and no recurrence was observed over 6 months.

## POSTERS

**Conclusions:** Although the visual outcome is limited, submacular surgery for CNVM can stabilize or improve visual acuity in large fibrotic CNVM (3 DD or more).

**Poster No.:** EX1-123

**Panel No.:** 123, **Session:** EX1

### Temporary Vision Loss and Iatrogenic Retinal Holes After Inadvertent Globe Penetration During Retrobulbar Anesthesia for Routine Cataract Surgery: A Case Report

*First Author:* Leandrea Mae **NOLLORA**  
*Co-Author(s):* Peter Vincent **CO**, Nilo Vincent **FLORCRUZ**, Robert William **KING**, Paul **SIOPONGCO**

**Purpose:** This paper aims to discuss and inform fellow surgeons of rare retrobulbar anesthesia complications that may happen even during routine surgeries.

**Methods:** A patient with mature, brunescant cataract with a preoperative visual acuity of hand movements, good light perception, and an axial length of 22.37 experienced inadvertent globe penetration with probable intravitreal lidocaine + bupivacaine injection during retrobulbar anesthesia for routine cataract surgery. The injection and surgery were immediately aborted. Immediately post block, visual acuity decreased to no light perception and B scan ultrasonography revealed homogenous hyperechoic densities with low to moderate spikes in the vitreous cavity. Serial B scan was done with monitoring of visual acuity which improved gradually to hand movements, fair light perception 1 week post retrobulbar block. Due to improvement in visual acuity and B scan findings, the patient was then rescheduled for cataract surgery under general anesthesia. The patient underwent extracapsular cataract extraction with in the bag intraocular lens. Intraoperatively, there was note of minimal bleached vitreous hemorrhage, epiretinal membrane, 3 small retinal holes at the area of the superior arcade, and shallow bullous retinal detachment after inducing posterior vitreous detachment. Surgeon then decided to do pars plana vitrectomy, membrane peeling, endolaser, and C3F8 gas tamponade.

**Results:** 1 month postoperative, the patient achieved best-corrected visual acuity of around 20/80, which after 3 months of follow-up improved to 20/25.

**Conclusions:** This case highlights the importance of early recognition, acceptance, and timely medical and appropriate surgical intervention in cases of complications encountered inside the operating room.

**Poster No.:** EX1-124

**Panel No.:** 124, **Session:** EX1

### The Dazzling Posterior Capsular Opacification: Post Silicone Oil Removal

*First Author:* Subham **SINHA ROY**  
*Co-Author(s):* Twinkey **BHUTIA**, Suklengmung **BURAGOHAIN**, Amber **DUBEY**

**Purpose:** To report a rare case of glittering posterior capsular opacification post silicone oil removal in a patient with retinal detachment.

**Methods:** Descriptive case report.

**Results:** A 62-year-old male presented with decreased vision in his right eye 2 months after cataract surgery. He was diagnosed to have total retinal detachment and underwent 25-G pars plana vitrectomy with silicone oil (1300 cst) insertion. The retina was attached and subsequently silicone oil was removed after 4 months with improvement in vision. He presented with decreased vision in his right eye after 2 years secondary to silicone oil droplet adhesion at the posterior surface of the posterior capsule mimicking a glittering posterior capsular opacification. Pars plana membranectomy was performed with significant improvement in best-corrected visual acuity.

**Conclusions:** In the literature, few reports of sticky silicone oil droplet adhesion at the posterior capsule have been reported in cases of heavy silicone oil. This case highlights the rare complication of oil droplet adhesion at the posterior capsule in a lesser viscosity silicone oil (1300 cst) with significant visual impairment and treated with pars plana membranectomy.

Poster No.: EX1-125

Panel No.: 125, Session: EX1

**Unveiling a Rare Ophthalmic Enigma: Choroidal Neovascular Membrane in Vitrectomized Aphakic Eye with Retino-choroidal Coloboma**

First Author: Twinkey **BHUTIA**

Co-Author(s): Manabjyoti **BARMAN**

**Purpose:** To elucidate a distinctive case of choroidal neovascular membrane (CNVM) in a vitrectomized aphakic eye with retino-choroidal coloboma.

**Methods:** A comprehensive ophthalmic assessment, including visual acuity evaluation, slit lamp examination, fundus examination, optical coherence tomography (OCT), and ultrasonography (USG), was conducted.

**Results:** The patient exhibited progressive vision loss in both eyes (OU), left eye (OS) > right eye (OD). Best-corrected visual acuity (BCVA) in OD was 6/60, N/36 and OS hand movement close to face (HMCF). OU displayed microcornea and iris coloboma. OD showed iridodonesis and aphakia, while OS had dense nuclear sclerosis cataract. Fundus examination unveiled retino-choroidal coloboma type 1 in OD, with an attached retina. OCT revealed a classic CNVM at the edge of lasered chorio-retinal atrophy and coloboma. USG of OS displayed excavation of the ocular coat with well-defined margins, involving the optic disc, indicative of retino-choroidal coloboma. The final diagnosis encompassed OD classic CNVM with microcornea, aphakia, iris, and retino-choroidal coloboma post-retinal detachment surgery, and OS microcornea with iris and retino-choroidal coloboma, with cataract. Intravitreal injection was recommended for CNVM management in OD.

**Conclusions:** This unique case emphasizes the rarity of CNVM in a vitrectomized aphakic eye with retino-choroidal coloboma. Timely diagnosis and tailored treatment approaches are crucial to preserve visual function in such complex cases. Further research is warranted to enhance our understanding of CNVM

mechanisms in this context and optimize treatment strategies.

Poster No.: EX1-126

Panel No.: 126, Session: EX1

**Vitrectomy with Subretinal Injection of Recombinant Tissue Plasminogen Activator for Submacular Hemorrhage with or without Vitreous Hemorrhage**

First Author: Haoyu **CHEN**

Co-Author(s): Tingkun **SHI**, Jing **WEN**

**Purpose:** To explore the anatomical and functional outcomes and associated prognostic factors of pars plana vitrectomy (PPV) combined with injection of subretinal recombinant tissue plasminogen activator (rt-PA) in patients with submacular hemorrhage (SMH) with or without vitreous hemorrhage.

**Methods:** This retrospective study collected the clinical case data and auxiliary examination results of patients who underwent surgery at Shantou International Eye Center from October 2019 through March 2023. The main observation variables were best-corrected visual acuity (BCVA), SMH displacement, and postoperative complications.

**Results:** A total of 64 eyes were included in the study. The mean time from onset to surgery was  $13.95 \pm 9.91$  days, and the mean follow-up time was  $242.31 \pm 171.95$  days. The SMHs of 47 eyes were completely displaced after surgery. The mean BCVA improved significantly from  $1.97 \pm 0.55$  logMAR units to  $1.01 \pm 0.69$  logMAR units at last follow-up ( $p < 0.001$ ). Postoperative complications included 10 eyes (15.63%) with recurrent SMH or vitreous hemorrhage (VH), 2 eyes (3.13%) with rhegmatogenous retinal detachment, and 3 eyes (4.68%) with epiretinal membrane. In a multiple linear regression analysis, treatment-naïve condition, early surgery, and younger age were significantly associated with better postoperative visual acuity ( $p = 0.036$ ,  $0.043$ , and  $0.005$ , respectively).

**Conclusions:** PPV combined with subretinal rt-PA injection is an effective treatment for

patients with SMH as well as for patients with preoperative VH.

## Translational Medicine

**Poster No.:** EX1-127

**Panel No.:** 127, **Session:** EX1

### Can Code-free Deep Learning Replace Traditional Deep Learning? A Look at Screening, Treatment Planning, Surgical Training, Innovative Research, and Hospital Resource Management

*First Author:* Carolyn Yu Tung **WONG**

*Co-Author(s):* Fares **ANTAKI**, Pearse **KEANE**, Timing **LIU**, Ciara O'**BYRNE**, Priyal **TARIBAGIL**

**Purpose:** By reviewing code-free deep learning (CFDL) and traditional deep learning (DL) applications in the ophthalmological field, we aim to discuss whether CFDL is superior to non-CFDL solutions in real-world implementations using the tasks of (1) diabetic retinopathy screening, (2) retinal multi-disease classification, (3) surgical video classification, (4) oculomics, and (5) resource management as exemplars.

**Methods:** We performed a search for studies reporting CFDL applications in ophthalmology in PubMed on June 25, 2023, using the keywords "autoML" and "ophthalmology". A subsequent search in PubMed was then performed to find equivalent DL studies performing the same ophthalmological tasks as those in the identified CFDL studies. English articles with full text were included. Reviews, editorials, and case reports were excluded. Twelve relevant studies were included.

**Results:** Despite studies portraying optimism towards CFDL's promising performance and superior added benefits to DL at different integration points of the ophthalmology clinical pathway, limitations of suboptimal quality evaluation of CFDL robustness, ambiguous data quality control, and mono-dimensional analyses of incentivizing factors directed the CFDL analyses to performance-centric approaches. High-quality assessment of superior CFDL applicability over DL warrants a context-specific, weighed assessment of computational

reliabilism (CR) requirement, cost-efficiency, and clinician intent. Trustworthiness, CR, and interpretability are distinct concepts to be clarified under CFDL. CFDL and DL could work in concert on the same task at different stages.

**Conclusions:** CFDL supplements DL in ophthalmology and is superior at times, depending on the task's execution stage. CFDL's superiority is concluded only after weighted evaluation multi-dimensionally. Regardless, benchmarking datasets and reporting standardization are needed.

**Poster No.:** EX1-128

**Panel No.:** 128, **Session:** EX1

### Light-induced Sericin Hydrogel Injected into the Anterior Chamber of Mice with Chronic Ocular Hypertension Efficacy, Medication Sensitivity, and Material Safety

*First Author:* Li **LIAO**

*Co-Author(s):* Xuanchu **DUAN**, Yang **ZHAO**

**Purpose:** To assess the efficacy and safety of a mouse model of light-induced sericin hydrogel injection into the anterior chamber, as well as the animal's pharmacological sensitivity to antihypertensive medications.

**Methods:** A rise in intraocular pressure (IOP) and decreased retinal ganglion cells are frequent indicators of effective modeling of chronic ocular hypertension in mice. In this study, the sensitivity of the mouse model to pharmaceutical therapy to reduce intraocular tension was assessed, the model's safety was confirmed using a cytotoxicity test, and the success rate of the mouse model of ocular hypertension was assessed by assessing alterations in retinal ganglion cells.

**Results:** Prior to injection, the experimental group had a baseline intraocular pressure (IOP) of  $9.42 \pm 1.28$  mm Hg ( $1 \text{ kPa} = 7.5 \text{ mm Hg}$ ), while the control group had  $9.08 \pm 1.21$  mm Hg. Post-injection, complications occurred in 5 eyes, leading to their exclusion. After 4 weeks, the experimental group had a higher IOP ( $19.7 \pm 4.52$  mm Hg) than the control ( $9.92 \pm 1.55$  mm Hg), which was statistically significant ( $P < 0.05$ ). Different interventions were applied



to the experimental group, with timolol and tafluprost showing significant IOP reductions compared to high IOP controls ( $P < 0.05$ ). Retinal ganglion cells are damaged in the high IOP group, while light-induced sericin hydrogel had no significant effect on cell viability.

**Conclusions:** Mice injected with light-induced sericin hydrogel developed optic nerve dysfunction resembling chronic ocular hypertension. Tafluprost and timolol effectively lowered intraocular pressure, with sensitivity to drug withdrawal. The model demonstrated safety with minimal impact on cell proliferation in sericin toxicity tests.

Poster No.: EX1-129

Panel No.: 129, Session: EX1

**RIP3-mediated Microglial Necroptosis Promotes Neuroinflammation in the Early Stages of Diabetic Retinopathy**

First Author: Zijing HUANG

**Purpose:** Increasing evidence suggests that microglia-mediated neuroinflammation plays a key role in the early stages of diabetic retinopathy (DR). However, the molecular mechanisms of microglial activation during the early stages of DR are not fully understood.

**Methods:** Streptozotocin (STZ)-induced diabetes mouse model was established. Microglia activation and the levels of inflammatory cytokines were investigated. Key necroptotic machinery, including RIP3, MLKL, and p-MLKL, were detected in the diabetic retina. Necroptosis in microglia was explored by double immunostaining of p-MLKL and iba-1, as well as knockdown of RIP3 in DR. The therapeutic effect of anti-necroptosis in DR was investigated by intravitreal injection of an RIP3 inhibitor, GSK-872. Finally, the presence of necroptosis was observed in cultured BV2 microglia under hyperglycemic conditions.

**Results:** We found that activated microglia triggered an inflammatory cascade through a process called necroptosis, a newly discovered pathway of regulated cell death. In the diabetic retina, key components of the necroptotic machinery, including RIP1, RIP3, and MLKL,

were highly expressed and mainly localized in activated microglia. Knockdown of RIP3 in DR mice reduced microglial necroptosis and decreased pro-inflammatory cytokines. Additionally, blocking necroptosis with the specific inhibitor GSK-872 improved retinal neuroinflammation and neurodegeneration, as well as visual function in diabetic mice. RIP3-mediated necroptosis was activated and contributed to inflammation in BV2 microglia under hyperglycemic conditions.

**Conclusions:** Our data demonstrate the importance of microglial necroptosis in retinal neuroinflammation related to diabetes and suggest that targeting necroptosis in microglia may be a promising therapeutic strategy for the early stages of DR.

Poster No.: EX1-130

Panel No.: 130, Session: EX1

**Sustained Release of Glial Cell-derived Neurotrophic Factor Secreted from Terminable Cell-encapsulating Collagen-alginate Composite Encapsulated Cell Therapy Gel as a Therapy for Retinal Degenerative Diseases**

First Author: Tingyu HU

Co-Author(s): Joseph Yau Kei CHAN, Amy Cheuk Yin LO, Wai Ching LAM, Brian Ka Cheung TAM

**Purpose:** To assess the in vivo safety, performance, termination, and efficacy of a glial cell-derived neurotrophic factor (GDNF)-secreting collagen alginate composite (CAC) encapsulated cell therapy (ECT) gel on neuroprotection in retinal degeneration (RD).

**Methods:** New Zealand white rabbits received intravitreal injection of CAC ECT gels. After 2 weeks, gel safety was evaluated using electroretinogram for retinal function, hematoxylin-eosin (H&E) staining for retinal histology, and immunohistochemistry for glial activation, while gel performance was assessed through scanning electron microscopy, phase contrast microscopy, Live-Dead assay, and GDNF ELISA. Rabbits with gels received 0.1 mg/mL doxycycline for 1 week to assess termination. Therapeutic efficacy was

## POSTERS

investigated in a sodium iodate (SI, 10 mg/kg)-induced rabbit RD model after 2-week implantation through electroretinogram, H&E staining, and TUNEL assay.

**Results:** Intravitreal surgery procedure and presence of CAC gels inside vitreous did not alter retinal function and structure, but the procedure itself may induce glial activation. Retrieved gels exhibited mechanical stability, integrity, no host tissue attachment, and an interpenetrating network. Encapsulated cells were viable and secreted GDNF.

Doxycycline treatment effectively terminated gel functionality. RD rabbits with gels showed improved retinal function, outer nuclear layer (ONL) thickness, and ONL nuclei number, and alleviated photoreceptor apoptosis.

**Conclusions:** The terminable CAC ECT gel was safe in rabbit eyes and displayed mechanical stability, integrity, and controlled GDNF release. Intravitreal gel implantation in RD rabbits improved both photoreceptor morphology and retinal function. Our findings suggested that CAC gel can provide therapeutic drugs to the retina, which could aid in the clinical management of RD.

## E-POSTERS

## Cataract and Refractive Surgery

**Efficacy of Ultrawide Field Scanning Confocal Laser-based Red-free Imaging in Detecting Retinal Vascular Changes in Retinopathy of Prematurity***First Author: Sushma JAYANNA**Co-Author(s): Tapas PADHI, Miloni SHAH*

**Purpose:** To evaluate the efficacy of ultrawide field red-free (UW-RF) imaging versus ultrawide field color fundus (UW-CF) imaging in detecting various retinal vascular changes in retinopathy of prematurity (ROP).

**Methods:** In our retrospective cross-sectional study, the scanning laser ophthalmoscope (SLO) based UW-RF images of babies with ROP were compared with the corresponding SLO based UW-CF images by 2 independent ROP specialists masked to the patient details. The analysis consisted of (1) detection rate of new vessels, vascular-avascular junction, and additional fine vascular changes, if any; (2) average time taken to analyze; (3) subjective comfort.

**Results:** The study included 88 eyes of 44 babies with ROP of various profiles. The detection rate of all the vascular changes was higher in the UW-RF imaging group (new vessels,  $p = 0.03$ ; fine vascular changes,  $p = 0.048$ ; and detecting vascular-avascular junction,  $p = 0.23$ ). The time taken to analyze UF-RF images was shorter than UW-CF images (mean 0.33 vs 0.5 minutes;  $p < 0.001$ ). The comfort level of the examiner was higher in analyzing the vascular changes in UW-RF images ( $p < 0.001$ ) than with UW-CF images.

**Conclusions:** UW-RF imaging has greater efficacy in detecting various vascular lesions in ROP with greater ease and less time than UW-CF imaging and can be a useful tool in detecting subtle peripheral vascular changes.

**Surgical Outcomes and Complications Following Sutureless Intrasclear Intraocular Lens Fixation: 7-year Experience with the Yamane Technique***First Author: Mun Wai LEE*

**Purpose:** To evaluate the surgical outcomes and complications following sutureless intrasclear intraocular lens (IOL) fixation using the Yamane technique.

**Methods:** Retrospective study of 108 eyes of 100 patients who underwent intrasclear IOL fixation with the Yamane technique by a single surgeon. Primary indications for surgery, best-corrected visual acuity (BCVA), refractive outcomes, complications, and duration of follow up were analyzed. All visual acuities were converted to logarithm of the minimal angle of resolution (logMAR) for analysis.

**Results:** The primary indications for surgery were aphakia (11.1%), intraoperative posterior capsular rupture or zonulysis (16.7%), dislocated IOL (58.3%), dislocated cataract (11.1%), opacified IOL (1.8%), and corneal decompensation (0.9%). The mean preoperative BCVA was  $0.89 \pm 0.79$  and this improved to  $0.42 \pm 0.52$  with a mean follow up of  $15.9 \pm 15.1$  months. The mean postoperative spherical equivalent was  $-0.48 \pm 1.01$ D and the mean refractive spherical equivalent (MRSE) was  $-0.09 \pm 1.00$  D with 57.3% and 79.2% of eyes within 0.5 D and 1 D of target refraction, respectively. Complications included bullous keratopathy (2.8%), secondary glaucoma (4.6%), cystoid macular edema (1.8%), vitreous hemorrhage (0.9%), retinal detachment (0.9%), uveitis (5.5%), IOL malposition (5.5%), and haptic extrusion (1.8%). A second procedure was required in 2 eyes with IOL tilt, 2 eyes with haptic extrusion, and 1 eye which had a retinal detachment. All other complications either resolved spontaneously or were successfully managed with topical medications.

**Conclusions:** Sutureless IOL fixation with the Yamane technique showed good visual outcomes and is a safe technique with a low incidence of complications. There is an associated learning curve as all complications recorded occurred during the surgeon's first 30 cases.

### Eye Trauma, Emergencies & Infections

#### A Case Series of Complicated Cataract Management in Northern Territory, Australia

*First Author:* Christopher **GO**  
*Co-Author(s):* Susith **KULASEKARA**, Ario **WILSON-POGMORE**

**Purpose:** Complicated cataracts are common in Northern Territory, Australia due to the high incidence of trauma and delayed presentations especially in the Aboriginal and Torres Strait Island populations. Often, these go undetected during the preoperative assessment due to factors including low self-reported trauma, language barriers, poor dilation of dark irises, and low tolerance for delay or wait time.

**Methods:** A case series of 8 complicated cataracts managed by a single surgeon at Royal Darwin Hospital over 18 months.

**Results:** Eight patients aged from 30-70 (median 60), with 5 males and 3 females, 7 identified as Aboriginals or Torres Strait Islanders, and 5 were from remote communities. Preoperatively, 3 had reported trauma, 1 had a posterior capsular defect, and 3 had phacodonesis; 4 more were identified intraoperatively. A variety of surgical techniques were used; 4 had scleral tunnel with intracapsular extraction (ICCE) and ACIOL, 3 had converted ICCE via limbal wound extension, and 1 had routine phacoemulsification. Postoperatively, all patients' visual acuity (VA) improved and 4 had significant improvement. One was lost to follow-up from day 1 and 5 had missed appointments.

**Conclusions:** This case series describes a learned experience of cataract management unique to the Northern Territory region

including high suspicion of traumatic cataract with zonular dehiscence. The authors also advocate for the use of scleral tunnel incision to mitigate the risks of infection and induced astigmatism in the setting of unreliable follow-up. Subconjunctival dexamethasone is also preferred intraoperatively given difficulties with compliance and accessibility in remote communities.

#### Analysis of Penetrating Ocular Injuries with Intraocular Foreign Bodies: Variations in Clinical Manifestations and Outcomes

*First Author:* Bhavik **PANCHAL**  
*Co-Author(s):* Naveen K., Avinash **PATHENGAY**, Rudvij **PANDYA**

**Purpose:** To study the various patterns, clinical manifestations, and outcomes of penetrating ocular injuries with intraocular foreign bodies (IOFB).

**Methods:** Retrospective study. All patients diagnosed with IOFB secondary to open globe injury were included from January 2017-December 2022.

**Results:** One hundred twenty-three eyes of 116 patients were analyzed (males 93.9%). Mean age was  $33.7 \pm 14.2$  years (median, 32 years). Quarter 2 presented with maximum injuries and 37.9% presented on Friday and Saturday. 67% of injuries occurred at the workplace. Metallic foreign body was the cause for 62.9% of patients with 30% of them due to hammer and chisel type of injury. Half of the patients presented within the first 2 days. 57% had zone 1 injury, 23% had zone 2. There was no difference between the eye involved in injury. Though corneal injury was the most common, foreign body was most common in the posterior segment. 55.8% of patients were operated on within the first 2 days after presentation. Mean interval between presentation and surgery was 4.5 days. The mean presenting VA was 2.69 and mean final VA was 1.3. Mean OTS raw score at presentation was 53. The mean final follow up was 12.3 months. Four eyes required evisceration, 10 eyes went into phthisis, and 1 individual developed sympathetic ophthalmia. Twenty-one had positive microbiology growth.



**Conclusions:** Zone 2 involvement, wooden foreign body, delay in presentation, surgical intervention, and endophthalmitis were associated with poor outcomes. Early presentation with surgical intervention, metallic FB, and good vision at presentation were associated with better visual outcomes. Wearing the right gear will avoid morbidity.

### Neurologic and Systemic Complications of Herpes Zoster Ophthalmicus

*First Author: Gillian Louise SAQUIAN  
Co-Author(s): Charmaine ANG, Fatima REGALA*

**Purpose:** Orbital apex syndrome is a rare neuro-ophthalmic manifestation of herpes zoster virus infection. Two of its consequences if left untreated are viral meningitis and cerebrovascular disease. Early diagnosis and treatment of herpes zoster ophthalmicus is crucial to avoid consequences.

**Methods:** This is a case of a 74-year-old female who consulted for vesicular rashes on the right periocular area. History revealed that 2 weeks prior to consult, patient noted appearance of vesicular, painful rashes on her forehead and right periorbital area, extending to the lateral tip of her nose. A mixture of herbs topically applied offered no relief. There was gradual right visual loss, with conjunctival hyperemia, ptosis, and limitation of eye movement. Ophthalmological and neurological evaluation showed the following: complete ptosis right with limited eye movement, negative light perception, nonreactive pupils, and recurrent hyphema. There was also decreased sensorium and right-sided body sensorimotor weakness.

**Results:** Lumbar tap yielded elevated protein and lymphocytes. Cavernous sinus thrombosis was seen with neuro-imaging. A diagnosis of orbital apex syndrome with meningitis secondary to herpes zoster ophthalmicus was then established. Patient was treated with topical and intravenous acyclovir and pregabalin. There was improvement after 3 weeks except for vision which remained negative, with persistence of the limited eye movement and ptosis.

**Conclusions:** It is necessary to consider the possibility of orbital apex syndrome development in a patient with herpes zoster ophthalmicus. Furthermore, cerebrospinal studies and MRI will help select a treatment method. Prompt treatment should be initiated to avoid systemic complications.

### Pars Plana Vitrectomy and Globe Rupture Repair Surgery to Extricate Intraocular Artificial Christmas Tree Remnant

*First Author: Graecia BUNGARAN  
Co-Author(s): Zev PANKA, Richardo RUSLI, Eugeni Jr SUMANTI, Priscillia TONDOLAMBUNG, Dyana WATANIA*

**Purpose:** To report a case of emergent intraocular foreign body (IOFB) removal in blunt open globe injury (OGI) with Ocular Trauma Score (OTS) 2.

**Methods:** A case report of a Southeast Asian male with IOFB from OGI. Visual acuity (VA), intraocular pressure (IOP), slit lamp examination (SLE), posterior segment, and CT scan were evaluated.

**Results:** A 59-year-old male sustained a right eye (RE) OGI from chopping branches of an artificial Christmas tree 2 days prior to admission. On examination RE showed VA light perception, IOP 10 mm Hg, shallow anterior chamber (AC), corneal edema and central epithelized corneal wound, opaque lens, and ruptured anterior capsule. Ocular ultrasound (USG) and CT scan revealed high-density foreign body embedded in the posterior globe. LE showed VA 6/9, IOP 12 mm Hg, SLE normal findings. Pars plana vitrectomy (PPV), IOFB extraction, lens extraction, intravitreal and intracameral antibiotic injection, and corneal suture were done; IOFB was found to be of polyvinyl chloride material. Postoperation topical and systemic broad spectrum antibiotic and antifungal, topical and systemic prednisolone, and topical sodium chloride were prescribed. First day postoperation RE showed VA light perception, IOP 16 mm Hg, conjunctival injection, intact corneal suture (central and superior), and USG showed no retained IOFB. One month postoperation RE

had VA hand movements, IOP 15 mm Hg, aphakic lens, minimal corneal scarring, and intact corneal suture was removed.

**Conclusions:** PPV for IOFB removal in open globe injury is crucial along with prophylaxis for endophthalmitis. Lower OTS score predicts unfavorable VA. Prevention is central in OGI, hence education of protective eyewear use during high-risk activities significantly reduces the incidence of OGI.

### Salvaging Vision in Perforating Ocular Trauma with Tractional Retinal Detachment

First Author: Kumudini **SUBEDI**

Co-Author(s): Raghunandan **BYANJU**

**Purpose:** Foreign bodies (FB) are implicated in 16% of penetrating ocular injuries. We encountered 2 cases of perforating ocular trauma with tractional retinal detachment and metallic intraorbital FB in adolescent males.

**Methods:** A 17-year-old male presented with nail-hammer injury 6 hours after trauma. Snellen's acuity was 3/60 with corneal laceration of 5 mm, lens matter in anterior chamber, and vitreous hemorrhage. After primary repair by anterior segment surgeon, posterior segment injury was treated on day 3 following diagnosis of retinal detachment and intraocular FB on ultrasound. During retinal surgery, no FB was noted. On computed tomography (CT), metallic FB of 5.2 x 3.5mm was noted at insertion of inferior oblique muscle. Final Snellen's acuity was 6/12p, despite site of exit being only 2 disc diameters (DD) from the macula. A 16-year-old male presented 20 days after injury with metal on metal hammering accident. Primary management was done elsewhere. Presenting Snellen's acuity was 6/18p. Scleral site of entry was 1.4 mm from 9 o'clock limbus with no lens trauma. CT scan showed intraorbital FB near orbital apex. Foreign body (4.4 x 4.3 mm) left a tract in the subretinal space to enter intraconal space 1 DD nasal to the optic disc. Vitrectomy was done for tractional retinal detachment and postoperative best corrected Snellen's vision was 6/12.

**Results:** We were able to salvage the vision in both cases in spite of serious trauma.

**Conclusions:** With high precision surgery, vision may be salvaged in eyes with perforating trauma and tractional retinal detachment in spite of the presence of intraorbital foreign body.

## Glaucoma

### Combined Phacoemulsification and Endoscopic Cyclophotocoagulation versus Phacoemulsification Alone in the Treatment of Glaucoma

First Author: Hsuan-en **HUANG**

Co-Author(s): Hung-ju **CHEN**

**Purpose:** To compare the effectiveness of combined phacoemulsification and endoscopic cyclophotocoagulation (phaco-ECP) with phacoemulsification alone in patients with glaucoma.

**Methods:** We conducted searches in PubMed, Cochrane Library, EMBASE, and Web of Science to identify studies that compared the intraocular pressure (IOP)-lowering effects of combined phaco-ECP with phacoemulsification alone. The study protocol was registered in the International Prospective Register of Systematic Reviews. The endpoints were IOP reduction and the mean reduction in the number of glaucoma drops.

**Results:** We included 5 studies involving a total of 602 eyes. The measured IOP after combined phaco-ECP was significantly lower than in the phacoemulsification alone group at 3 months (SMD: 0.476; 95% CI: 0.057 to 0.894), 6 months (SMD: 0.586; 95% CI: 0.323 to 0.850), 12 months (SMD: 0.387; 95% CI: 0.154 to 0.620), and 24 months (SMD: 0.387; 95% CI: 0.175 to 0.581) post-surgery. Moreover, there was no statistically significant difference in the mean reduction of postoperative glaucoma medications between the combined phacoemulsification plus ECP group and the phacoemulsification alone group at 3 months (SMD: 0.414; 95% CI: -0.003 to 0.831) and 6 months (SMD: 0.409; 95% CI: -0.007 to 0.826).

However, a statistically significant difference was observed at 12 months postoperatively (SMD: 0.425; 95% CI: 0.009 to 0.842).

**Conclusions:** ECP demonstrates a synergistic effect with phacoemulsification in controlling IOP both in the short term and long term. Additionally, it appears to reduce the long-term requirement for glaucoma eye medications. More high-quality studies are needed to confirm our findings in the future.

### Intraocular Inflammation, Uveitis & Scleritis

#### A Case of Acute Foveolitis as the Presenting Manifestation of Life-threatening Invasive Group B Streptococcus Disease

First Author: Xin **WEI**

Co-Author(s): Su Ling **HO**

**Purpose:** To report a case of acute unilateral foveolitis associated with invasive group B Streptococcus (GBS, *Streptococcus agalactiae*) disease.

**Methods:** Case report.

**Results:** A 36-year-old Eurasian female presented to the emergency department with 4 days' history of left eye pain, redness, and decreased vision. Examination of the left eye showed visual acuity of counting fingers, 3+ cells in the anterior chamber, and a yellowish lesion at the fovea with scattered intraretinal hemorrhages. Optical coherence tomography showed subretinal fluid and hyperreflective material involving the fovea. Fluorescein angiography showed mild disc and retinal vascular leakage. On further systemic review, she reported symptoms of fever, vomiting, diarrhea, abdominal cramps, myalgia, joint pain, and rashes on the palms of similar duration. Systemic workup showed GBS in blood aerobic and anaerobic culture and urine culture. Trans-thoracic echocardiogram showed presence of masses on the anterior mitral valve leaflet, suggestive of native mitral valve infective endocarditis. Subsequently she also developed right shoulder pain and swelling due to septic arthritis. The patient was comanaged with infective disease specialists and treated

with 6 weeks of intravenous antibiotics (vancomycin and ceftriaxone) and oral steroid as well as topical antibiotics and steroid in the left eye. The patient had resolution of systemic symptoms and intraocular inflammation after treatment and her best-corrected visual acuity improved to 20/40.

**Conclusions:** Foveolitis may occur as a complication and the presenting sign of invasive GBS disease in an otherwise healthy adult. Recognition of such association by ophthalmologists is crucial in the management of this life-threatening condition.

#### An Unforeseen Encounter: A Diagnosis of VKH-like Syndrome in a BRAF Mutant Metastatic Melanoma Patient Treated with Dabrafenib and Trametinib

First Author: Cadric **GUNARATNAM**

Co-Author(s): Michael **HOGDEN**

**Purpose:** To report a single case of Vogt-Koyanagi-Harada (VKH)-like uveitis associated with concurrent use of BRAF and MEK inhibitors in the treatment of metastatic melanoma.

**Methods:** Case report and review of literature.

**Results:** A 49-year-old woman with stage IV metastatic cutaneous melanoma developed bilateral acute panuveitis, along with multifocal serous retinal detachments, during treatment with a combination of dabrafenib and trametinib, commencing 4 months prior. Clinical assessment, together with fluorescein angiography (FA) and optical coherence tomography (OCT) as well as serology to exclude other key differential diagnoses, led to the diagnosis of VKH-like uveitis. The patient was subsequently treated with systemic corticosteroids and modification of the dosing schedule of the suspected offending agents, resulting in the eventual complete resolution of intraocular inflammation and serous retinal detachments. Currently, systematic reviews reporting ocular adverse effects of combined dabrafenib and trametinib therapy are limited, although a retrospective study by Mettler et al. reported an odds ratio of 21.8 (95% CI, 6.8–69.7) for VKH-like disease. Management

of VKH in reported cases has also advocated discontinuation of offending agents and initiation of intravenous corticosteroids for 3 days, followed by oral corticosteroid treatment, with a tapering schedule.

**Conclusions:** This single case report highlights the importance of early recognition of a VKH-like syndrome in these specific patient groups and also provides insight into how this condition can be effectively managed, with both excellent ocular outcomes, as well as facilitating ongoing life-saving treatment for metastatic malignancy.

### **Novel CAPN5 Mutation Within the Regulatory Domain of Calpain-5 is Associated with Early-onset Autosomal Dominant Neovascular Inflammatory Vitreoretinopathy**

*First Author: Ma.Patricia RIEGO DE DIOS  
Co-Author(s): Christine Marie Kara GOZALI-AGAS, Manuel Benjamin IBANEZ*

**Purpose:** CAPN5 is the gene implicated in autosomal dominant neovascular inflammatory vitreoretinopathy (ADNIV). The majority of CAPN5 mutations causing ADNIV are in the catalytic domain. This report discusses the case of a 9-year-old Filipino male with a novel CAPN5 variant located in the regulatory domain, presenting with a phenotype of early-onset retinal dystrophy and mild inflammation.

**Methods:** After clinical exam, ancillary tests were requested which included fundus photos, fundus autofluorescence, optical coherence tomography of the macula, full field electroretinogram, and complete blood count (CBC). The patient also underwent genetic testing via next-generation sequencing.

**Results:** A 9-year-old male came in for nyctalopia. Upon presentation, patient was found to have a best-corrected visual acuity of 20/30 in both eyes. Ocular exam revealed vitreous cells and bony spicule-like pigmentary changes in the retinal periphery, similar to those seen in retinitis pigmentosa. Ancillary testing was consistent with a rod-cone like dystrophy. CBC showed an inflammatory process. Genetic testing revealed the patient to be heterozygous

for a novel variant in CAPN5 c.1826C>G (p. Thr609Ser). This variant is not found in the population database (gnomAD) and the amino acid is highly conserved among species.

**Conclusions:** This study reports a novel CAPN5 variant associated with a mild ADNIV and rod-cone dystrophy like phenotype. Identifying new CAPN5 variants and ADNIV phenotypes such as the one presented here will help further the understanding of this rare disease.

### **Pediatric Uveitis: Prevalence, Demographics, and Treatment Outcomes in a Tertiary Eye Center**

*First Author: Mei Kwan YIU  
Co-Author(s): Mary HO, Wilson YIP, Alvin YOUNG, Grace YUNG*

**Purpose:** To study the demographics and treatment outcomes of pediatric uveitis.

**Methods:** In this retrospective case series, cases of pediatric uveitis were identified in a tertiary eye centre (New Territories East Cluster) from 1/1/2022 to 1/8/2023. The patients were managed through conjoint assessments by pediatric rheumatologists and ophthalmologists, providing comprehensive eye and systemic exams. Clinical records were retrieved.

**Results:** A total of 21 cases of pediatric uveitis were included. The male to female ratio was 1:1.3. The mean age of uveitis onset was  $12.2 \pm 4.7$  (5-22). 72.7% of cases suffered from bilateral uveitis. 71.4% of cases presented with anterior uveitis. The most common complication was posterior synechiae (47.6%), followed by cataract (38.1%). Six out of 21 cases were found to have uveitis associated with systemic diseases. Commonly seen associated conditions included juvenile idiopathic arthritis, HLA-B27 associated uveitis, and tubulointerstitial nephritis and uveitis. Three out of 21 patients encountered either first attack of uveitis or flare associated with COVID-19 vaccination. An elevated ANA level was observed in most cases (71.4%). 85.7% of patients required topical or systemic steroid for disease control. Steroid response



was a common phenomenon, observed in 42.9% of cases. The majority (81.0%) required steroid sparing immunotherapy, including methotrexate, mycophenolate mofetil, and tacrolimus. A substantial number of cases (47.6%) required biologics including anti-TNF alpha agents and IL-6 inhibitors.

**Conclusions:** Pediatric uveitis exhibits variability in its causes and clinical course. A noteworthy proportion of cases experienced steroid-induced glaucoma and necessitated the use of biologics. Prompt diagnosis, comprehensive care, and judicious use of treatment modalities are crucial.

### Vogt-Koyanagi-Harada-like Uveitis Induced by Darafenib Plus Trimetinib: A Report of Two Cases

First Author: Liangqi **FENG**  
Co-Author(s): Jie **HU**, Meng **XUAN**

**Purpose:** Darafenib plus trimetinib (DPT), approved targeted therapy for BRAFV600E-mutational melanoma, rarely induces uveitis. Vogt-Koyanagi-Harada (VKH)-like uveitis arising from DPT remains exceptionally uncommon. We present two cases of DPT-induced VKH-like uveitis.

**Methods:** Two patients with malignant melanoma on DPT exhibited bilateral visual acuity (VA) decline, prompting detailed ocular examinations.

**Results:** Patient 1, 65 years old, had best-corrected VA (BCVA) of 0.12 OU. Patient 2, 57 years old, displayed BCVA of 0.1 OD and 0.2 OS. Slit lamp biomicroscopy revealed bilateral posterior synechiae and Tyndall phenomenon in both patients. Optical coherence tomography uncovered bilateral papilledema and serous retinal detachments (SRD). Notably, elevated intraocular pressure and a shallow anterior chamber were observed in patient 1. Drug-induced uveitis diagnosis prompted systemic corticosteroid treatment initiation, DPT discontinuation, and collaboration with an oncologist. Within 1-2 weeks, both patients responded favorably, with recovered VA and SRD resolution. However, retinal pigment

epithelium and chorioretinal fusion, with thickening, developed. After uveitis resolution, patient 2 cautiously reintroduced half-dose DPT, avoiding recurrence. Conversely, patient 2 experienced recurrent uveitis at either dose. This patient's management involved a half dose of DPT combined with cyclosporine.

**Conclusions:** We report two severe cases of DPT-induced VKH-like uveitis. Uveitis responded positively to corticosteroids and DPT discontinuation within 1-2 weeks. However, retreatment with DPT carried uveitis recurrence risk. Adjusted DPT dosage or cyclosporine incorporation emerged as potential mitigation strategies. Extreme cases necessitated DPT cessation and collaborative oncologist intervention. Vigilant monitoring and a multidisciplinary approach are vital in managing ocular effects of targeted therapy.

## Ocular Imaging

### A Comparison of Choroidal Imaging Biomarkers between Simple and Complex Central Serous Chorioretinopathy

First Author: Arman **ZARNEGAR**  
Co-Author(s): Selina **CHANG**, Jay **CHHABLANI**, Joshua **ONG**, Elham **SADEGHI**, Amrisha **SELVAM**

**Purpose:** This study analyzes choroidal imaging biomarkers based on CSCR complexity.

**Methods:** This retrospective study included 85 eyes of 75 patients with CSCR with multimodal imaging at baseline, including optical coherence tomography (OCT). CSCR subtypes were defined as simple ( $\leq 2$  disc areas [DA] of pigment epithelium alteration [PEA]) and complex ( $> 2$  DA of PEA or multifocality).

**Results:** The mean age was  $52.6 \pm 13.3$  years (57 males, 18 females). There were 34 (80%) eyes with simple CSCR vs 51 (60%) with complex. Mean symptom duration was 399 and 1123 days in simple vs complex. The baseline visual acuity in the logarithm of the minimum angle of resolution was  $0.22 \pm 0.28$ . OCT imaging biomarkers ( $\mu\text{m}$ ) in simple vs complex included mean central macular

thickness ( $330.8 \pm 185.1$  vs  $216.2 \pm 79.8$ ,  $p = 0.003$ ); serous retinal detachment height ( $158.2 \pm 179.7$  vs  $72.2 \pm 75.9$ ,  $p = 0.02$ ); inner choroid thickness:subfoveal choroidal thickness ( $0.35 \pm 0.09$  vs  $0.40 \pm 0.12$ ,  $p = 0.056$ ). In the simple group, there were 14 PEDs (mean height  $128.7 \pm 116.9$ , mean width  $725.2 \pm 393.5$ ), with 8 in the complex (mean height  $81.4 \pm 76.4$ , mean width  $377.3 \pm 262.2$ ).

**Conclusions:** Given the general ambiguity in characterizing CSCR, a classification system based on complexity has been proposed. These data demonstrate differences in retinal and choroidal imaging parameters across eyes with varying CSCR complexity.

#### A Longitudinal Study of Pigment Epithelial Detachment Morphology and Outcomes in Central Serous Chorioretinopathy

First Author: Arman **ZARNEGAR**  
Co-Author(s): Selina **CHANG**, Jay **CHHABLANI**, Razeen **KHAN**, Joshua **ONG**, Sanya **YADAV**

**Purpose:** We studied long-term changes in pigment epithelial detachments (PED) in central serous chorioretinopathy (CSCR).

**Methods:** Retrospective analysis of PED optical coherence tomography (OCT) parameters included 16 eyes of 14 patients with CSCR and PED at baseline. Eyes with CNV were included. We measured PED composition indices (PEDCI). Eyes were divided into control and treatment groups.

**Results:** Mean age was  $50.4 \pm 11.6$  years with 12 males and 2 females. Eight eyes underwent observation and 8 were treated with 4 receiving PDT, 4 anti-VEGF injections, and 3 mineralocorticoid antagonists. Four eyes exhibited CNV. By year 3, mean visual acuity (VA) improved from 20/50 to 20/40 ( $p = 0.22$ ). The treatment group demonstrated worse baseline VA but improved more than the control group by year 3. Overall mean PED height and width decreased by 51.3% ( $p = 0.01$ ) and 33.2% ( $p = 0.12$ ) by year 3 and by 50.4% ( $p = 0.04$ ) and 33.2% ( $p = 0.55$ ) in the first year alone. In the treatment group, 50% of PEDs fully resolved compared to 25% in

the observation group. Mean central macular thickness (CMT) ( $244.3 \pm 114.9$  vs  $202.9 \pm 78.2$ ,  $p = 0.39$ ) and serous retinal detachment (SRD) height ( $59.8 \pm 75.2$  vs  $43.1 \pm 114.2$ ,  $p = 0.07$ ) decreased ( $\mu\text{m}$ ). The inner choroid layer, Haller layer, and subfoveal choroidal thicknesses decreased. PEDCI was 53.9% serous and 18.5% neovascular at baseline; however, it changed to 43.1% serous ( $p = 0.48$ ) and 30.5% neovascular ( $p = 0.28$ ).

**Conclusions:** At year 3, PED height decreased significantly. 37.5% of PEDs fully resolved. PEDCI shifted from primarily serous to neovascular type. Mean choroidal parameters and VA improved.

#### Anterior Scleral Thickness in Myopic Eyes and Its Association with Ocular Parameters

First Author: Sang Woo **PARK**  
Co-Author(s): Mi-sun **SUNG**

**Purpose:** This study was designed to determine whether the anterior scleral thickness is affected by axial elongation and to investigate the association between anterior scleral thickness and various ocular parameters in myopic eyes.

**Methods:** Anterior scleral thickness was measured in 8 meridians (superior-nasal, superior, superior-temporal, temporal [T], inferior-temporal, inferior [I], inferior-nasal, and nasal [N]) using anterior segment optical coherence tomography. Bruch's membrane opening (BMO) area, width of  $\beta$ -parapapillary atrophy with and without Bruch's membrane (PPA+BM and PPA-BM), and the global peripapillary and subfoveal choroidal thickness were additionally measured. Age- and sex-adjusted partial correlation analysis and linear regression analysis were performed to examine the effects of axial length and various ocular parameters on anterior scleral thickness in myopic eyes.

**Results:** Overall, the anterior scleral thickness varied topographically according to the meridians and distance from the scleral spur. In the partial correlation analysis controlled for the effect of age and sex, increasing axial length was related to anterior scleral thinning

at several measurement points along the T, I, and N meridians. Among the several ocular parameters, multivariate linear regression analysis with age, sex, and axial length as covariates revealed that central corneal thickness, intraocular pressure, and BMO area were significantly associated with anterior scleral thickness.

**Conclusions:** There was a close relationship between the anterior scleral thickness and several ocular parameters in myopic eyes. These features should be taken into consideration when managing myopia, and our results might have important implications for understanding the pathogenesis of scleral changes during axial elongation.

### Artificial Intelligence for Predicting the Development of Epiretinal Membrane

First Author: Yi-ting **HSIEH**

**Purpose:** To develop deep learning models for the prediction of epiretinal membrane (ERM) from the macular optical coherence tomography (OCT) of the contralateral healthy eyes, and to analyze the features for predicting ERM in the fellow eyes.

**Methods:** 1155 macular OCT images from the healthy eyes of 750 persons (465 females and 285 males) with or without ERM in their fellow eyes were enrolled. Deep learning-based algorithms were used to develop models for prediction of ERM in the fellow eyes, and 10-fold cross-validation was applied. Gradient-weighted class activation mapping (Grad-CAM) was used for feature analysis.

**Results:** When all OCT images were used for model training, the accuracy for predicting ERM in the fellow eyes was only  $59.9 \pm 10.0\%$ . If only the images of females were used for model training, the accuracy increased to  $66.6 \pm 6.1\%$ . The Grad-CAM showed that the characteristics for identifying ERM in the fellow eyes lay at the foveal slopes of the healthy eyes.

**Conclusions:** ERM in the fellow eyes could be predicted from macular OCT of healthy eyes using deep learning with fair accuracy, and

the foveal slopes might be the key structural characteristics for the development of ERM. The better prediction accuracy in females only implicates that sexual differences in the foveal structure may overlap with the characteristics for predicting ERM development. These novel findings provide useful information for further investigation in the pathogenesis of ERM.

### Association of Intravenous Fluorescein Angiography and Adaptive Optics Imaging in Diabetic Retinopathy: A Prospective Case Series

First Author: Ryan **HUANG**

Co-Author(s): Andrew **MIHALACHE**, Rajeev **MUNI**, Marko M. **POPOVIC**, Peng **YAN**

**Purpose:** To our knowledge, we present the first case series investigating the relationship between adaptive optics (AO) imaging and intravenous fluorescein angiography (IVFA) parameters in patients with diabetic retinopathy (DR).

**Methods:** Consecutive patients with DR over the age of 18 years presenting to a single centre in Toronto, Canada from 2020-2021 were recruited. AO was performed with the RTX1 camera (Imagine Eyes, Orsay, France). IVFA was assessed with the artificial intelligence-based RETICAD system to extract blood flow, perfusion, and blood-retinal barrier (BRB) permeability values from IVFA images. Correlations between AO and IVFA parameters at various eccentricities were calculated using Pearson's correlation coefficient.

**Results:** Across 9 cases, a significant positive correlation existed between photoreceptor spacing on AO and BRB permeability ( $r = 0.303$ ,  $p = 0.027$ ), as well as perfusion ( $r = 0.272$ ,  $p = 0.049$ ) on IVFA. When stratified by location, a significant positive correlation was found between photoreceptor dispersion and both BRB permeability and perfusion ( $r = 0.770$ ,  $p = 0.043$ ;  $r = 0.846$ ,  $p = 0.034$ , respectively). A significant negative correlation between photoreceptor regularity ( $r = -0.974$ ,  $p = 0.026$ ) and density ( $r = -0.819$ ,  $p = 0.046$ ) with BRB permeability was also observed.

**Conclusions:** Photoreceptor spacing on AO was significantly correlated with BRB permeability and perfusion on IVFA in patients with DR. Future studies with larger sample sizes are needed to understand the relationship between AO and IVFA parameters in diverse patient populations.

### FN-OCT: Disease Detection Algorithm for Retinal Optical Coherence Tomography Based on a Fusion Network

First Author: Jing **FENG**

**Purpose:** To prevent vision damage and blindness caused by the delayed discovery of retinopathy, a fusion network (FN)-based retinal OCT classification algorithm (FN-OCT) is proposed in this paper to improve upon the adaptability and accuracy of traditional classification algorithms.

**Methods:** The InceptionV3, Inception-ResNet, and Xception deep learning algorithms were used as base classifiers, a convolutional block attention mechanism (CBAM) was added after each base classifier, and 3 different fusion strategies were used to merge the prediction results of the base classifiers to output the final prediction results (choroidal neovascularization (CNV), diabetic macular edema (DME), drusen, normal).

**Results:** The results showed that in a classification problem involving the UCSD common retinal OCT dataset (108,312 OCT images from 4,686 patients), compared with that of the InceptionV3 network model, the prediction accuracy of FN-OCT was improved by 5.3% (accuracy = 98.7%, area under the curve (AUC) = 99.1%). The predictive accuracy and AUC achieved on an external dataset for the classification of retinal OCT diseases were 92% and 94.5%, respectively, and gradient-weighted class activation mapping (Grad-CAM) was used as a visualization tool to verify the effectiveness of the proposed FNs.

**Conclusions:** This finding indicates that the developed fusion algorithm can significantly improve the performance of classifiers while providing a powerful tool and theoretical

support for assisting with diagnosis using retinal OCT.

### Longitudinal Outcomes of Optic Nerve Stroke with and without Optic Disc Drusen

First Author: Xia **GONG**

Co-Author(s): Yaping **LIAO**, Sangeethabalasri **PUGAZHENDHI**, Sophia **WANG**, Miaomiao **YU**, Ping **ZHU**

**Purpose:** This study aimed to compare clinical and ophthalmic features, along with longitudinal changes, between adults with non-arteritic anterior ischemic optic neuropathy (NAION) with optic disc drusen (ODD-AION) and those without ODD (nODD-AION).

**Methods:** A database of 993 AION patients seen at Stanford Byers Eye Institute was established using International Classification of Diseases codes and natural language processing via STANford Research Repository (STARR). Eighteen (23 eyes) ODD-AION patients and 23 (23 eyes) nODD-AION patients were included. The baseline was defined as 6 months post-event or after optic disc edema resolution. Six ophthalmic parameters were collected for chronic AION, observing changes over a median 1-year follow-up (0 to 8 years). Generalized estimating equation (GEE) models assessed the associations between ODD and characteristics.

**Results:** The average age of participants was  $58.5 \pm 14.4$  years, with 75.6% being male. Adjusting for confounders in GEE models, ODD-AION eyes exhibited better best-corrected visual acuity ([LogMAR],  $\beta = -0.289$ , 95% CI [-0.537, -0.041],  $P = 0.022$ ), lower intraocular pressure ( $\beta = -3.75$ , 95% CI [-3.75, -0.725],  $P = 0.004$ ), smaller vertical cup-to-disc ratio ( $\beta = -0.172$ , 95% CI [-0.323, -0.021],  $P = 0.025$ ), and thicker ganglion cell complex ( $\beta = 8.34$ , 95% CI [2.47, 14.21],  $P = 0.022$ ) during follow-up. However, the mean deviation of perimeter and retinal nerve fiber layer thickness showed no significant differences. ODD-AION patients exhibited lower diastolic blood pressure around onset compared to nODD-AION at onset ( $74.03 \pm 7.98$  vs  $84.23 \pm 8.61$ ,  $P = 0.023$ ).



**Conclusions:** ODD-AION eyes displayed better functional and structural outcomes during follow-up compared to nODD-AION cases. Patients with ODD-AION had lower IOP and diastolic blood pressure, recognized risk factors for NAION.

### Multimodal Imaging in a Mac Tel 2 Latin American Cohort

*First Author: Lihteh WU*  
*Co-Author(s): Genesis CHEN, Andres LASAVE, Carolina POZZONI*

**Purpose:** To describe the multimodal imaging (MMI) findings in Mac Tel 2 in a Latin American cohort.

**Methods:** A retrospective chart and MMI review of eyes diagnosed with Mac Tel 2 in the past decade (2013-2023). MMI included blue fundus autofluorescence, SD-OCT, confocal blue reflectance imaging, OCT angiography, and fluorescein angiography.

**Results:** A total of 122 eyes of 67 patients (52 females) with a mean of age 62 years (range, 25-81) were included. Systemic comorbidities included 26 with HTN, 23 with DM, and 6 with hypothyroidism. Of the patients with DM, there were 4 eyes with mild NPDR, 2 eyes with moderate NPDR, and 1 eye with PDR. The mean presenting BCVA was 20/55 (20/20 -20/400). There were 9 (14%) unilateral Mac Tel 2 eyes (6 OS and 3 OD). Findings included hyper FAF (93.3%), cavitations in the inner (62.5%) and outer retina (40%), discontinuities in the EZ (85%), outer retinal hyperreflectivity (18%) on SD-OCT, macular neovascularization (3%), increased confocal blue reflectance (82%), crystals (17%), pigment (26%), FA abnormalities (92%), and OCTA abnormalities (55%).

**Conclusions:** Mac Tel 2 is mostly a bilateral but asymmetric entity. Up to 14% may present unilaterally. The earliest abnormality detected in MMI was hyper FAF.

### Optical Coherence Tomography Angiography Evaluation of the Macular Vasculature

*First Author: Isaac CHAY*  
*Co-Author(s): Colin TAN*

**Purpose:** To determine the size of the superficial and deep foveal avascular zone (FAZ) in healthy adults using optical coherence tomography angiography (OCTA), and to ascertain the effects of demographic and ocular parameters on the FAZ.

**Methods:** In a prospective cohort study of 170 eyes, healthy volunteers underwent OCTA scans. The FAZ from 3 mm x 3 mm scans was independently graded using the ImageJ software. The effect of central retinal thickness (CRT), axial length (AL), and spherical equivalent were analyzed using multiple linear regression analyses.

**Results:** The mean age was 22.7 years (21–30, SD  $\pm$  1.5), with mean spherical equivalent of -4.3 D. The mean CRT was 260.6  $\mu$ m (220–301  $\mu$ m, SD  $\pm$  16.6). Mean superficial FAZ area was 0.25 mm<sup>2</sup> (0.04–0.48 mm<sup>2</sup>) while mean deep FAZ area was 0.38 mm<sup>2</sup> (0.12–0.66 mm<sup>2</sup>). The deep FAZ was significantly larger than the superficial FAZ ( $p < 0.001$ ). Females had a larger superficial (0.28 mm<sup>2</sup> vs 0.22 mm<sup>2</sup>,  $p < 0.001$ ) and deep FAZ (0.41 mm<sup>2</sup> vs 0.36 mm<sup>2</sup>,  $p = 0.006$ ). On univariate linear regression, both superficial and deep FAZ area had significant correlations with CRT, sex, AL, and spherical equivalent, but not with age. By multiple linear regression analysis, superficial and FAZ area varied significantly with CRT ( $p < 0.001$ ) and sex ( $p < 0.001$ ).

**Conclusions:** Both the superficial and deep FAZ size varies significantly among healthy young adults. Factors such as CRT, sex, and spherical equivalent influence the size of the FAZ, and should be accounted for when assessing whether the FAZ appears abnormal.

### Quantitative Retinal and Choriocapillaris Blood Flow Assessment Using OCTA in Healthy Korean Subjects

First Author: Young Hwan **JEONG**  
Co-Author(s): Iksoo **BYON**

**Purpose:** To evaluate the macular blood flow changes in the Korean population using swept-source optical coherence tomography angiography (SS-OCTA).

**Methods:** Healthy Korean subjects underwent SS-OCTA imaging with the PLEX Elite 9000 (Carl Zeiss Meditec, Inc, Dublin, CA). All eyes were scanned twice using a 6 x 6 mm scan protocol centered on the fovea. The superficial and deep capillary plexus (SCP and DCP) and choriocapillaris (CC) en face OCTA images were obtained using device default settings. The quantitative OCTA flow parameters of vessel density (VD) in SCP and DCP and CC flow deficit were assessed. The main outcome measures were changes in OCTA flow parameters by aging.

**Results:** Of the 351 subjects, 351 eyes were enrolled and were categorized into age groups: 20s (n = 57), 30s (n = 37), 40s (n = 43), 50s (n = 45), 60s (n = 76), 70s (n = 74), and 80s (n = 19). The 20s showed higher VDs in SCP (37.33%) than the 50s (36.74%), 60s (36.62%), 70s (36.24%), and 80s (35.64%) ( $p < 0.05$  in all). The VD in DCP were significantly lower in the 20s (26.18%) than in the 60s (27.23%), 70s (27.69%), and 80s (28.49%) ( $p < 0.05$  in all). The CCFD of the 20s were significantly lower (17.74%) than all other age groups [30s (19.15%), 40s (22.04%), 50s (23.01%), 60s (25.03%), 70s (27.56%), and 80s (29.30%) ( $p < 0.05$  in all)].

**Conclusions:** In a healthy Korean population, the retinal blood flow significantly changed at middle and old ages (SCP decreased in 50s and DCP increased in 60s). The choriocapillaris blood flow significantly decreased along with aging.

### Ultra-widefield Optical Coherence Tomography in a Patient with Acute Retinal Necrosis

First Author: Hae Jung **SUN**  
Co-Author(s): Suk Min **HAN**, Juno **KIM**

**Purpose:** To report findings of ultra-widefield optical coherence tomography (OCT) in a case of acute retinal necrosis.

**Methods:** A 35-year-old male was referred with uveitis in his right eye. Anterior chamber cells were 4+ in the right eye and fundus examination showed peripheral whitish lesions on the inferotemporal area. Fluorescein angiography revealed perivascular leakage in the inferotemporal area of the right eye. Topical and oral steroids were prescribed and after 2 weeks the peripheral whitish lesions were increased in the right eye and necrotic change with retinal hemorrhage was also noticed in his left eye. Viral polymerase chain reaction was performed with aqueous humor and varicella-zoster virus was reported positive. He was diagnosed with acute retinal necrosis (ARN) and intravitreal ganciclovir injections were performed in both eyes. Intravenous acyclovir injection was started and oral prednisolone was added to treatment. After 7 days of intravenous acyclovir injection, maintenance therapy was continued with oral valacyclovir.

**Results:** After 8 weeks of treatment, the peripheral retinal necrotic lesions had recovered in both eyes. The recovered areas were followed-up using OCT from an Optos ultra-widefield retinal imaging device. Loss of the sensory retina with very gentle sloping at the borders of necrosis was noticed. Near total loss of the sensory retina in the right eye progressed to retinal detachment (RD) which revealed no definite retinal break during retinal reattachment surgery.

**Conclusions:** Ultra-widefield OCT could be helpful in predicting the progression of RD in ARN for near-total loss of the sensory retina may develop RD even without a definite tear.

### Variation of Optical Coherence Tomography Angiography Parameters with Severity of Diabetic Retinopathy

First Author: Isaac **CHAY**

**Purpose:** Optical coherence tomography angiography (OCTA) produces high-resolution imaging of the retinal microvasculature in vivo. We aimed to correlate the retinal vasculature parameters seen on OCTA with the clinical severity of diabetic retinopathy (DR).

**Methods:** A prospective cohort study involving 82 diabetics with mild to severe nonproliferative diabetic retinopathy (NPDR) were compared against 20 healthy controls. The foveal avascular zone (FAZ) and vessel densities were measured for both superficial and deep capillary plexus and correlated with the severity of DR, graded using color fundus photography (CFP).

**Results:** Mean FAZ sizes were significantly larger in patients with DR compared to controls (0.47 mm<sup>2</sup> vs 0.28 mm<sup>2</sup>,  $p < 0.01$ ). In those with DR, mean FAZ sizes increased with severity of DR (mild: 0.36 mm<sup>2</sup> vs moderate: 0.52 mm<sup>2</sup> vs severe: 0.56 mm<sup>2</sup>,  $p < 0.05$ ). Vessel densities were lower in patients with DR compared to controls (44.2% vs 51.3%,  $p < 0.001$ ). The vessel densities were also progressively lower with worsening severity of DR (mild: 46.5% vs moderate: 43.9% vs severe: 40.9%,  $p < 0.005$ ). No spatial predilection in vessel density reduction in relation to specific ETDRS subfields was observed.

**Conclusions:** Retinal microvascular parameters measured on OCTA varies according to the degree of severity of DR. This ability to differentiate DR severity is important in the clinical evaluation of DR. OCTA derived parameters may potentially be useful as a novel imaging biomarker for DR disease severity.

### Ocular Oncology & Pathology

#### A Novel Germline RB1 Mutation in Filipino Identical Twins with Bilateral Retinoblastoma

First Author: Josept Mari **POBLETE**

**Purpose:** Retinoblastoma (Rb) is considered the most common primary intraocular malignancy of childhood, but its occurrence in identical twins is very rare. We report the first case of Filipino identical twins with bilateral retinoblastoma having a novel germline mutation in their RB1 gene.

**Methods:** A pair of Filipino identical twins initially presented with leukocoria and buphthalmos at 4 months of age. Fundoscopy and ocular imaging studies were consistent with bilateral retinoblastoma. DNA samples isolated from peripheral blood were sent for mutational analysis of RB1 gene through DNA sequencing.

**Results:** A pathogenic variant, c.607del (p.Glu204Lysfs\*10), was identified in RB1 of the twins. This sequence change creates a premature translational stop signal in the RB1 gene, thus resulting in an absent or disrupted protein product. Algorithms developed to predict the effect of sequence changes on RNA splicing suggest that this variant may disrupt the consensus splice site. Interestingly, this variant is not present in population databases, making this mutation novel.

**Conclusions:** Mutational analysis of the RB1 gene in Filipino identical twins revealed a novel mutation seen for the first time in Rb patients. With the discovery of a novel mutation, this report motivates the need for identifying the molecular basis of retinoblastoma in Filipinos, as these mutations may be unique and highly heterogeneous. Identification of the RB1 gene pathogenic variants will allow for early diagnosis and improve management of retinoblastoma in the Philippines.

## Bilateral Coats-like Vasoproliferative Retinal Tumor in a 12-year-old Filipino with Retinitis Pigmentosa Fundus in the Left Eye and Leukocoria in the Right Eye

First Author: Darby **SANTIAGO**  
Co-Author(s): Zadkiel **VELASQUEZ**

**Purpose:** Vasoproliferative retinal tumors are relatively rare in the general population, and even rarer for Asians. This is the first reported case in a Filipino patient.

**Methods:** A 12-year-old Asian girl consulted in our clinic with a 6-year history of recurrent headaches, eye redness, and photophobia of the right eye. The right eye was blind with leukocoria. The fundus of the left eye showed a Coats-like yellow pinkish peripheral mass with adjacent telangiectatic vessels and macular edema in the left eye. Ocular multimodal imaging, ERG, and CT scan were done.

**Results:** Visual acuity was NLP OD and 20/55 OS. IOP OD 46; 12 OS. Anterior segment exam of the right showed rubeosis, ectropion uvea, +1 cells and flare, clear lens, and beginning peripheral band keratopathy. Retina abutting the posterior capsule showed some pigment clumps. Ultrasound showed an elongated homogenous fixed retrolental mass, and low amplitude homogenous dot echo with good after movement in the posterior vitreous. Left eye anterior segment findings were normal while the retina showed diffuse patches of atrophic RPE, few to several pigment clumps in the mid periphery, a yellow mass in the peripheral inferonasal quadrant with adjacent telangiectatic vessels. Macular OCT showed cystoid spaces. Treatment for the left eye included anti-VEGF injection and focal laser, resulting in vision improvement to 20/48 after 1 week. Cryotherapy is the next treatment option.

**Conclusions:** This rare disease can be misdiagnosed and dismissed. Early detection, recognition, and customized treatment can lead to vision preservation if not improvement.

## Diagnostic Methods for Primary Vitreoretinal Lymphoma: A Systematic Review

First Author: Ryan **HUANG**  
Co-Author(s): Peter **KERTES**, Andrew **MIHALACHE**, Rajeev **MUNI**, Marko M. **POPOVIC**

**Purpose:** To provide a comprehensive overview on diagnostic modalities and their associated sensitivity in diagnosing primary vitreoretinal lymphoma (PVRL).

**Methods:** A systematic literature search was conducted on Ovid MEDLINE, EMBASE, and the Cochrane Library for studies published between January 2000 and June 2023. Studies reporting on the various diagnostic tools used to diagnose patients with PVRL were included. The aggregated sensitivity of each diagnostic modality was reported and compared using the chi-squared ( $\chi^2$ ) test.

**Results:** 662 eyes from 29 retrospective studies that were diagnosed with PVRL were included. An interleukin-10/interleukin-6 (IL-10/IL-6) ratio greater than 1 had the highest sensitivity (89.39%,  $n = 278/311$  eyes,  $n = 16$  studies) for PVRL, where the sensitivity was not significantly different between vitreous samples (88.89%,  $n = 232/261$  eyes,  $n = 13$  studies) compared to aqueous samples (83.33%,  $n = 20/24$ ,  $n = 2$  studies,  $p = 0.42$ ). Flow cytometry of vitreous samples showed a high sensitivity (88.00%,  $n = 66/75$ ,  $n = 6$  studies) with PVRL, however the requirement of a large sample of viable cells for definitive diagnosis may limit its actual yield. Monoclonal immunoglobulin heavy chain rearrangements on polymerase chain reaction gave a positive result in 354/416 eyes (85.10%,  $n = 20$  studies) with PVRL, while MYD88-L265P mutation analysis performed poorly, yielding a positive result in 63/90 eyes (70.00%,  $n = 8$  studies) with PVRL.

**Conclusions:** An IL-10/IL-6 ratio greater or equal to 1 may provide the highest diagnostic yield in identifying patients with PVRL. Future studies should employ multiple diagnostic tools to further establish nuanced guidelines when determining the optimal PVRL diagnostic tool in diverse patient populations.



### Genetic Study of Sight-threatening Diabetic Retinopathy in Chinese Patients with Type 2 Diabetes

First Author: Chi Lik AU

Co-Author(s): Yu-yan chloe CHEUNG, Callie KO, Chi-ho paul LEE

**Purpose:** Sight-threatening diabetic retinopathy (STDR) is the leading cause of blindness among working-age populations. Several genome-wide association studies (GWAS) have been conducted, but the heritability of STDR remains unexplained. In this study, we aimed to perform a comprehensive two-stage GWAS on STDR, using the latest Illumina Infinium Asian Screening Array (ASA) with subsequent replication and functional validation analyses.

**Methods:** Genotyping was performed using ASA at the Centre for PanorOmic Sciences (CPOS; HKU). ASA data were submitted to TOPMed Imputation Server. Genetic variants with minor allele frequency (MAF) < 0.01 and INFO score < 0.3 were excluded. Meta-analysis was then conducted using GWAMA software. Single variant association analysis was performed in SNPTEST using the multiple logistic regression model with adjustment for age, gender, duration of diabetes, hypertension, hemoglobin A1c, and the first five principal components. The inverse variance fixed-effect method was used.

**Results:** A total of 1,101 STDR cases were recruited (704 in the discovery stage analysis, 397 in the replication stage analysis), with 2,649 Chinese as control. Approximately 8 million genetic variants were included in the analysis. A number of the newly identified STDR-associated variants were found to be Asian-specific. The strongest association was detected at an intronic variant of ANXA2 (rs2123830;  $P = 1.87 \times 10^{-7}$ ; OR [95% CI]: 1.59 [1.31-1.96]). In the meta-analysis of the discovery and replication stages, the ANXA2 variant again showed the strongest association with STDR ( $P = 2.18 \times 10^{-6}$ ; OR [95% CI]: 1.45 [1.24-1.70]). Two intergenic variants located at the RPL31P11-FCRLA (rs66930627;  $P = 7.25 \times 10^{-6}$ ; OR [95% CI]: 1.54 [1.27-1.85]) and COL6A1-COL6A2 (rs72613655;

$P = 9.60 \times 10^{-6}$ ; OR [95% CI]: 0.73 [0.63-0.84]) loci showed suggestive associations with STDR.

**Conclusions:** The ANXA2 variant showed association with STDR in Chinese patients with type 2 diabetes.

### Management of Unilateral Advanced Retinoblastoma

First Author: Allyson FACUNDO

**Purpose:** The estimated number of new retinoblastoma cases diagnosed globally is 7202-8102 each year. The outcome is favorable in developed countries, where mortality is <5%; in Asia, mortality is 20-60%.

**Methods:** A 2-year-old girl diagnosed with unilateral Group E retinoblastoma, presented with eyelid swelling. Signs began at birth, when a gradually enlarging, whitish opacity on the left eye was noted. Notable left eye examination included visual acuity of no light perception, restricted myopathy, upper lid edema with pseudoptosis, chemosis, hazy cornea, deep anterior chamber, rubeosis iridis at 6-8 o'clock positions, and whitish retrolental mass. Right eye examination was normal. B-scan and cranio-orbital MRI revealed a dense, irregularly fungating mass (1.4 cm) with multiple calcifications in the left vitreous cavity; no brain involvement. Patient was co-managed with a pediatric oncologist, administered neoadjuvant chemotherapy (vincristine-etoposide-carboplatin) and adjuvant chemotherapy post-enucleation.

**Results:** The findings are consistent with known facts of retinoblastoma. Leukocoria and strabismus are the most common manifestations; advanced cases present with lid edema and orbital signs. Hazy cornea and rubeosis iridis suggest anterior chamber infiltration and possibly neovascular glaucoma: high-risk features that require adjuvant chemotherapy post-enucleation to decrease distant metastasis from 16% to 4%. Although the outcome of the use of neoadjuvant chemotherapy is inferior compared to upfront enucleation, neoadjuvant chemotherapy debulks the tumor and bides time to facilitate

enucleation in patients with unilateral, advanced retinoblastoma, especially in resource limited settings.

**Conclusions:** High-risk features require adjuvant chemotherapy to decrease the risk of distant metastasis and improve survival of a patient with retinoblastoma.

### Recurrent Orbital Retinoblastoma After Partial Exenteration with Central Nervous System Metastasis Mimicking Oresseptal Cellulitis: A Case Report

*First Author:* Patharika **NAVAPATHANAPONG**  
*Co-Author(s):* Chaiwat **APHIVATANASIRI**,  
Nipaporn **TEWATTANARAT**, Phanthipha  
**WONGWAI**

**Purpose:** To review and discuss the natural history of the disease and the multidisciplinary team involved in the treatment of this patient together with an update on available treatment with an emphasis on the importance of examination under anesthesia and prompt treatment.

**Methods:** A case report.

**Results:** We report a case of metastasis of extraocular retinoblastoma with c.540-2A>G mutation, which was the third case reported, and central nervous system metastasis. A 7-month-old boy presented with conjunctival injection, tearing, leukocoria, and enlarged left eye. MRI of the brain with orbit and eye examination under anesthesia (EUA) were performed. Retinoblastoma group F was the diagnosis due to intraorbital optic nerve involvement. Patient received neoadjuvant chemotherapy and then the left eye was partially exenterated. After adjuvant chemotherapy and external beam radiation, EUA was scheduled but had to be postponed due to the patient's fever and clinical presentation of preseptal cellulitis. Later, MRI showed tumor progression at the optic nerve and recurrent tumor at the lower lid. Lumbar puncture was performed to evaluate the stage of the disease showing leucoblast. Extraocular retinoblastoma with central nervous system metastasis was the diagnosis at that time. EUA

was performed and there was a newly detected lesion at the right eye, group A, treated by laser photocoagulation. Treatment plan was discussed among family members and palliative care was carried out. Patient had a survival period after disease onset of 1 year.

**Conclusions:** Treatment of extraocular retinoblastoma remains challenging especially in low to middle income countries. Multidisciplinary team treatment and prompt management is the key. Recurrent orbital tumor can mimic the infection process.

### Tangled: A Case Report on Periorbital Arteriovenous Malformation Treated with Triamcinolone Injection and Excision

*First Author:* Gillian Louise **SAQUIAN**  
*Co-Author(s):* Marco **TUMALAD**, Sandra  
**WORAK**

**Purpose:** Periorbital arteriovenous malformations are rare, high flow, developmental hamartomas that result from vascular dysgenesis. It usually presents at birth and becomes evident during childhood. Since these lesions are highly vascularized and recurrence is very common, treatment modalities should be directed towards prevention of ischemia of associated structures, minimize blood loss, and prevent recurrence.

**Methods:** This is a case of a 45-year-old female who presented with vascular masses on both left upper and lower lids. The masses started to appear when the patient was 18 years old. The mass gradually increased in size up until it partly obscured the visual axis. Several attempts to excise the mass were made, however, it recurred. Due to the recurrent nature of the mass, the patient underwent brain imaging and angiography revealing arteriovenous malformation on both the upper and lower lids.

**Results:** Patient was then referred to an interventional radiologist and partial endovascular embolization of the vessels was done. Decrease in the vascularity of the mass was noted, but excision was still warranted. Prior to excision, intralesional triamcinolone was injected to aid fibrosis and to ensure minimal

blood loss. Then, patient underwent excision of the arteriovenous malformation of the left upper and lower lids. On subsequent follow ups, there was markedly improved cosmesis, and additional intralesional triamcinolone was injected to prevent recurrence.

**Conclusions:** A combination of embolization and excision of arteriovenous malformations carry the highest success rates. Care must be taken to prevent embolization of the major arteries. Following excision, regular follow up is necessary for monitoring.

### Ophthalmic Epidemiology

#### A Validation Study of a Novel Diabetic Retinopathy Awareness and Practice Assessment Filipino Questionnaire

First Author: Maria Christine **DY**

**Purpose:** This study developed a survey instrument validation framework testing the effectiveness of a drafted diabetic retinopathy awareness and practice assessment Filipino questionnaire.

**Methods:** This was a 16-item questionnaire validation study of outpatients at a tertiary hospital in the Philippines. This was adapted in Tagalog with the following sections: demographics, diabetes status, and diabetic retinopathy awareness. The protocol used for the cross-cultural adaptation included forward translation and pilot testing. The final translated questionnaire was then pre-tested in the study site and subjected to statistical analysis. Reliability was assessed through stability, internal consistency, and equivalence while validity through content and construct. Cohen's kappa test, Kuder Richardson's reliability test, and the Fleiss Kappa test were used as statistical analysis tools.

**Results:** The questionnaire was found to be stable with Cohen's coefficient of 0.85-1 and of high consistency (Kuder Richardson's reliability coefficient 0.8). Experts gave moderate agreement (Fleiss coefficient 0.52) for equivalence. For construct validity, most of the

questions were of no agreement and hence, are appropriate for target groups. Overall, results showed that the survey instrument is both reliable and valid, thus effective enough to be conducted with Filipino patients.

**Conclusions:** Diabetes continues to rise with 7.1% of Filipinos diagnosed. However, its impact on vision is underemphasized with one-third of the population developing retinopathy. This presents the need for increased awareness with this study contributing to promotion of better health-seeking behavior. This novel validated instrument can be applied to measure baseline diabetic retinopathy knowledge and increase awareness of vision screening and preservation among diabetic patients.

#### Association Between Social Determinants of Health and Incidence of Age-related Macular Degeneration in the National Health Interview Survey: A Population-based, Cross-sectional Analysis

First Author: Nikhil S. **PATIL**  
Co-Author(s): Radha **KOHLI**, Andrew **MIHALACHE**, Rajeev **MUNI**, Marko M. **POPOVIC**, Jim **XIE**

**Purpose:** The relationship between the social determinants of health (SDH) and the incidence of age-related macular degeneration (AMD) are poorly understood. In this study, we assessed these relationships in a large, population-based sample of the United States civilian population.

**Methods:** This population-based, cross-sectional analysis included respondents to the National Health Interview Survey (NHIS) who were over 50 years old and answered the question about whether they had received a diagnosis of AMD. Primary outcomes included patient-reported diagnosis of AMD and vision loss due to AMD. Variables within the domains of demographics, socioeconomics, health status, and healthcare access were included in the univariable and multivariable analyses.

**Results:** 14,267 NHIS participants were included in our analysis. In our multivariable analysis, respondents aged 81+ had a significantly higher prevalence of AMD (OR =

## E-POSTERS

7.58,  $p < 0.001$ ) and odds of vision loss (OR = 4.57,  $p < 0.001$ ). Gay, lesbian, bisexual, or respondents with a sexual orientation of other (OR = 0.45,  $p = 0.03$ ) had a significantly lower prevalence of AMD. Black/African-American respondents (OR = 0.23,  $p < 0.001$ ) and Asian-American respondents (OR = 0.38,  $p = 0.03$ ) had a significantly lower prevalence of AMD than white respondents.

**Conclusions:** Age, sexual orientation, and race are significant determinants of a diagnosis of AMD. These determinants should be considered by policymakers and clinicians, and further investigation into possible third-variable explanations such as smoking and nutrition trends may be worthwhile.

#### Association Between Sociodemographic Factors and Glaucoma in the National Health Interview Survey: A Population-based, Cross-sectional Analysis

First Author: Jim XIE

Co-Author(s): Radha KOHLY, Rajeev MUNI, Nikhil S. PATIL, Matt SCHLENKER

**Purpose:** To investigate the association between social determinants of health (SDH) with glaucoma diagnosis and glaucomatous vision loss in a nationally representative adult U.S. cohort.

**Methods:** This cross-sectional, population-based analysis included participants who answered glaucoma-related questions on the 2017 National Health Interview Survey (NHIS). The 2017 NHIS was chosen because it is the most recent NHIS that includes glaucoma-related questions. Relationships between self-reported glaucoma outcomes and SDH-related factors were examined using univariable and multivariable regression models.

**Results:** In total, 26,696 of 26,742 (99.83%) NHIS respondents were included, of whom 880 (3.30%) reported a glaucoma diagnosis and 275 (1.03%) reported glaucomatous vision loss. Participants were predominantly middle-aged ( $50.95 \pm 18.60$  years), female (54.75%), and non-Hispanic White (70.49%). In age-adjusted multivariable regression ( $n = 25,456$ ), non-

Hispanic Black race (odds ratio [OR] = 1.87, 99% CI = [1.37, 2.55,  $p < 0.001$ , compared to non-Hispanic White race] and poor health status (OR = 1.54, 99% CI = [1.00, 2.37],  $p = 0.01$ , compared to good health status) were significant predictors of glaucoma diagnosis. For glaucomatous vision loss, having an income below the poverty threshold (OR = 2.41, 99% CI = [1.12, 5.20],  $p = 0.003$ , compared to income  $\geq 5$  times the poverty threshold) was the only significant predictor in univariable analyses. No SDH-related factors were significantly associated with glaucomatous vision loss in multivariable analysis ( $n = 848$ ). Multicollinearity was minimal (variation inflation factor  $< 1.6$  for all independent variables).

**Conclusions:** Non-Hispanic Black race and poor health status were associated with glaucoma diagnosis. Physicians and policymakers should consider SDH when assessing clinical risk and designing public health interventions.

#### Association Between Sociodemographic, Clinical Access, and Regional Factors with Diabetic Retinopathy in the National Health Interview Survey: A Cross-sectional, Population-based Analysis

First Author: Michele ZAMAN

Co-Author(s): Lana MOAYAD, Nikhil S. PATIL, Jim XIE, Chris ZAJNER

**Purpose:** Diabetic retinopathy (DR) is the most common microvascular complication of diabetes and the leading cause of blindness in adults in the United States. The impact of diverse social determinants of health (SDH) on the prevalence of DR is poorly understood. In this study, we aim to investigate the relationship between DR prevalence and both sociodemographic and healthcare access factors in a nationally representative sample of the United States population.

**Methods:** A cross-sectional analysis of the data from the 2017 National Health Interview Survey (NHIS) was conducted using data from adult respondents to the question: "Have you ever been told by a doctor or other health professional that you had diabetic retinopathy?". The NHIS is a public registry



based on the civilian, non-institutionalized population of the United States that provides self-reported information on household composition, demographic characteristics, socioeconomic factors, health status, and health care access. Univariable and multivariable logistic regressions were used to examine the association between sociodemographic factors and the prevalence of DR.

**Results:** We included 26,966 participants who were eligible in the adult sample of the NHIS. In our univariable analysis, multiple SDH factors, such as health status, disability, insurance, income relative to poverty threshold, employment status, education level, and marital status, were associated with a higher odds of having DR ( $p \leq 0.001$ ).

**Conclusions:** Our study highlights the multitude of SDH factors that are associated with the prevalence of DR. Health care providers and policymakers should tailor future interventions to address these SDH factors in a holistic model of DR screening and care.

### Genomics of Inherited Retinal Dystrophies in Malays and Indians Within a Singapore Cohort

First Author: Choi Mun **CHAN**  
Co-Author(s): Yasmin **BYLSTRA**, Beau **FENNER**,  
Sylvia **KAM**, Ranjana **MATHUR**, Tien En **TAN**

**Purpose:** To date, there is no literature on IRDs presenting in the Malay population, with limited studies on Indians. We aim to study the relative frequencies of IRDs seen among the Malay and Indian populations in Singapore, as well as understand their enotypic and phenotypic presentations.

**Methods:** A total of 90 Malay and Indian patients with IRD who visited from October 2018 were sequentially enrolled. Detailed clinical histories and ophthalmic examinations were conducted. The examination included visual acuity, slit lamp biomicroscopy, fundus imaging, optical coherence tomography, color vision testing, and Goldmann kinetic perimetry. Genetic analysis was conducted via whole exome sequencing.

**Results:** Ninety IRD patients, mean age 47.6 years were enrolled. Forty-five patients were recruited for each race with 48 males and 42 females. The most prevalent phenotype observed among the Malays was RP (51.1%), followed by Stargardt disease (20.0%), cone or cone-rod dystrophy (15.6%), and LCA (4.44%). Vitelliform dystrophy, X-linked retinoschisis, and unspecified macular dystrophy were found once. There was also only one case of syndromic RP: Usher syndrome. The most common clinical diagnosis in Indians was RP (46.7%), followed by Stargardt disease (17.8%) and cone or cone-rod dystrophy (11.1%). There were 2 cases of Vitelliform dystrophy and 3 cases of syndromic RP: 2 cases of Usher syndrome, type 2 and a single case of Bardet-Biedl syndrome were observed.

**Conclusions:** The most frequent genotypes in Malays with retinal dystrophies are different from that in other known reported populations. This knowledge will influence possible therapeutics for such populations in the region.

### Normative Data and Associations of Optical Coherence Tomography Angiography Measurements of the Macula: The Singapore Malay Eye Study

First Author: Zhen Ling **TEO**

**Purpose:** To describe the normative quantitative parameters of macular retinal vasculature and their systemic and ocular associations, using optical coherence tomography angiography (OCTA).

**Methods:** Adults above 50 years old were recruited from the population-based Singapore Malay Eye Study. All participants underwent standardized examination and spectral domain-OCTA of the macula. Scans with pre-existing retinal disease, macular pathology, and poor quality were excluded. Normative quantitative vessel densities of the superficial, deep layer, and foveal avascular zone were evaluated. Ocular and systemic associations with macular retinal vasculature parameters were evaluated using linear regression with generalized estimating equation models.

**Results:** We included 1184 scans (1184 eyes) of 749 participants. Mean macular superficial vessel density (SVD) and deep vessel density (DVD) were  $45.1 \pm 4.2\%$  (95% confidence interval [95% CI] 37.8–51.4%) and  $44.4 \pm 5.2\%$  (95% CI 36.9–53.2%), respectively. Mean SVD and DVD were highest in the superior quadrant ( $48.7 \pm 5.9\%$ ) and nasal quadrant ( $52.6 \pm 4.4\%$ ), respectively. Mean foveal avascular zone (FAZ) area and perimeter were  $0.32 \pm 0.11$  mm<sup>2</sup> (95% CI 0.17–0.51 mm) and  $2.14 \pm 0.38$  mm (95% CI 1.54–2.75 mm), respectively. In multivariable regression analysis, female gender was associated with higher SVD ( $\beta = 1.25$ ,  $p < 0.001$ ) and DVD ( $\beta = 0.75$ ,  $p = 0.021$ ). Older age ( $\beta = -0.67$ ,  $p < 0.001$ ) was associated with lower SVD while longer axial length ( $\beta = -0.42$ ,  $p = 0.003$ ) was associated with lower DVD. Female gender, shorter axial length, and worse BCVA were associated with a larger FAZ. No association with vessel density was found with a range of systemic parameters.

**Conclusions:** This study provides normative macular vasculature parameters which may serve as reference values for quantitative interpretation of OCTA data.

### Physical and Psychosocial Challenges as Predictors of Vision Difficulty in Children: A Nationally Representative Survey Analysis

First Author: Andrew **MIHALACHE**  
Co-Author(s): Ryan S. **HUANG**, Radha P. **KOHLI**, Rajeev **MUNI**, Nikhil S. **PATIL**, Marko **POPOVIC**

**Purpose:** Vision loss may have a profound impact on a child's development. Our study aims to elicit associations between vision difficulties and physical or psychosocial challenges in children.

**Methods:** This population-based analysis of the 2021 National Health Interview Survey (NHIS) included a sample of participants 2–17 years old in the United States for whom data were available on our primary outcome of vision difficulty. General health status, hearing difficulty, mobility difficulty, communication difficulty, learning difficulty, anxiety, depression, difficulty making friends, bully victimization, and

recent injuries were investigated as predictors of vision difficulty. We employed univariable and multivariable logistic regression models using Stata version 17.0 (StataCorp LLC, College Station, Texas).

**Results:** 7,373 children were included in our analysis. In our multivariable analysis, children with a good/fair (OR = 1.90, 95% CI = [1.34, 2.69],  $p < 0.01$ ) or poor (OR = 5.24, 95% CI = [1.63, 16.87],  $p < 0.01$ ) general health status had a higher odds of vision difficulty relative to children with an excellent/very good health status. Children with hearing difficulties (OR = 9.03, 95% CI = [5.46, 14.95],  $p < 0.01$ ), difficulties communicating (OR = 1.96, 95% CI = [1.18, 3.25],  $p < 0.01$ ), difficulties learning (OR = 1.93, 95% CI = [1.27, 2.93],  $p < 0.01$ ), and difficulties making friends (OR = 1.94, 95% CI = [1.12, 3.36],  $p = 0.02$ ) had a higher odds of vision difficulty in our multivariable analysis.

**Conclusions:** Several factors pertaining to physical and psychosocial challenges in children are associated with vision difficulty. It is essential for future research to further explore potential causal links between vision difficulty and physical or psychosocial factors, which will aid in coordinating public health efforts dedicated to achieving equity in vision health.

### Prevalence and Risk Factors of Presbyopia in Fujian Eye Study

First Author: Yang **LI**  
Co-Author(s): Qinrui **HU**, Xiaoxin **LI**, Bin **WANG**

**Purpose:** To evaluate the prevalence and risk factors of presbyopia among urban and rural adults over 50 years in a coastal province of southeast China.

**Methods:** We performed a population-based cross-sectional study in randomly sampled communities of Fujian Province from May 2018 to October 2019 and 8211 residents aged over 50 years underwent a questionnaire and a series of related examinations, such as presenting near visual acuity (PNVA). PNVA was measured using logarithmic visual acuity chart at a distance of 30 cm, and we defined presbyopia as PNVA worse than 20/50 in our

logarithmic near visual acuity chart (equal to N6 according to the WHO definition).

**Results:** Of 8033 participants, 5509 (68.6%) had PNVI, of whom 3428 (62.2%) were female, 3057 (55.4%) were from an urban area, 4300 (78.0%) were from a coastal region, 4735 (86.0%) had any degree of education, and 3244 (58.9%) had any level of income. The prevalence of presbyopia was 68.6%, and presbyopia was significantly correlated with older age, less education, lower income, and higher refractive error, while sex, degree of urbanization, geographic location, smoking, alcohol consumption, and tea consumption were not statistically significantly associated with presbyopia.

**Conclusions:** There was a significant burden of presbyopia in southeast China, which suggested more investment in accessible services and policy to enhance eye health in the elderly with low educational background and low income.

#### Other (General Ophthalmology)

##### A Case of Sudden Bilateral Vision Loss: Unravelling Complex Clinical Course

First Author: Ricko Wai Leung **WONG**

**Purpose:** To present a case of delayed diagnosis of invasive fungal sinusitis leading to bilateral vision loss.

**Methods:** Case report.

**Results:** A 66-year-old male with relapsing acute myeloid leukemia (AML) presented after an allogenic bone marrow transplant. Concurrently, he was on antimicrobial prophylaxis including antifungals. He was admitted to the hospital with a temperature of 37.5°C and upper jaw pain, thought to be TMJ dysfunction. CT scan exhibited rhinosinusitis and periodontal disease. Despite upgrading antibiotics to vancomycin and meropenem for his positive blood culture, high-grade fever persisted. Due to unremarkable MRI and potential drug interactions, antifungal therapy was not initiated. Day 9 full body CT scan did

not identify the source of fever. Ophthalmology was consulted on day 11 for sudden bilateral vision loss. The assessment revealed subtle focal intraretinal hemorrhage only and optical coherence tomography showed a couple of small subretinal fluid. Repeat MRI showed fat stranding along orbital apices, sphenoid sinuses, and ethmoid sinuses. ENT was consulted but clinical examination, sinus swab, and serum *Aspergillus* galactomannan assay did not support invasive fungal sinusitis. Sinus surgery and debridement were offered on day 14 due to the clinical course and results supportive of invasive *Aspergillus* sinusitis. The patient developed ongoing epistaxis, large bowel obstruction, and multi-drug resistant enterococcal bacteremia. Repeated MRI showed chiasmatic and multi-focal subcortical infarcts. He passed away on day 28 of admission with no reported improvement in his visual acuity.

**Conclusions:** This case emphasizes early recognition, interdisciplinary collaboration, and timely interventions are pivotal to enhancing the outcomes in such multifaceted cases.

##### Defeat the Enemy: A Case of Sino-orbital Mucormycosis with Optic Neuropathy

First Author: Dalal **MAHGOUB**  
Co-Author(s): Hussein **ALHUTTAITAWI**,  
Zunaina **EMBONG**, Anas **MUSA**, Wan  
Hazabbah **WAN HITAM**

**Purpose:** To report a case of sino-orbital mucormycosis with optic neuropathy.

**Methods:** Case report.

**Results:** A 49-year-old woman with underlying uncontrolled diabetes mellitus presented with 2-week history of left sided facial pain and numbness with left eye painless blurry vision. Left eye visual acuity (VA) was 6/36 with positive relative afferent pupillary defect, decreased light brightness, and red saturation with normal color vision and confrontation test. There was restriction of the extraocular muscles (EOMs) over the left eye. Anterior and posterior segment examination of the left eye was normal. There was grade I left

side facial paralysis with reduced sensation V2 and V3 of trigeminal nerve. Right eye VA and ocular examination was normal. Computed tomography revealed features of chronic sinusitis with extra-sinus involvement of left extra-conal orbit and left nasopharynx. Surgical intervention with functional endoscopic sinus surgery with fungal debridement was performed and left medial maxillectomy was done. Culture of slough tissue revealed growth of *Rhizopus oryzae* and *Aspergillus niger*. Patient was treated with intravenous (IV) ceftriaxone, metronidazole, and amphotericin-B for 6 weeks and continued with oral itraconazole for 6 months. Intraorbital liposomal amphotericin-B injections were performed 3 times. After 4 weeks of receiving the IV medications, her left eye VA improved to 6/6, EOMs were full, normal optic nerve functions, facial pain subsided, and facial numbness resolved.

**Conclusions:** Invasive sino-orbital mucormycosis is a severe infection requiring a multidisciplinary approach. When dealing with uncontrolled diabetes patients, mucormycosis should be considered. For the effective eradication of infection, early diagnosis, systemic antifungal medication, and sinus debridement surgery are crucial.

### Google Bard Artificial Intelligence Chatbot Performance in Ophthalmology Knowledge Assessment

*First Author:* Andrew **MIHALACHE**  
*Co-Author(s):* Peter **KERTES**, Rajeew **MUNI**,  
 Nikhil S. **PATIL**, Marko **POPOVIC**

**Purpose:** With the popularization of ChatGPT in recent months, understanding the potential of artificial intelligence (AI) chatbots in medical education is important. Recently, the AI chatbot Google Bard was released, a direct competitor to ChatGPT. To date, there have been no studies published evaluating Google Bard's knowledge in ophthalmology.

**Methods:** In this study, we evaluated Google Bard's performance on OphthoQuestions, a platform for board certification examination practice questions used in the United States (U.S.). Accuracy, response length, response

time, and provision of explanations were evaluated. Subspecialty-specific performance was noted. A secondary analysis was conducted using Bard from Vietnam.

**Results:** Overall, Google Bard had an accuracy of 70.06% across 125 text-based multiple-choice questions. Bard chose the same multiple-choice option that OphthoQuestions respondents most frequently chose 61.19% of the time. The secondary analysis revealed an accuracy of 65.08% using Bard from Vietnam, with 27 questions (21.6%) answered different than when using Bard from the U.S.

**Conclusions:** Google Bard had an acceptable performance in responding to ophthalmology board examination practice questions. Its performance in Vietnam was slightly worse than in the U.S. Bard appears to be performing slightly worse at the time of our study in comparison with ChatGPT-4 and better than ChatGPT-3. Bard may tend to provide a confident explanation even when providing an incorrect answer and appears to have varied responses depending on country of the user.

### Observational Study of Fundus Outcomes in a Real-world Population with Suspected POAG and Myopia

*First Author:* Yao **LU**

**Purpose:** To follow up the changes in the thickness of the retinal nerve fiber layer (RNFL) adjacent to the optic disc and the thickness of the ganglion cell-inner plexiform layer (GC-IPL) in the macular area in patients with suspected glaucoma combined with myopia who have high intraocular pressure (IOP) or an enlarged cup-to-disc ratio.

**Methods:** We selected 150 patients with myopia and suspected glaucoma in the observation group (including 82 patients with increased cup-to-disc ratio and 68 patients with elevated intraocular pressure), 236 patients with simple myopia in the control group, and 15 patients with myopia and primary open angle glaucoma (POAG) in the control group. The results of eye specialized examinations were collected, and optical coherence tomography



(OCT) was used to obtain GC-IPL and RNFL thickness. Observations and comparisons were made with the control group between groups; then we compared and analyzed the RNFL and GC-IPL of patients with myopia and suspected glaucoma follow-up to explore the changes in their parameters.

**Results:** 1. The thickness of the temporal RNFL in patients with large optic cups has significantly decreased. 2. No significant differential changes in RNFL and GC-IPL were seen in patients with myopia combined with suspected POAG after 6 and 12 months of follow-up.

**Conclusions:** Patients with suspected POAG combined with myopia can be followed up and observed for 1 year without IOP-lowering pharmacological intervention for the time being.

### Pediatric Retina

#### Twin Pregnancy: Is it a Risk Factor for ROP?

First Author: Angelica Aja **ALCOREZA**  
Co-Author(s): Sharlene **PRILE**

**Purpose:** Retinopathy of prematurity (ROP) is one of the leading causes of avoidable blindness in children. As commonly identified risk factors for ROP, prematurity ( $\leq 32$  weeks AOG), low birth weight ( $\leq 1500$  grams), oxygen exposure, and an unstable clinical course are part of the screening guidelines. However, twin pregnancy as a possible risk factor for ROP still warrants further investigation. This is a case of type 1 ROP in one newborn of a twin pregnancy.

**Methods:** One-month-old twin males born at 34 weeks AOG were referred for ROP screening. One never developed ROP. The other with a BW of 1.7 kg had neonatal pneumonia at birth. Antibiotics and oxygen supplementation via nasal cannula were given but the clinical course was stable. Initial examination showed squinting to bright light and an unremarkable anterior segment. Indirect ophthalmoscopy of both eyes showed mildly dilated and tortuous vessels with retinal vascularization reaching anterior zone 2 nasally and an extraretinal

fibrovascular proliferation (EFP) at anterior zone 2 at 4 (right eye) and 5 o'clock (left eye) temporally. Diagnosed with type 1 ROP with pre-plus disease bilaterally, immediate laser indirect ophthalmoscopy (LIO) of the temporal avascular retina of both eyes was done under local anesthesia. Patient was then monitored closely for any disease progression.

**Results:** A significant decrease in the dilatation and tortuosity of the retinal vessels with resolution of the EFP was noted 8 days post-LIO.

**Conclusions:** ROP screening may be warranted in infants from twin pregnancies as they might be predisposed to developing treatment-requiring ROP.

### Retina (Medical)

#### A 12-week Phase 2/3 Double-masked, Randomized, Multicenter Study of OCS-01 OPTIREACH Technology Topical Dexamethasone Eye Drops in Subjects with Diabetic Macular Edema: Efficacy and Safety Findings

First Author: Timothy **LAI**  
Co-Author(s): Arshad M. **KHANANI**

**Purpose:** The objective of this phase 2/3 DIAMOND (DIAbetic Macular edema patients ON a Drop) study was to assess the efficacy and safety of OCS-01 and determine the optimal dose for the next steps of the DIAMOND program.

**Methods:** Subjects with center-involving diabetic macular edema (DME) were randomized 2:1 to receive OCS-01 or vehicle 6 times/day for a 6-week loading phase, followed by 3 times/day for a 6-week maintenance phase. The primary endpoint was the mean change in BCVA ETDRS letter score at week 6 vs baseline; secondary endpoints were mean change vs baseline in central subfield thickness (CST) at weeks 6 and 12 and proportion of patients with  $\geq 3$ -line (15 letters) BCVA gain at week 6.

**Results:** Out of 288 screened, 148 were randomized, with 100 who received OCS-01 and 48 who received vehicle. Demographics were well-balanced between the two arms. The study demonstrated a statistically significant improvement in mean BCVA ETDRS letter score from baseline to week 6 vs vehicle (OCS-01: 7.2 letters vs vehicle: 3.1 letters,  $p = 0.007$ ). This effect was sustained until week 12 (OCS-01: 7.6 letters vs vehicle: 3.7 letters,  $p = 0.016$ ). The CST at week 6 significantly decreased in the treatment arm (OCS-01:  $-63.6 \mu\text{m}$  vs vehicle:  $+5.5 \mu\text{m}$ ,  $p < 0.0001$ ). 25% of OCS-01 patients achieved  $\geq 3$ -line improvement in BCVA at week 6 (OCS-01 25.3% vs vehicle: 9.8%,  $p = 0.015$ ). OCS-01 was well-tolerated with no unexpected adverse events.

**Conclusions:** The study met the primary and secondary endpoints. The results support the progression of the DIAMOND program, with two parallel global phase 3 studies.

#### A Case of Occlusive Retinitis Following Intravitreal Faricimab-svoa Injection

First Author: Ricko Wai Leung **WONG**  
Co-Author(s): Randolph **DOBSON**, Christopher **KENNEDY**, Xia Ni **WU**

**Purpose:** To describe the investigation, treatment, and visual outcomes of bilateral occlusive retinal vasculitis following intravitreal faricimab-svoa injection.

**Methods:** Case report.

**Results:** An 85-year-old woman with bilateral neovascular age-related macular degeneration (nAMD) transitioned from intravitreal aflibercept to faricimab-svoa. Following her third dose of faricimab-svoa in the right eye and the second dose in the left eye, painless left blurry vision developed which was managed in clinic, and similar symptoms occurred in her right eye within 24 hours. Hospitalization ensued, diagnosing bilateral occlusive vasculitis. Upon admission, her right eye had 6/18 vision and her left eye had hand movement vision at 30 cm. Bilateral 0.5+ anterior chamber cells and 2 to 3+ vitreous haze were present, along with arterial and venous sheathing in her right eye.

Initial optical coherence tomography (OCT) revealed sub-RPE hyperreflective material and inner retinal thickening. Fundus fluorescein angiogram (FFA) showed occlusive vasculitis and capillary non-perfusion. Initial treatment involved bilateral intravitreal vancomycin, ceftazidime, and dexamethasone with oral prednisolone at a dose of 75 mg (1 mg/kg), plus additional topical medications, including topical steroid and antibacterial. After excluding endophthalmitis, dexamethasone implant was applied in her left eye to control posterior uveitis. Oral and topical steroid were tapered gradually. After 6 weeks, only subjective contrast sensitivity improved. Bilateral 0.5+ vitreous cells persisted, with consistent arterial and venous sheathing. Repeat FFA showed stable non-perfusion areas.

**Conclusions:** This case represents the first publicly reported occlusive vasculitis post faricimab-svoa treatment. It underscores the complexities in managing bilateral occlusive vasculitis, emphasizing further research and vigilance to address such complications effectively.

#### A Review on Ocular Adverse Events Following SARS-CoV-2 Vaccination

First Author: Ho Lam **WONG**

**Purpose:** This review aims to summarize ocular adverse events followed by SARS-CoV-2 vaccination, which were reported to the vaccine adverse event reporting system (VAERS).

**Methods:** Studies analyzing the ocular adverse effects after SARS-CoV-2 vaccination were reviewed, including the demographics, clinical history, and presentation of the patients recruited.

**Results:** SARS-CoV-2 vaccination has resulted in corneal graft rejection, particularly in patients with endothelial keratoplasty compared to those with penetrating keratoplasty. Female patients had an earlier onset of graft rejection after a second dose of BNT162b2. Herpetic eye diseases had also been reported to VAERS after patients receiving BNT162b2, mRNA-1273, and Ad26.CO2.S. More than half

of the cases were reported within the first 2 weeks after vaccination. The 30-day risk analysis revealed a significantly higher risk of herpes zoster ophthalmicus after BNT162b2 than other vaccines. Retinal artery and vein occlusion were seen in vaccinated patients. Most retinal vessel occlusion cases were reported within the first week post-vaccination, with a significantly longer onset interval in patient vaccinated with Ad26.COV2.S. Vaccine-associated uveitis were found mostly in patients injected with BNT162b2, mainly anterior uveitis and iridocyclitis. Glaucoma, another ocular complication, was reported within the first week of vaccination. The cumulative-incidence analysis showed a higher risk of glaucoma in patients with BNT162b2 vaccine.

**Conclusions:** Studies revealed a temporal association between SARS-CoV-2 vaccination and ocular pathologies, although the risk is relatively low. Nevertheless, VAERS is a passive surveillance system and underreporting is common, which impedes the relative-risk calculation. Thus, it is essential that ophthalmologists closely monitor patients with a high risk of developing complications after vaccination.

### Aflibercept 8 mg for Diabetic Macular Edema: 96-week Results from the Phase 2/3 PHOTON Trial

First Author: Andrew **CHANG**  
Co-Author(s): Diana **DO**

**Purpose:** To evaluate aflibercept 8 mg vs 2 mg efficacy and safety in DME.

**Methods:** PHOTON (NCT04429503) was a double-masked, 96-week, phase 2/3, non-inferiority trial in which patients with DME were randomized to receive aflibercept 8 mg every 12 or 16 weeks after 3 monthly doses (8q12 [n = 328] or 8q16 [n = 163]) or aflibercept 2 mg every 8 weeks after 5 monthly doses (2q8; n = 167). The dosing interval for patients in the 8q12 and 8q16 groups could be shortened from week 16 and extended from week 52 based on protocol criteria. Exploratory endpoints included mean change from baseline

in best-corrected visual acuity (BCVA) at week 96 and the proportion of patients with  $\geq 12$ - and  $\geq 16$ -week dosing intervals through week 96.

**Results:** Mean BCVA change from baseline at week 96 was +8.4 (2q8), +8.8 (8q12), and +7.5 (8q16) letters (least squares mean difference: non-inferiority 8q12 vs 2q8: [nominal P < 0.0001]; 8q16 vs 2q8: [nominal P = 0.0044]). Through week 96, 88% (8q12) and 84% (8q16) of patients maintained  $\geq 12$ - and  $\geq 16$ -week dosing intervals, respectively. In the 8 mg-combined group, 44% of patients had assigned dosing intervals of  $\geq 20$  weeks at week 96. Of these patients, 27% had assigned dosing intervals of 24 weeks at week 96. Aflibercept 8 mg and 2 mg safety outcomes were similar through week 96.

**Conclusions:** Aflibercept 8 mg maintained non-inferior BCVA gains vs 2 mg, with no new safety signals through 96 weeks. Most patients maintained extended dosing intervals of  $\geq 12$  weeks (88% in 8q12) and  $\geq 16$  weeks (84% in 8q16).

### Assessing Visual Outcomes with Intravitreal Bevacizumab in Patients with Wet Age-related Macular Degeneration

First Author: Pratik **BIKKANNAVAR**  
Co-Author(s): Malavika **SUBASH**

**Purpose:** Guidelines by the National Institute for Health and Care Excellence in the United Kingdom recommend intravitreal therapy (IVT) for patients with wet age-related macular degeneration (wAMD) having a Snellen visual acuity (VA) from 6/12 to 6/96, with aflibercept and ranibizumab being the licensed drugs. In patients with a VA outside this range, yet still considered likely to see an improvement in their vision with IVT, IV bevacizumab may be used off-license. This study examines the visual outcomes in patients with wAMD treated with IV bevacizumab at a district general hospital.

**Methods:** This study included patients commenced on IV bevacizumab for wAMD from August 2019 to August 2022. The baseline VA and optical coherence tomography central macular thickness (OCTCMT), as well as the

VA and OCTCMT at follow-ups for 6 months following the commencement of bevacizumab IVT, were recorded.

**Results:** Of 8 patients studied, 6 had a baseline VA < 6/96, with 2 having a baseline VA > 6/12. In the former group, the 4 patients with hemorrhagic wAMD had no improvement in VA with IV bevacizumab, whereas the 2 with non-hemorrhagic wAMD did see improvement. Both the patients with a baseline VA > 6/12 saw their VA stably maintained with IV bevacizumab. No salient relation was seen between changes in the OCTCMT and changes in the VA.

**Conclusions:** Bevacizumab IVT may improve VA in patients with a baseline VA < 6/96 only in non-hemorrhagic wAMD. Bevacizumab IVT may also stably maintain the VA in wAMD patients with baseline VA > 6/12, but this benefit must be weighed against the risks of IVT in an otherwise asymptomatic patient.

#### Association Between Mean Platelet Volume and Retinal Vein Occlusion in Adult Patients

First Author: Tariq ALI

**Purpose:** To assess the association between mean platelet volume and retinal vein occlusion (RVO) in adult patients.

**Methods:** An observational cross-sectional study involving 30 cases of RVO and 30 cases of age and sex-matched control of patients 21-80 years old was conducted. Following a brief history, general and ocular examination was done and blood samples were taken from the subjects to measure platelet count and indices using the Electrical Impedance Cell Counting method in SYSMEX Automated Haematology Analyser XN2000 (Sysmex, Japan).

**Results:** The mean age in the cases was 51.1 ( $\pm 11.9$ ) years and that of the control was 54.5 ( $\pm 12.7$ ) years. The mean platelet count (MPC) was 2,948,66 ( $\pm 87772$ )/mm<sup>3</sup> and 2,97,667 ( $\pm 60250$ )/mm<sup>3</sup>, respectively, in cases and controls without any statistically significant difference between these 2 groups ( $p = 0.886$ ). The mean mean platelet volume (MPV) was 11 ( $\pm 1.5$ ) fl and 9.8 ( $\pm 1.3$ ) fl in the cases and

controls, respectively, and the difference between them was statistically significant ( $p = 0.002$ ). There was a positive correlation between MPV and RVO ( $r = 0.376$ ;  $p = 0.003$ ) as well as logistic regression analysis demonstrated a 1.9 times higher likelihood of developing RVO for every femtoliter increase in MPV (OR = 1.949;  $p = 0.001$ ). ROC curve analysis also demonstrated that MPV has good sensitivity and specificity (70% and 67%, respectively, for an MPV cut-off of 10.35 fl) for the prediction of RVO ( $p = 0.004$ ; AUC = 0.717).

**Conclusions:** Our study suggested that not platelet count, but mean platelet volume was an independent risk factor for the development of RVO.

#### Changes in Subfoveal Choroidal Thickness and Choroidal Vascular Index After Intravitreal Injection of Anti-vascular Endothelial Growth Factor in Choroidal Neovascular Membrane

First Author: Abu Faisal Md Jahangir ALAM  
Co-Author(s): Mohamed AZZAM, Niaz KHAN, Muhammad MONIRUZZAMAN, Farzana MOU, Mst SAYEDATUNNESSA

**Purpose:** To evaluate changes in subfoveal choroidal thickness (SFCT) and choroidal vascular index (CVI) after intravitreal anti-VEGF injection for choroidal neovascular membrane (CNVM).

**Methods:** An observational case series of 15 patients (15 eyes) who underwent anti-vascular endothelial growth factor (anti-VEGF) therapy for CNVM. The 15 fellow eyes in these patients were used as controls. All eyes were evaluated with swept source optical coherence tomography (SS-OCT) and optical coherence tomography angiography (OCTA).

**Results:** Mean patient age was  $61.87 \pm 13.75$  years. Follow up was after 3 doses of intravitreal anti-VEGF injection. Subfoveal choroidal thickness (SFCT) decreased significantly from a mean of  $251.60 \pm 82.81 \mu\text{m}$  to  $191.13 \pm 50.75 \mu\text{m}$ . SFCT decreased by 24.03%; P value was 0.02. Before anti-VEGF, mean CVI was  $64.02 \pm 2.93\%$ . And after 3 doses of anti-VEGF, mean



CVI was  $62.94 \pm 3.52\%$ . After anti-VEGF, CVI decreased by 1.63%; P value was 0.18.

**Conclusions:** SFCT decreased significantly after 3 doses of anti-VEGF injection in CNVM. CVI also decreased but not significantly.

### Changes to Macular Vascular Density and Central Retinal Thickness and Association with Functional Impact After Anti-VEGF Injections in Clinically Significant Macular Edema

*First Author:* Muhammad **MONIRUZZAMAN**  
*Co-Author(s):* Md **AHMED**, Abrar **AHMED**, Abu Faisal Md Jahangir **ALAM**, Mohamed **AZZAM**, Md. **RAHMAN**

**Purpose:** We aim to demonstrate the changes to macular vascular density and its relationship with functional changes followed by intravitreal injections in clinically significant macular edema.

**Methods:** In this hospital-based study, patients with clinically significant macular edema received monthly anti-VEGF injections for 3 months. Post injection OCT scans were compared with the baseline scans.

**Results:** Data of 27 eyes were evaluated. Visual acuity gains were found to be significant from logMAR  $0.61 \pm 0.42$  at baseline to logMAR  $0.32 \pm 0.29$ . CMT reduction was significant from  $450.92 \pm 181.76 \mu\text{m}$  at baseline to  $273.12 \pm 137.82 \mu\text{m}$  post injection. Macular vascular density was  $27.05 \pm 7.94$  at baseline which also saw a reduction to  $23.26 \pm 6.67$ . Six (22%) eyes that had no significant changes to VA gains, despite reduction of CMT, also had no change in macular vascular density. Fifteen eyes (76%) with significant VA gains also had significant reduction in macular vascular density.

**Conclusions:** Central macular thickness (CMT) and its changes are proportional to visual gains following intravitreal anti-VEGF injections. There also is a direct correlation with the visual acuity improvement and macular vascular density (MVD). Despite the reduction of CMT, patients with stationary MVD showed no significant VA gains, hence this may be a more reliable

biomarker to predict functional changes to the macula.

### Clinical Features and Treatment Outcomes of Polypoidal Choroidal Vasculopathy in Patients Less than 55 Years

*First Author:* Kiran **KEDARISETTI**  
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**Purpose:** To study the disease characteristics and treatment outcomes in patients with polypoidal choroidal vasculopathy (PCV) aged < 55 years and to compare with the older population.

**Methods:** Retrospective chart review of electronic medical records of patients with ICG confirmed PCV were studied. Patients were categorized into less than 55 (group A) and more than 55 years of age (group B). The demographic profile, ICGA features, visual outcomes, and number of injections were analyzed.

**Results:** Group A consisted of 42 patients and group B had 31. More females were in group A (71% vs 51%) than in group B. The average follow-up duration was 19 months for group A and 37 months for group B. In group A, the BCVA of logMAR  $0.56 \pm 0.43$  at presentation improved to  $0.49 \pm 0.53$  at final follow-up. The initial BCVA in group B was worse ( $0.74 \pm 0.81$ ) and declined at final follow-up to  $0.88 \pm 0.75$ . In group A, the polypoidal lesions (polyps) were located subfoveally in 38% of patients while the branching neovascular network (BNN) was located at the fovea in 21% of patients. In group B, 29% of polyps and 25% of BNN were located at the fovea. On ICGA, the polyps were first identified at 1:09 and 4:11 minutes in group A and B, respectively. The mean number of intravitreal anti-VEGF injections were 3.3 and 5.2 injections, respectively.

**Conclusions:** Younger patients with PCV presented with better initial vision and responded more favorably to treatment with fewer injections compared to older patients. Polyps were identified earlier in younger patients using ICGA.

### Clinical Practice Pattern on Use of Ranibizumab Biosimilar in Indian Settings (Clariant Survey)

First Author: Ashish **SHARMA**  
Co-Author(s): Dr. Maneesha **KHALSE**, Nilesh **KUMAR**, Dr. Nikula **PARACHURI**, Varsha **PAWAR**

**Purpose:** The advent of intravitreal anti-VEGF therapies such as ranibizumab improved management of retinal vascular disorders. The affordability constraint with innovator ranibizumab directed a trend shift in utilization of ranibizumab biosimilars (RBZ). Our aim is to understand the clinical utilization pattern of RBZ among retina specialist in Indian scenarios.

**Methods:** Online structured questionnaire was prepared based on practice patterns among retina specialist and their perception about RBZ pertaining to safety, efficacy, quality parameters, and necessity of clinical studies. Responses were obtained from 104 retina experts practicing across India in June 2023.

**Results:** A total of 104 respondents participated (south 33%, north 24%, west 27%, east 16%) practicing in private clinics (43%), institutions (17%), corporate (33%), and charitable hospitals (7%). Majority (94%) were aware of biosimilars availability. About 71% administered RBZ in 25-75% of patients. According to participants (85%), RBZ was equivalent to innovators from efficacy perspective. The top reason to prefer RBZ was the decreased cost to patients who are paying out-of-pocket expenses (87%). About 91% of experts consider ranibizumab biosimilars safe to use and post-injection reactions were less as per 88% (n = 91). However, 73% of specialists insist on the safety and efficacy data in real-world settings rather than design/strength of trials or pharmacological quality attributes.

**Conclusions:** The majority of Indian retina experts perceive RBZ as cost-effective alternatives due to their acceptable efficacy and safety profile. The respondents need more real-world data for clinical decision-making; still, there is scope to generate awareness about

physicochemical analysis and manufacturing process of biosimilars.

### Different Damage Between Superficial Capillary Plexus and Deep Capillary Plexus According to Diabetic Retinopathy Severity

First Author: Hwa-young **YU**  
Co-Author(s): Jung-tae **KIM**, Min-woo **LEE**, Yong-yeon **SONG**

**Purpose:** To identify the difference between superficial capillary plexus (SCP) and deep capillary plexus (DCP) damages as diabetic retinopathy (DR) severity progressed.

**Methods:** The subjects were divided into 4 groups: patients with type 2 diabetes without DR (group 1), patients with mild to moderate nonproliferative DR (NPDR) (group 2), patients with severe to very severe NPDR (group 3), and proliferative DR (PDR) (group 4). The vessel density (VD) of SCP (SVD) and DCP (DVD) and their ratio were compared among the groups. Linear regression analyses were performed to identify factors associated with the SVD/DVD ratio.

**Results:** The SVDs were  $25.5 \pm 6.1$ ,  $25.1 \pm 7.0$ ,  $24.5 \pm 9.0$ , and  $21.6 \pm 6.9\%$  ( $P = 0.003$ ); the DVDs were  $25.6 \pm 5.3$ ,  $23.0 \pm 7.0$ ,  $22.3 \pm 8.8$ , and  $17.5 \pm 5.0\%$  ( $P < 0.001$ ); and the SVD/DVD ratios were  $1.00 \pm 0.16$ ,  $1.12 \pm 0.20$ ,  $1.14 \pm 0.33$ , and  $1.24 \pm 0.27$  ( $P < 0.001$ ) in group 1, 2, 3, and 4, respectively. In multivariate analysis, DR severity ( $B = 7.21$ ,  $P < 0.001$ ) and HbA1c level ( $B = 1.58$ ,  $P = 0.043$ ) were significantly associated with the SVD/DVD ratio.

**Conclusions:** Both SVD and DVD tended to decrease as DR severity progressed. Additionally, as the DR severity progressed, the SVD/DVD ratio increased, indicating more severe reduction of DVD than SVD. This ratio was positively associated with HbA1c level, indicating a significant relationship between HbA1c level and DVD rather than SVD.

### Effect of Anti-VEGF on Choroidal Vascular Index in Retinal Vein Occlusion

First Author: Muhammad **MONIRUZZAMAN**  
Co-Author(s): Tariq **ALI**, Mohamed **AZZAM**, S.m Baratul **ISLAM**, Mst **SAYEDATUNNESSA**, Md Abul Bashar **SHEIKH**

**Purpose:** We aim to demonstrate the changes to choroidal thickness and choroidal vascularity index in retinal vein occlusion patients after receiving anti-VEGF injection.

**Methods:** In this hospital-based study, all effected eyes received 3 monthly loading injections of anti-VEGF injections. Post injection macula OCT and OCTA were compared with the baseline scans. Choroidal vascular index was measured manually using Image-J software.

**Results:** Data of 43 eyes were analyzed. There was significant reduction of subfoveal choroidal thickness (SFCT),  $291.67 \pm 74.36$  from baseline to  $246.81 \pm 75.45$  post injection. Choroidal vascular index increased from  $63.14 \pm 3.13$  at baseline to  $64.51 \pm 3.50$  post injection. There were also significant reductions in central macular thickness,  $548.47 \pm 241.34$  from baseline to  $222.93 \pm 86.89$ , and macular vascular density from  $27.85 \pm 8.4$  to  $21.44 \pm 8.07$ .

**Conclusions:** Choroidal thickness and choroidal vascularity index may be used as a good marker to monitor and evaluate retinal pathologies. The results of this study may further help in understanding effects of the underlying choroid towards retinal pathologies.

### Effects of TGF- $\beta$ 2 and Hypoxia on Epithelial-mesenchymal Transition of Human Retinal Pigment Epithelium

First Author: Soma **SUZUKI**  
Co-Author(s): Fumihito **HIKAGE**, Hiroshi **OHGURO**, Araya **UMETSU**, Megumi **WATANABE**

**Purpose:** Epithelial-mesenchymal transition (EMT) of human retinal pigment epithelial cells (RPE) has been implicated in the pathogenesis of retinal fibrotic diseases such as proliferative vitreoretinopathy and age-related macular

degeneration. In this study, we investigated the effect of TGF- $\beta$ 2 and/or hypoxia (low O<sub>2</sub>) on EMT of RPE using two-dimensional (2D) and three-dimensional (3D) cultures of human retinal pigment epithelial cells (HRPE).

**Methods:** In the absence or presence of TGF- $\beta$ 2 (5 ng/mL) and/or hypoxia (37°C, 5% CO<sub>2</sub>, 1% O<sub>2</sub>), the following analyses were performed: 1) transepithelial electrical resistance (TEER) of 2D HRPE cells, 2) size and stiffness measurements of 3D HRPE spheroids, 3) mRNA expression of various related molecules, and 4) real-time cell metabolism measurements (2D/3D).

**Results:** TGF- $\beta$ 2 and/or hypoxia 1) increased the barrier function of the 2D HRPE monolayers measured by TEER, 2) reduced the size and increased the stiffness of the 3D HRPE spheroids, and 3) upregulated mRNA expressions of the extracellular matrix proteins in both 2D and 3D HRPE cells. In addition, a real-time metabolic analysis indicated that TGF- $\beta$ 2 caused a decrease or an increase in the maximal capacity of mitochondrial oxidative phosphorylation in the 2D HRPE cells or the proton leakage in the 3D HRPE spheroids.

**Conclusions:** Our findings indicate that TGF- $\beta$ 2-induced EMT of both 2D and 3D cultured HRPE was greatly modified by hypoxia, but during these EMT processes, the metabolic aspects was different between 2D and 3D HRPE cells, suggesting that the TGF- $\beta$ 2-induced EMT of HRPE cells may be variable between their planar and spatial environments.

### Efficacy of Pattern Electroretinogram to Detect Diabetic Retinopathy

First Author: Roshija **KHANAL RIJAL**  
Co-Author(s): Deepesh **MOURYA**

**Purpose:** To study the efficacy of pattern electroretinogram (PERG) for detecting diabetic retinopathy (DR).

**Methods:** This was a retrospective comparative trial. An office-based Diopsys Nova system was used for PERG. PERG of patients with moderate to severe NPDR was compared with normal subjects without any other associated ocular morbidity.

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**Results:** There were a total of 53 patients; 30 were normal and 23 with DR. The mean age was  $53 \pm 3.4$ . The mean Hc magD was lower ( $1.03 \pm 0.23$ ) in diabetic subjects compared to normal ( $1.36 \pm 0.45$ ). Similarly, the mean Lc magD was also found to be lower ( $0.97 \pm$ ) in diabetics vs normal ( $1.10 \pm 0.33$ ).

**Conclusions:** PERG values were lower in patients with DR compared to normal subjects. This technique can be used to assess the risk of diabetic retinopathy progression.

### Establishing the Pathogenicity of a Novel Variant in BBS5 in a Filipino Family

*First Author: Diego RAMOS*

*Co-Author(s): Manuel Benjamin IBANEZ, Tamilyn Chelsea LADDARAN*

**Purpose:** Bardet-Biedl syndrome (BBS) is a ciliopathy arising from pathogenic variants in 26 genes. It is rare and only one genetically confirmed case has been reported in the Philippines. For this case, we report a patient with clinical features of BBS found to have a homozygous variant of unknown significance (VUS) in BBS5, which was later reclassified to likely pathogenic after family segregation testing.

**Methods:** A 17-year-old-male referred to the ocular genetics service for poor vision and nystagmus since birth, underwent a comprehensive ophthalmic exam and work-up (OCT of the macula, fundus photography and autofluorescence, and electroretinogram). An inherited retinal dystrophy panel with deletion/duplication analysis was done which showed a homozygous VUS in BBS5. Parents then underwent molecular testing and segregation analysis for that VUS.

**Results:** Fundus photography showed mottled retinas with peripheral bony spicule-like deposits, pale discs, attenuated vessels, and severe macular atrophy. Autofluorescence photos likewise showed profound pigmentary atrophy that was most advanced at the macula. Optical coherence tomography revealed total loss of the macular photoreceptor layers and presence of epiretinal membranes.

Electroretinogram showed extinguished responses in dark and light adapted conditions. Molecular testing in the proband showed a homozygous intronic VUS in BBS5 c.259-3C>G. Segregation testing revealed the variants to be in trans configuration, leading to their reclassification to likely pathogenic.

**Conclusions:** This is the second genetically confirmed case of BBS in the Philippines. This is also the first reported case of the variant involved to be associated with BBS and classified as likely pathogenic instead of unknown significance.

### Fatty Acid-binding Protein 4 is a New Pathological Indicator for Proliferative Diabetic Retinopathy

*First Author: Shohei SUETAKE*

*Co-Author(s): Fumihito HIKAGE, Kaku ITOH, Hiroshi OHGURO, Araya UMETSU, Megumi WATANABE*

**Purpose:** The current study purpose is to elucidate the pathological contributions of fatty acid-binding protein 4 (FABP4), an intracellular lipid chaperone to be involved the pathogenesis of various metabolic diseases, such as diabetes, within proliferative diabetic retinopathy (PDR).

**Methods:** Vitreous concentrations of FABP4 (V-FABP4) and VEGFA (V-VEGFA) in patients with PDR ( $n = 20$ ) and non-PDR ( $n = 20$ ) were determined by enzyme-linked immunosorbent assays. The data including height and weight, systemic blood pressures, several blood biochemical parameters, and blood flow at the optic nerve head (ONH) by laser speckle flowgraphy (LSFG) were collected.

**Results:** The levels of both V-FABP4 and V-VEGFA were significantly higher in PDR patients than in non-PDR patients with a high positive correlation ( $r = 0.72$ ,  $P < 0.001$ ), although those were not affected by body mass index values and the presence of vitreous hemorrhaging. Both V-FABP4 and V-VEGFA were negatively correlated with the ONH ocular blood flow, but those were more evident in V-FABP4. A significant decrease in V-FABP4



expression was observed in the statin dosing group.

**Conclusions:** Our current investigation suggested that V-FABP4 may become a new clinical indicator involved in the pathogenesis of PDR, in addition to V-VEGFA.

### Flecked Retina Disorder in an Adult Filipino Male: A Case of Fundus Albipunctatus Versus Retinitis Punctata Albescens

*First Author: Maria Giselle DY*  
*Co-Author(s): Karina DE SAGUN*

**Purpose:** We aim to present a case of an adult Filipino male with either fundus albipunctatus or retinitis punctata albescens.

**Methods:** This is a case report.

**Results:** A 48-year-old Filipino male who was a known case of error of refraction consulted for spectacle correction due to progressive bilateral blurring of vision, as well as nyctalopia. Review of systems, past ocular, medical, and family histories were unremarkable. Corrected distance visual acuity was 20/20 in both eyes (BE), and near vision was J1 with refraction. External, color, anterior segment, and intraocular pressure examinations were normal. Bilateral fundus examination showed normal optic nerve and retinal vessels with multiple deep retinal yellowish-white dots at the posterior to midperipheral retina with foveal sparing. Flecked retina disorder specifically fundus albipunctatus versus retinitis punctata albescens was considered. Macular optical coherence tomography and automated visual field perimetry were normal in BE. Ultra wide-field fluorescein angiography was requested but not yet done. Full-field electroretinography (ERG) showed a consideration of rod dystrophy, however such test with prolonged dark adaptation would have been preferred to differentiate between the two conditions, where there is normalization of initially reduced scotopic ERG responses in fundus albipunctatus during prolonged dark adaptation. Patient was then given his refraction and advised to have regular monitoring.

**Conclusions:** Deep retinal yellow-white dots in a patient with nyctalopia may be associated with either fundus albipunctatus or retinitis punctata albescens. In these cases such as in our patient, a full-field ERG with prolonged dark adaptation can help differentiate between these two disorders.

### Initial Patient Experience Switching to Faricimab for Neovascular Age-related Macular Degeneration and Polypoidal Choroidal Vasculopathy

*First Author: Farah IBRAHIM*  
*Co-Author(s): Gemmy CHEUNG CHUI MING, Kelvin TEO*

**Purpose:** To describe early experience in patients with neovascular age-related macular degeneration (nAMD) and polypoidal choroidal vasculopathy (PCV) whose treatment was switched to faricimab from other anti-VEGF agents.

**Methods:** This is a prospective cohort of eyes with nAMD and PCV previously treated with anti-VEGF agents other than faricimab. We evaluated visual acuity (VA), central subfield thickness (CST), macular volume (MV), pigment epithelial detachment (PED) height, and choroidal thickness (CT) after one administration of faricimab. Where present, fluid was further evaluated according to intraretinal fluid (IRF), subretinal fluid (SRF), or within PED.

**Results:** Fifty-four eyes from 54 patients were included (48.1% PCV and 51.9% typical nAMD). Median (interquartile range (IQR)) VA, CST, and MV improved from 0.4 (0.43) to 0.3 (0.33) logMAR,  $p = 0.02$ , 359 (128) to 322 (120)  $\mu\text{m}$ ,  $p < 0.01$ , and 9.1 (1.5) to 8.7 (1.0)  $\text{mm}^3$ ,  $p < 0.01$  from switch to post switch visit. CT reduced from 167 (151) to 149 (113)  $\mu\text{m}$ ,  $p < 0.01$ . There was also significant reduction in maximum PED height between visits, 262 (184)  $\mu\text{m}$  and post switch visit 222 (135)  $\mu\text{m}$ ,  $p < 0.01$ . This difference was greater in PEDs that were predominately serous in nature. In eyes with typical nAMD ( $n = 28$ ), improvements were significant for VA, CST, MV, CT, and PED. In eyes with PCV ( $n = 26$ ), only reductions in PED and CT were statistically significant, while VA,

CST, and MV only showed numerically smaller improvements. One patient developed mild vitritis without vasculitis, which resolved with topical steroids with no sequelae.

**Conclusions:** In our series of Asian nAMD, switching to faricimab was associated with stable visual acuity and meaningful anatomical improvements, particularly with typical nAMD subtypes.

### Inner Choroidal Fibrosis: An Optical Coherence Tomography Biomarker of Severity in Chronic Central Serous Chorioretinopathy

First Author: Saarang **HANSRAJ**  
Co-Author(s): Niroj **KUMAR SAHOO**

**Purpose:** To describe a potential biomarker termed as «inner choroidal fibrosis» in cases of chronic central serous chorioretinopathy presenting to a tertiary care referral center.

**Methods:** We present 5 eyes of 4 patients with chronic central serous chorioretinopathy, in which we noticed a grey-white subretinal lesion in the macula. The clinical course of these eyes was analyzed and multimodal imaging was conducted, which included color fundus photography, short wave autofluorescence, fluorescein (FFA) and indocyanine green (ICG) angiography, optical coherence tomography (OCT), and OCT angiography (OCT-A).

**Results:** We observed that the lesion was hypofluorescent on autofluorescence, FFA, and ICG. In all cases on OCT we could see a characteristic heterogeneous, hyperreflective lesion in the inner choroid corresponding to the white subretinal lesions. The lesion was distinct from the adjacent choroid, with greater reflectivity and greater thickness than the adjacent areas of compressed choroidal vasculature. The dilated outer pachyvessels were pushed outwards in all cases. On OCT-A, the corresponding lesion showed flow void areas. We have termed this zone of inner choroidal hyperreflectivity as “inner choroidal fibrosis”. Three of the patients had a history of choroidal neovascularization. The contralateral

eye in 2 of these 3 patients also developed choroidal neovascularization.

**Conclusions:** We report a potential biomarker for chronic central serous chorioretinopathy termed as “inner choroidal fibrosis” in 4 cases of chronic CSCR. It can best be identified on OCT as a region of heterogeneous hyperreflectivity in the inner choroid. This fibrosis could be regarded as a degenerative process secondary to more severe disease in the past.

### Intraretinal Cysts Associated with Pachychoroid Neovascularopathy: Choroidal Leak or Neovascular Leak?

First Author: Moon Young **CHOI**  
Co-Author(s): Won Ki **LEE**

**Purpose:** To discern the dominant pathologic process of intraretinal cystic lesions requiring switching of anti-vascular endothelial growth factor treatment in a subset of patients with pachychoroid neovascularopathy.

**Methods:** Optical coherence tomography images from before and after the switch of intravitreal injections were assessed.

**Results:** The extent of intraretinal cysts involved the outer nuclear layer and internal nuclear layer in 10 patients (71.4%) and 4 (28.6%) involved only the inner nuclear layer. All of the participants showed retinal pigment epithelium atrophy and defect in outer retinal layers including external limiting membrane defect co-localized to the intraretinal cystic lesions. Pre-switch injection resulted in 13 (92.9%) no response and near no response and 1 (7.1%) partial response of intraretinal cyst level, whereas post-switch injection resulted in 12 (85.7%) complete resolutions and near complete resolutions and 2 (14.3%) partial resolutions. The reduction of subfoveal choroidal thickness (SFCT) was significant in aflibercept, the post-switch injections (from median of 209.1 to median of 174.9,  $p = 0.001$ ). Bevacizumab and ranibizumab, the pre-switch injections, did not show a significant decrease in SFCT values. There was no significant

improvement in best-corrected visual acuity both before and after switching of injections.

**Conclusions:** Intravitreal aflibercept injections appear to more effectively contribute to the reduction of IRCL and SFCT compared to bevacizumab and ranibizumab injections. This observation may suggest that the primary source of intraretinal cystic fluid is of choroidal origin.

### Intravitreal Brolucizumab Injections as Rescue Therapy for Neovascular Age-related Macular Degeneration

*First Author: Pik Sha CHAN*  
*Co-Author(s): Harvey UY*

**Purpose:** To report the clinical outcomes of intravitreal brolucizumab injection utilized as rescue treatment for neovascular age-related macular degeneration with insufficient response to prior anti-VEGF treatment.

**Methods:** Retrospective analysis of eyes that exhibited lack of or suboptimal response to prior anti-VEGF treatments and received a minimum of 3 brolucizumab 6 mg intravitreal injections (IVI) as rescue treatment. Main outcome measures: number of IVI brolucizumab injections administered, change in visual acuity (VA), change in central subfield thickness (CST), adverse events.

**Results:** Twelve eyes of 12 patients were included. The mean (SD) patient age was  $71.6 \pm 11.4$  years. The mean duration of illness was  $8.9 \pm 5.4$  months while the mean number of prior IVI using other anti-VEGF agents was  $5.4 \pm 3.1$ . The mean number of IVI brolucizumab injections administered was  $3.8 \pm 0.9$ . The mean VA change was +4.7 ETDRS letters of which 25% improved 3 lines or more, 33% improved 1–2 lines, 33% had unchanged VA, and 9% had worsened VA due to unresponsiveness. The mean central subfield thickness decreased by 118.7  $\mu\text{m}$  (30% from baseline). No adverse events were observed in this short-term observation period.

**Conclusions:** This small case series demonstrated the effectiveness and safety of IVI brolucizumab for the management of eyes

with nAMD with lack of or suboptimal response to prior anti-VEGF agents. A majority of eyes exhibited improvements in VA and CST with no observed clinically significant adverse events.

### Late-onset Retinal Detachment in Untreated Retinopathy of Prematurity: A Review

*First Author: Seruni Hanna ARDHIA*  
*Co-Author(s): Ari DJATIKUSUMO*

**Purpose:** To comprehensively review the characteristics, management, and outcomes of late-onset retinal detachment in patients with untreated retinopathy of prematurity (ROP).

**Methods:** A literature search was done from 3 databases, Pubmed, Scopus, and Embase, using the keywords "late-onset", "retinal detachment", and "retinopathy of prematurity". Studies regarding late-onset retinal detachment in untreated or regressed retinopathy of prematurity until July 2023 were included.

**Results:** Retinal detachment is a less frequent finding in untreated ROP; however, it is a vision-threatening complication. Late-onset retinal detachment in ROP was found in patients of 3-76 years, with a history of prematurity, and/or low birth weight, with or without oxygen administration and stay in the neonatal intensive care unit, alongside ophthalmoscopic findings indicative of regressed ROP. Retinal detachment may occur unilaterally or bilaterally, with mostly rhegmatogenous or tractional detachment. Successful retinal reattachment was achieved after surgical treatments, including scleral buckling, vitrectomy, and a combination of both procedures. Performing surgery at an earlier stage may lead to better visual outcome.

**Conclusions:** Retinal detachment, as the most concerning late retinal complication in untreated ROP, can develop in all age groups. Maintaining continual follow-ups is crucial for ROP patients. Successful retina reattachment and overall visual acuity improvement can be achieved through prompt surgical intervention.

## Long-term Efficacy and Safety of Pegcetacoplan in the GALE Open-label Extension of the Phase 3 OAKS and DERBY Trials

*First Author:* Mark **GILLIES**  
*Co-Author(s):* Jeffrey **HEIER**, Daniel **JONES**, Chao **LI**, Charles **WYKOFF**, Felix **YEMANYI**

**Purpose:** To report the efficacy and safety of continuous intravitreal pegcetacoplan treatment in patients with geographic atrophy (GA) in an open-label extension study (GALE, NCT04770545) of the phase 3, randomized, double-masked, sham-controlled OAKS (NCT03525600) and DERBY (NCT03525613) trials.

**Methods:** In OAKS and DERBY, patients with best-corrected visual acuity  $\geq 24$  Early Treatment Diabetic Retinopathy Study letters and GA lesion area of 2.5–17.5 mm<sup>2</sup> were randomized to pegcetacoplan monthly (PM), pegcetacoplan every other month (PEOM), sham monthly (SM), or sham every other month (SEOM). In GALE, patients in the pegcetacoplan arms of OAKS and DERBY continued the same treatment frequency, and patients receiving SM or SEOM crossed over to PM or PEOM, respectively. The change in total GA lesion area was evaluated via piecewise linear slope analysis.

**Results:** In OAKS and DERBY (N = 1258 total patients enrolled) at month 24, the reductions of GA lesion growth vs sham (pooled) were 20% with PM and 17% with PEOM (both  $p < 0.0001$ ; nominal). Pegcetacoplan was well tolerated at 24 months. Most study eye ocular adverse events were classified as mild or moderate. Overall, 83% of patients who completed OAKS and DERBY entered GALE. Between months 24 and 30 (first 6 months of GALE), PM and PEOM reduced lesion growth vs projected sham by 39% and 32% (both  $p < 0.0001$ ; nominal), respectively, and the safety profile remained consistent. Twelve-month GALE data will be presented.

**Conclusions:** These findings support the longer-term efficacy and safety of intravitreal

pegcetacoplan with slower growth rates versus the first 24 months of treatment.

## Management of Retinopathy of Prematurity: Are We Preferring Intravitreal Anti-VEGF Injection More Than Conventional Laser?

*First Author:* Tariq **ALI**  
*Co-Author(s):* Nuzhat **CHOUDHURY**, Ferdous Akhter Jolly **JOLLY**

**Purpose:** We practice intravitreal injection of anti-VEGF in type 1 retinopathy of prematurity (ROP), i.e., aggressive ROP, stage 3 disease in zone I and zone II and also in babies with non-dilating pupil and in very sick babies. In recent years we probably prefer injection more than conventional laser indirect ophthalmoscope (LIO). We wanted to share our experience in last 2 years about the management of ROP in our center.

**Methods:** A retrospective chart review was done where use of anti-VEGF injection and laser in ROP babies in 2021 and 2022 was compared. Chi-square test was done to measure the statistical significance.

**Results:** Out of 50 babies (91 eyes) in 2021, 10 babies (20 eyes) were treated with anti-VEGF injection and 29 babies (50 eyes) with laser. Injection of anti-VEGF followed by laser was done in 10 babies (20 eyes). In 2022, total 88 babies (133 eyes) were treated. Out of this 41 babies (53 eyes) were treated with anti-VEGF injection, 28 babies (53 eyes) with laser, and 12 babies (18 eyes) with injection of anti-VEGF followed by laser. Use of anti-VEGF injection was superseded more in 2022 than 2021 (53 eyes vs 20 eyes) which was statistically significant ( $p = 0.005$ ). Laser treatment is declining more in 2022 than in 2021 but it failed to achieve any significance.

**Conclusions:** Use of anti-VEGF injection in the management of type 1 ROP is gaining popularity as it is easier for the surgeon. But the long-term safety and consequences are unknown. So we should be judicious when using this controversial drug.



### OCT Features in Patients Switching to Brolucizumab with Recalcitrant Age-related Macular Degeneration

First Author: Christopher **GO**  
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**Purpose:** To investigate optical coherence tomography (OCT) features in patients with recalcitrant neovascular age-related macular degeneration (nAMD) switching to brolucizumab.

**Methods:** This is a post hoc analysis of OCT images in the SWITCH study cohort conducted at the University of Hong Kong Retina Clinical Trials center, Hong Kong. A single center, prospective, randomized study of patients who had recalcitrant nAMD with persistent subretinal (SRF) or intraretinal fluid (IRF) or had recurrence of SRF / IRF after less than 8-week treatment interval on treat and extend (T&E). OCT features assessed include central macular thickness (CMT), volume, subretinal and intraretinal fluid width and height, hyperreflective dots, nature and size of pigment epithelial detachment (PED).

**Results:** Thirty-four patients were recruited into the SWITCH study with 30 patients completing the study. There were 19 males and the mean age was 75.1 years. Prior to switching to brolucizumab, the patients received a mean of 18.8 injections. At baseline, the mean CMT was 399.3  $\mu\text{m}$ , 27 patients had SRF with a mean height of 142.9  $\mu\text{m}$  and 9 patients had IRF. All patients had PEDs with an average height 238.1  $\mu\text{m}$ . Mean SRF height was 57.3  $\mu\text{m}$  after the first brolucizumab injection with complete resolution of SRF in 12 patients (42.9%). After the third injection, 6 patients (21.4%) remained fluid free, 16 patients (53%) had reduction in SRF compare to baseline, and the mean SRF height was reduced to 87.2  $\mu\text{m}$ .

**Conclusions:** Brolucizumab had some anatomical improvement on OCT in patients with recalcitrant nAMD; however complete resolution was uncommon in this cohort following switch in treatment.

### Optical Coherence Tomography Angiography Findings in Patients with Acute Non-arteritic Central Retinal Artery Occlusion Treated with Carbogen Inhalation

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**Purpose:** To evaluate parametric changes of optical coherence tomography angiography (OCTA) in patients with acute non-arteritic central retinal artery occlusion (CRAO) over time after carbogen inhalation.

**Methods:** OCTA measurements in eyes with acute (within 7 days from onset) non-arteritic CRAOs from 1 January 2021 to 31 July 2023 were obtained prior to initiation of carbogen inhalation. Subsequent OCTA was collected at 12-24 hours and 36-48 hours after initiation of carbogen, at 1-2 weeks, and at 4-6 weeks follow up.

**Results:** Twenty-five eyes with CRAO were enrolled. Initial OCTA showed reduction of vessel density (VD) in both superficial and deep retinal layer in the whole image area, parafovea, and perifovea and remained decreased until 4-6 weeks (all  $P < 0.05$ ). VD at the fovea was initially increased compared to the unaffected eye followed by subsequent reduction at 1-2 weeks and 4-6 weeks (all  $P < 0.05$ ). Retinal thickening was universal and improved at 1-2 weeks and 4-6 weeks (all  $P < 0.001$ ). Constriction of the foveal avascular zone (FAZ) area and perimeter was observed on initial examination and was maintained until 4-6 weeks follow up (all  $P < 0.05$ ). Mean best-corrected visual acuity (BCVA) at presentation was  $2.2 \pm 0.35$  LogMAR. Baseline OCTA comparison between patients with final BCVA above and below 1.9 LogMAR and 0.3 LogMAR showed no differences between either group.

**Conclusions:** Eyes with acute non-arteritic CRAO showed generalized reduction of VD except at the fovea due to retinal edema. No recovery of VD was seen after treatment with carbogen inhalation. No baseline OCTA

parameters were predictive of favorable visual outcomes.

### Outcomes of Neovascular Age-related Macular Degeneration Following COVID-19 Lockdown Treat-and-extend Regimen Discontinuation

*First Author:* Jose Carlo **ARTIAGA**  
*Co-Author(s):* Pankaja **DHOBLE**, Swetha **KUMAR**, Deepthy **MENON**, Luke **NICHOLSON**, Shiao **WONG**

**Purpose:** To describe reactivation features of neovascular age-related macular degeneration (AMD) following successful treatment with intravitreal anti-VEGF therapy.

**Methods:** Patients attending the stable AMD clinic from November 1, 2019 to January 31, 2020 were included. Patients who did not require treatment over a period of 6 months from their last injection were monitored in the stable AMD clinic. Patients with macular neovascularization other than from AMD and patients with incomplete data were excluded. Baseline demographics such as age, sex, race, laterality, cause of macular neovascularization, drug, number of injections, and duration of treatment were recorded. Reactivation data collected included date, setting, symptoms, and time to retreatment.

**Results:** Medical records of 286 patients who attended the stable AMD clinic were included. Patients were mostly female (64.3%) and white (68.18%). Most patients were receiving aflibercept monotherapy (55.2%). Mean number of injections at baseline was  $17.79 \pm 11.74$  (range, 3-62). Mean duration of treatment was  $39.47 \pm 30.68$  months (range, 2-139). Reactivation was identified in 32.2% of cases; the most common symptom was blurring of vision in 44.6%; 39.1% were asymptomatic. 87% of recurrences were identified via scheduled visit. Mean time to retreatment was  $29.37 \pm 22.40$  months (range, 5-104), with 20.7%, 73.9%, and 88.04% of these patients requiring retreatment within 1 year, 3 years, and 5 years, respectively.

**Conclusions:** Despite prior treatment with no reactivation in 6 months, 32.2% reactivate, with 73.9% within 3 years. A significant proportion, 39.1%, reactivated without symptoms necessitating regular monitoring in the first 5 years.

### Preliminary Outcomes of Switching from Aflibercept to Faricimab for Refractory Age-related Macular Degeneration

*First Author:* De-kuang **HWANG**  
*Co-Author(s):* Yu-bai **CHOU**, Tai-chi **LIN**, Chang-chi **WENG**

**Purpose:** To evaluate the short-term efficacy and safety of faricimab for neovascular age-related macular degeneration (AMD) unresponsive to prior treatments.

**Methods:** A retrospective study at Taipei Veterans General Hospital enrolled AMD patients who were insufficiently treated with aflibercept and then switched to faricimab between May and June 2023. The criteria included prior treatment with more than 3 anti-vascular endothelial growth factor injections and recent aflibercept injections before the switch, with evidence of residual or recurring intraretinal/subretinal fluids. Exclusions included incomplete data or a lack of follow-up after faricimab treatment. Anatomical and functional outcomes, as well as the safety profile, were recorded and analyzed.

**Results:** Fifty-seven patients (61 eyes) were analyzed, with a mean age of  $71.6 \pm 9.7$ ; 54.4% were male. Visual acuity (VA in logMAR) before the last aflibercept, after the last aflibercept, and post-faricimab were  $0.53 \pm 0.45$ ,  $0.54 \pm 0.45$ , and  $0.59 \pm 0.47$ , respectively ( $p > 0.05$  before and after switching). The central macular thickness values before the last aflibercept, after the aflibercept just prior to faricimab, and after faricimab were  $271.6 \pm 76.9$ ,  $284.9 \pm 78.1$ , and  $243.8 \pm 62.8$ , respectively ( $p = 0.45$  for before and after aflibercept, and  $p < 0.001$  for before and after faricimab). No intraocular inflammation or any serious adverse events were observed in this case series.

**Conclusions:** Faricimab displayed noteworthy efficacy and safety in refractory nAMD patients, making it a viable option for those suboptimally responsive to previous treatments.

### Presumed Choroidal Tuberculoma Masquerading as Central Serous Chorioretinopathy in a 37-year-old Filipino Male

*First Author: Maijann PRECIA  
Co-Author(s): Rodrigo SENADOR, John Philip UY*

**Purpose:** Ocular tuberculosis is known to be a great imitator of various ocular pathologies, such as central serous chorioretinopathy (CSCR) which is rarely recorded in a few case reports. However, CSCR associated with choroidal tuberculoma has not been described. We report a case of a presumed choroidal tuberculoma masquerading as CSCR in a 37-year-old Filipino male.

**Methods:** Case report.

**Results:** The patient presented with a sudden painless metamorphopsia in the right eye. Past medical and past ocular histories were unremarkable. Visual acuity was 20/50. Anterior segment findings were unremarkable. Fundus examination showed a blister-like lesion in the macula. Macular OCT revealed a neurosensory detachment and double-humping of the RPE in the area superior to the fovea. Fluorescein angiography showed an area of stippled hyperfluorescence superotemporal to the fovea that stained, within an area of subsensory dye pooling, corresponding to the blister-like lesion seen in color photo. This area of stippled hyperfluorescence presented as a subretinal hypofluorescent lesion that stained lightly in indocyanine green angiography. B-scan ultrasound showed a 1.44 mm x 4.24 mm homogenous, dome-shaped lesion with low to moderate spikes and regular internal reflectivity. Cranial MRI showed few contrast-enhancing lesions within the white matter. Test results were normal chest X-ray and a positive quantiferon gold test, which strongly indicated presence of ocular tuberculosis. Anti-tuberculosis treatment was started.

**Conclusions:** There are no reported cases about the concurrence of choroidal tuberculoma and CSCR. Comprehensive examination and ancillary tests are needed to strengthen the diagnosis. We reported a case of presumed choroidal tuberculoma masquerading as CSCR.

### Presumed Unilateral Cancer-associated Retinopathy from Thymoma

*First Author: Oscar Jr ACOPIADO  
Co-Author(s): Jose Carlo ARTIAGA*

**Purpose:** Cancer-associated retinopathy (CAR) is a type of paraneoplastic autoimmune retinopathy caused by cross-reactivity of antibodies against the underlying malignancy with retinal antigens. Patients usually present with bilateral visual loss and retinal degeneration. We aim to describe a case of progressive unilateral cancer-associated retinopathy in a patient previously treated for thymoma.

**Methods:** Case report.

**Results:** A 32-year-old Asian female with myasthenia gravis who previously underwent surgical management for thymoma presented with a 1-year history of left eye progressive blurring of vision, poor color discrimination, and visual field loss. Best-corrected visual acuity was 20/70, with poor color vision and an afferent pupillary defect. Fundus examination showed areas of hypopigmented patches at the mid periphery and a dull foveal reflex. Macular OCT showed thinning and irregularities of the ellipsoid and interdigitation zones. Perimetry testing showed near total ring scotoma. Patient presented several years later with worse visual acuity of 20/1271 and poor gross color discrimination. Fluorescein angiography showed generalized transmitted hyperfluorescence with diffuse peripheral dye leakage, while macular OCT showed generalized thinning of the macula. Imaging showed normal foveal autofluorescence with surrounding parafoveal hyperautofluorescence and perifoveal hypoautofluorescence. The right eye remained unremarkable. Presumptive diagnosis was a unilateral CAR pending

electrophysiological testing and serological confirmation.

**Conclusions:** This is the first report of a unilateral CAR associated with thymoma. Unilateral involvement may rarely occur, and damage may still progress after several years and after removal of the underlying cause. Recognition and investigation is important to provide a better understanding of the disease.

### Real-world Outcomes and Complications from India of Intravitreal Brolucizumab for Persistent Diabetic Macular Edema

First Author: Saarang **HANSRAJ**  
Co-Author(s): Mudit **TYAGI**

**Purpose:** To assess the outcomes of intravitreal brolucizumab for persistent diabetic macular edema (P-DME) on visual acuity (VA) and central subfield thickness (CST) in a real-world setting.

**Methods:** A retrospective review of patients treated with intravitreal brolucizumab from January 2022 to May 2023 was conducted at the Kallam Anji Reddy Campus of the LV Prasad Eye Institute, India. Persistent diabetic macular edema (P-DME) was defined as any DME which persisted despite more than 3 intravitreal anti-VEGF agents or a combination of anti-VEGFs, intravitreal steroids, and/or laser photocoagulation. The change in VA, CST, and any incidence of adverse effects were analyzed.

**Results:** Seventeen eyes of 12 patients received a mean of 3.1 PRN injections of brolucizumab at a mean interval of 6.8 weeks per eye. The median VA at the time of presentation was 0.30 logMAR (SD  $\pm$  0.18; 20/40 Snellen equivalent). The median VA on initiating brolucizumab treatment was 0.40 logMAR (SD  $\pm$  0.21; 20/50 Snellen equivalent) which after a mean follow up of 11.9 weeks after the last injection improved to 0.24 logMAR (SD  $\pm$  0.21; 20/34 Snellen equivalent). Of the 13 eyes to follow up after the last injection, CI-DME resolved in 3 eyes (23%). The CST reduced from 462  $\mu$ m when initiating therapy to 280  $\mu$ m (39%) at last follow up. There was not even a single adverse event among the 53 total injections given.

**Conclusions:** Despite not resolving edema, brolucizumab helped improve VA in patients with P-DME with no adverse events and a longer reinjection interval.

### Resolution of Persistent Pigment Epithelial Detachment Following Series and Switching of Intravitreal Injections of Anti-vascular Endothelial Growth Factor Agents

First Author: Diandra **ASTARIDEWI**  
Co-Author(s): Wimbo **SASONO**

**Purpose:** To present a case of idiopathic pigment epithelial detachment (PED) treated with series of intravitreal anti-vascular endothelial growth factor (anti-VEGF) injections.

**Methods:** A 47-year-old male presented with sudden, painless central blurring of vision in his right eye. Right eye (RE) best-corrected visual acuity (BCVA) was 0.8, while left eye was 1.0, with emmetropia history without spectacle correction. Intraocular pressure (IOP) was 17/20. Optical coherence tomography (OCT) demonstrated unilateral idiopathic PED with well-demarcated elevation of the retinal pigment epithelium (RPE) with homogeneously hypo-reflective sub-RPE space.

**Results:** Two weeks following the administration of 4 consecutive monthly intravitreal injections of aflibercept, the elevation of RPE subsided; however his RE BCVA decreased to 0.7, with IOP 14. His visual acuity improved to 0.8 after a sixth injection; however OCT imaging showed elevation of RPE had returned. After a total of 8 doses of aflibercept, the anti-VEGF agent was changed to brolucizumab. A month after his third monthly injection of brolucizumab, he regained 1.0 BCVA with a slight increase in IOP of 25.0 mm Hg, with almost complete resolution of RPE elevation as demonstrated by OCT imaging.

**Conclusions:** PED are characterized by separation between the RPE and the innermost aspect of Bruch's membrane. Anti-VEGF has been used to treat exudative diseases of the retina and macula. One of the management methods for PED may consist of anti-VEGF therapy with several choices available.



Aflibercept is a recombinant humanized protein, FDA approved for neovascular age-related macular degeneration (nAMD) and diabetic retinopathy. Brolucizumab is a single-chain antibody fragment with FDA approval for nAMD.

### Retreatment with Faricimab in Prior Brolucizumab-related Intraocular Inflammation Eyes

*First Author: Tai-chi LIN*  
*Co-Author(s): Yu-bai CHOU, Yi-ming HUANG, De-kuang HWANG, Chang-chi WENG*

**Purpose:** To report on successful retreatment with faricimab in prior brolucizumab-related intraocular inflammation (IOI) eyes.

**Methods:** Retrospective case reports.

**Results:** A retrospective review of three patients of IOI after intravitreal injection of brolucizumab (IVBr) for neovascular age-related macular degeneration (nAMD) who received subsequent intravitreal faricimab treatment. All three patients demonstrated functional and anatomic improvement, and no ocular or systemic adverse events were noted after intravitreal faricimab injection (IVFa).

**Conclusions:** We demonstrated that retreatment with faricimab may be a favorable option for anti-vascular endothelial growth factor (anti-VEGF) recalcitrant eyes that develop IOI after switching to IVBr.

### Risk of Clinical and Subclinical Radiation-induced Retinopathy Following High-dose Irradiation in Chinese Patients with Nasopharyngeal Carcinoma: A Case-control Study

*First Author: Sophia Ling LI*  
*Co-Author(s): Noel CHAN, Mary HO, Ka Wai KAM, Ho Ming WONG*

**Purpose:** To evaluate changes in vascular parameters following high-dose intensity-modulated radiation therapy (IMRT) for nasopharyngeal carcinoma (NPC).

**Methods:** This retrospective case-control study recruited NPC patients receiving high dose

IMRT (>54 Gy) and age-/sex- matched healthy controls, to compare their clinical and OCT-angiography imaging findings. The relationship between microvascular parameters and radiation dose received by eyeball, optic nerve, and optic chiasm was evaluated.

**Results:** This study included 18 NPC patients who received IMRT from 2010 to 2016 with a mean follow-up of 6.9 years. The average age was  $59.0 \pm 13.4$  years. None developed clinically observable radiation retinopathy. However, compared to the 34 healthy controls, the irradiated eyes exhibited significantly lower microvascular parameters at both the superficial and deep capillary plexus, including lower vessel density (VD) ( $p = 0.003$  for deep plexus), a larger foveal avascular zone (FAZ) area ( $p = 0.047$  for superficial and  $p = 0.027$  for deep plexus), reduced fractal dimension (FD) ( $p = 0.011$  for superficial and  $p < 0.001$  for deep plexus), and decreased vessel density index (VDI) ( $p = 0.004$  for superficial and  $p < 0.001$  for deep plexus). The radiation dose to eyeball (both maximum [Dmax] and mean dose [Dmean]) was significantly correlated with visual acuity and microvascular parameters including non-perfused area, VD, FD, and VDI.

**Conclusions:** Though clinically observable radiation is rare, this study revealed significant decreased microvascular parameters in eyes receiving IMRT during a long-term follow up. The significant correlation between radiation dose to eyeball and vascular parameters highlighted the importance of closely monitoring radiation dose, and early identification of patients at risk.

### Severe Proliferative Retinopathy Following Pregnancy in a Young Female with Antiphospholipid Syndrome and Type 1 Diabetes Mellitus

*First Author: Oscar Jr ACOPIADO*  
*Co-Author(s): Jose Carlo ARTIAGA*

**Purpose:** Antiphospholipid syndrome (APS) is an autoimmune disease that may present with venous and arterial vaso-occlusive retinopathy, retinal vasculitis, and ischemic optic neuropathy.

Diabetes mellitus likewise poses microvascular damage and can lead to retinal ischemia and proliferative retinopathy. Pregnancy exacerbates vasculopathy, can increase the risk of vaso-occlusive retinopathy, and can cause progression of occult diabetic retinopathy. We aim to report on a case of proliferative retinopathy in a patient with a combination of these disease states.

**Methods:** Case report.

**Results:** A 30-year-old Asian female with well-controlled type 1 diabetes mellitus and obstetric APS with a recent poor obstetric history was referred to our service for baseline examination. The patient had no ocular complaints. Visual acuity for both eyes was 20/20 with normal pupil examination and normal Amsler grid findings. Anterior segment examination was unremarkable, with no iris nor angle neovascularization. Intraocular pressure was normal. Fundoscopy showed intraretinal and preretinal hemorrhages, hard exudates, venous tortuosity, arteriolar sclerosis and narrowing, and large areas of peripheral sea-fan neovascularization encroaching the posterior pole. Fluorescein angiography revealed large areas of peripheral nonperfusion and confirmed neovascularization. OCT angiography showed increased foveal avascular zone acircularity in the superficial and deep vascular plexuses bilaterally. The patient underwent panretinal photocoagulation for both eyes.

**Conclusions:** Patients with a combination of APS and diabetes may present with severe retinal ischemia and proliferative retinopathy. This is the first report that shows sea-fan neovascularization in APS and diabetes. Early screening, detection, and recognition are needed to provide the appropriate treatment and prevent progression of the disease.

### Severe Visual Impairment Caused by Optic Neuropathy and Choroidopathy Following Radiation Therapy

*First Author:* Kokoro **KONUMA**  
*Co-Author(s):* Kazusa **KUWANO**, Tadashi **NAKANO**, Akira **WATANABE**, Euido **NISHIJIMA**, Shumpei **OGAWA**

**Purpose:** While the development of retinopathy and optic neuropathy due to radiation therapy is established, the effects on choroidal circulation remain ambiguous. This case report presents a case of significant visual dysfunction, primarily attributed to optic neuropathy and choroidal circulation disturbance believed to result from radiation therapy.

**Methods:** Case report.

**Results:** A 63-year-old female had a history of cisplatin-concurrent intracavitary radiotherapy for left maxillary sinus tumor 2 years prior. In July 2022, elevated intraocular pressure was diagnosed in the left eye. A month later, inflammation within the anterior chamber and optic disc edema in the left eye were observed, leading to referral to our hospital. The initial visual acuity was 1.2 in the right eye and 0.5 in the left eye. Fluorescein angiography revealed no apparent abnormalities in retinal vasculature or circulation in the left eye, but background fluorescence attenuation and opticiliary shunt vessels were noted on the optic disc. Indocyanine green angiography demonstrated the disappearance of the inferior vortex vein. Subsequent treatment with intraocular pressure-lowering medication and topical steroids was administered, but progressive enlargement of optic disc edema occurred. Four months after the initial visit, vitreous hemorrhage developed, and due to no improvement after 1 month of observation, vitrectomy was performed. Following hemorrhage removal, worsening of optic disc edema and hemorrhage in the peripapillary subretinal area were observed, believed to originate from the opticiliary shunt vessels. Postoperatively, visual acuity remained at 0.04.

**Conclusions:** Radiation therapy can lead to severe visual impairment due to compromised optic nerve and choroidal circulation.

### Significance of Pre-vitrectomy Intravitreal Bevacizumab for Preventing Recurrent Vitreous Hemorrhage: A Systematic Review and Meta-analysis

First Author: Siddhi Putra I **GUSTI AGUNG**  
Co-Author(s): Firman **SETYAWARDHANA**

**Purpose:** This meta-analysis reviews the incidences of recurrent vitreous hemorrhage of diabetic retinopathy patients who underwent pars plana vitrectomy and evaluate how intravitreal bevacizumab pre-vitrectomy leverages the result of the surgery.

**Methods:** Systematic review and meta-analysis of randomized control trial assesses intravitreal bevacizumab administration prior to retinectomy for proliferative diabetic retinopathy patient focusing primarily on 2 outcomes: 1) early vitreous hemorrhage (VH) that occurred within 4 weeks post vitrectomy, 2) late VH occurred after 4 weeks post vitrectomy. All randomized control trial studies between 2009 to 2023 registered in PubMed and Cochrane Central using bevacizumab, proliferative diabetic retinopathy, pre-vitrectomy, vitreous hemorrhage as key words were identified. Revman 5.4 software was used to calculate the odds ratio and related 95% confidence intervals.

**Results:** 165 titles and abstracts were evaluated and 4 relevant studies with 245 participants were analyzed. Three studies contributed to early and late VH recurrent assessment. Pre-vitrectomy intravitreal bevacizumab (compared to vitrectomy alone) was associated with decrease risked of postoperative early recurrent VH [OR: 0.32 (95% CI: 0.16, 0.66),  $P = 0.002$ ]. Risk of late VH recurrent was also significantly decreased in group with preoperative intravitreal bevacizumab [OR: 0.29 (95% CI: 0.13, 0.66),  $P = 0.003$ ].

**Conclusions:** The use of intravitreal bevacizumab pre-vitrectomy can reduce the risk of both early and late recurrent vitreous

hemorrhage significantly and might be a promising strategy to manage proliferative diabetic retinopathy patients who need vitrectomy surgery. Further studies are required to explore more benefits and also adverse events from the use of intravitreal bevacizumab and other anti-VEGF pre-vitrectomy.

### Single-cell Sequencing and Transcriptomic Analysis Reveal Key Genes and Regulatory Mechanisms in Diabetic Retinopathy

First Author: Fei **LI**  
Co-Author(s): Yan **DAI**, Qingping **XIANG**

**Purpose:** Diabetic retinopathy (DR), a prevalent complication of diabetes with a poor prognosis, remains incompletely understood. Therefore, an in-depth study on the pathogenesis of DR at the molecular level is essential to identify key DR-related genes. The purpose of this study was to employ bioinformatics approaches to reveal key genes and potential molecular mechanisms underlying DR.

**Methods:** The single-cell sequencing dataset (GSE209872) and transcriptome sequencing datasets (GSE94019 and GSE102485) were acquired from the GEO database. Data was subjected to standardization, homogenization, PCA, and TSNE analysis. Annotations were conducted using the CellDex package, while cell types with known associations to disease were assigned to the clusters. FindAllMarkers was utilized to extract subtype-specific marker genes, and CellChat was employed for the analysis of cellular communication networks. In transcriptomics, the "limma" R package was used for differential expression analysis. WGCNA was applied to identify key genes. Further analysis of the signal pathway differences between the DR and control groups was performed using GSEA. The CIBERSORT method was utilized to evaluate immune infiltration.

**Results:** Six key genes associated with the development of DR, namely CD44, CPLX4, MMP14, PMEPA1, PMP22, and POSTN, were screened. These key genes predominantly impact progression of DR through immune-

related pathways. The immune profiling revealed significant heterogeneity in immune response between the control group and the DR group.

**Conclusions:** These 6 key genes have the potential to become biomarkers for the diagnosis of DR and provide new targets and research directions for the treatment of DR.

### The Doppelganger of the Optic Nerve Head: A Unique Case of Tubercular Choroiditis

*First Author:* Syifa **RAHMANI**  
*Co-Author(s):* Grimaldi **IHSAN**, Arief **KARTASASMITA**, Rova **VIRGANA**, Made Indra **WIDYANATHA**, Erwin **ISKANDAR**

**Purpose:** Tuberculosis (TB) is an airborne infection caused by Mycobacterium tuberculosis. The incidence of TB in Indonesia in 2017 was 319/100.000 people; however, the incidence of ocular TB has been reported to range from 1.4% to 1.8%. Though rare, the diagnosis of intraocular TB remains a challenge because its presentation mimics other diseases. This study aimed to report a case of presumptive tubercular choroiditis.

**Methods:** A 58-year-old woman had gradually blurred vision in her right eye for 1 month. An ophthalmology examination showed a visual acuity of 1/300 in the right eye. Ultrasonography (USG) B-scan of the right eye showed a mass-like lesion with high reflectivity and vitreous opacity that suggested vitreous hemorrhage. After vitrectomy surgery, funduscopic examination of the right eye showed a yellowish subretinal lesion below the arcade that resembled the optic nerve head. We suspected tuberculoma. An optical coherence tomography of the macula revealed macular edema. A chest X-ray revealed active chronic pulmonary tuberculosis. The patient was diagnosed with tubercular choroiditis of the right eye and then referred to an internist to start anti-tuberculosis treatment.

**Results:** After 6 months of oral anti-tubercular therapy, the visual acuity was restored along with resolving tuberculoma. The patient

achieved best-corrected visual acuity of 0.08 in the right eye. Macular edema was improved.

**Conclusions:** Thorough history-taking, a highly suspicious clinical presentation, ocular imaging, laboratory findings, and radiological findings are needed to diagnose tubercular choroiditis. Accurate diagnosis leads to appropriate and specific therapy for ocular tuberculosis.

### The Microstructural Changes of Retina Between Different Types of Diabetic Macular Edema

*First Author:* Zhengwei **GE**

**Purpose:** To observe the microstructural changes of retina between different types of diabetic macular edema (DME) on OCT and OCTA.

**Methods:** Patients with DME were divided into three groups: CME (cystoid macular edema), DRT (diffuse retinal thickening), and SRD (serous retinal detachment). Observational indicators included CMT (macular fovea retinal thickness), MCT (macular choroidal thickness), the defect degree of ellipsoidal zone and external membrane, DRIL (disorganization of the retinal inner layers), FAZ (foveal avascular zone), SCP/DCP (retinal superficial/ deep capillary blood flow density), and choroidal capillary area.

**Results:** The degree of defect of the ellipsoidal zone and external membrane in the three groups was SRD > CME > DRT. The CMT size, the DRIL length, and the FAZ area in the DRT group was smaller than that in the other two groups, while there was no significant difference between the CME group and SRD group. Correlation analysis showed that the degree of ellipsoid band and external membrane defect, the DRIL length, and the FAZ area were strongly correlated with BCVA (logMAR). At the same time, FAZ area was weakly positively correlated with the degree of ellipsoidal zone defect.

**Conclusions:** Compared with the other two groups, the shape of the ellipsoidal zone and outer membrane in the DRT group was more complete, the disorder of inner structure of the retina and the damage of FAZ was slighter,



while the pathological changes in SRD group were the most serious. The size of CMT, the integrity of the ellipsoid zone and outer membrane, the length of DRIL, and the area of FAZ in patients with DME were all related to visual acuity.

### Transient Acute Exacerbation of Subretinal Exudation Following Half-fluence Photodynamic Therapy for Bilateral Chronic Central Serous Chorioretinopathy: A Case Report

First Author: Debbie **GOH**

Co-Author(s): Thet **NAING**, George Naveen **THOMAS**

**Purpose:** To report a case of transient increased subretinal exudation after half-fluence verteporfin photodynamic therapy (PDT) in central serous chorioretinopathy (CSCR), and discuss its mechanism and progression.

**Methods:** History, physical examination, and imaging data were retrospectively reviewed and obtained from the electronic medical records of the patient.

**Results:** A 38-year-old Indian man with bilateral recurrent CSCR was treated with half-fluence verteporfin PDT. This treatment resulted in a drastic acute exacerbation of macular subretinal fluid (SRF) in both eyes within 1 day associated with significant drop in vision from 6/6 to 6/120 in the right eye and 6/6 to 6/60 in the left eye. This resolved spontaneously over the next month with a corresponding improvement in visual acuity of 6/6 in each eye without the need for any adjunctive treatment.

**Conclusions:** Acute subretinal exudation is a rare occurrence after half-fluence verteporfin PDT in CSCR. This is the first case report describing this phenomenon after bilateral half-fluence PDT in a patient with recurrent CSCR. It is important to be aware that observation may be appropriate for this transient phenomenon, without compromising functional or anatomical outcomes.

### Treatment-naive and Refractory Diabetic Macular Edema Treated Using Intravitreal Brolucizumab: Short-term Outcomes

First Author: Jia-kang **WANG**

**Purpose:** To investigate the short-term efficacy and adverse events of brolucizumab treatment for center-involved diabetic macular edema (DME).

**Methods:** We included patients with center-involved DME as treatment-naive cases or eyes with poor response to prior treatment of at least 3 continuous monthly injections of other anti-vascular endothelial growth factor (VEGF) agents from April 2022 to July 2023. All the patients underwent 1 to 3 monthly intravitreal injections of brolucizumab. The cases received a single intravitreal brolucizumab injection. Primary outcome measures included change in best-corrected visual acuity (BCVA), central foveal thickness (CFT) in 1 mm on optical coherence tomography (OCT), dry macula rate, and response rate (CFT reduction more than 10%). Complications after injections were recorded. The intra-group changes in CFT and BCVA were compared with Wilcoxon signed rank test.

**Results:** A total of 20 eyes in 16 patients were included, composed of 12 refractory and 8 treatment-naive eyes. The BCVA significantly increased by +7.5 letters and CFT reduced significantly one month after a single brolucizumab injection in recalcitrant cases with prior anti-VEGF treatment ( $p < 0.05$ ). 66.6% of the resistant eyes responded well anatomically. 44.4% of the naive patients had dry macula without submacular fluid and/or intraretinal cysts. Intraocular inflammation (IOI) was found in 2 refractory eyes and in 1 naive eye. There were no systemic thromboembolic events or other serious ocular complications observed including retinal vascular occlusion/vasculitis, retinal detachment, or infectious endophthalmitis.

**Conclusions:** Intravitreal injection of brolucizumab may be effective for treatment-naive or refractory center-involved DME

following short-term observation. Self-limited and mild IOI can occur after brolucizumab treatment for DME.

### Treatment-naive and Refractory Myopic Choroidal Neovascularization Treated Using Intravitreal Brolucizumab: Short-term Outcomes

First Author: Jia-kang **WANG**

**Purpose:** To investigate the short-term efficacy and adverse events of brolucizumab treatment for myopic choroidal neovascularization (mCNV).

**Methods:** We included patients with active mCNV as treatment-naive cases or eyes with a poor response to at least 3 continuous monthly injections of other anti-vascular endothelial growth factor (VEGF) agents from April 2022 to July 2023. All the patients underwent 1 to 3 monthly intravitreal injections of brolucizumab. The cases received single intravitreal brolucizumab. Primary outcome measures included change in best-corrected visual acuity (BCVA), central foveal thickness (CFT) in 1 mm on optical coherence tomography (OCT), dry macula rate, and response rate (CFT reduction more than 10%). Complications after injections were recorded. The intra-group changes in CFT and BCVA were compared with Wilcoxon signed rank test.

**Results:** A total of 18 eyes in 18 patients were included, composed of 5 refractory and 13 treatment-naive eyes. The BCVA significantly increased by +18.5 letters and CFT reduced significantly one month after a single brolucizumab injection in the treatment-naive cases ( $p < 0.001$ ). All the naive eyes responded well anatomically. 81.8% of the naive patients had dry macula. Severe intraocular inflammation (IOI) was found in one treatment-naive and one refractory female. A small full-thickness macular hole (150  $\mu$ m in diameter) was found after the first brolucizumab injection in one naive case, causing BCVA deterioration.

**Conclusions:** Intravitreal injection of brolucizumab may be effective for treatment-naive or refractory mCNV following short-

term observation. Close follow-up is essential while ocular complications can occur in some patients with mCNV undergoing brolucizumab treatment.

### Vitreous FABP-5 is Involved in the Pathogenesis of Retinal Vascular Diseases

First Author: Megumi **SUZUKI**  
Co-Author(s): Fumihito **HIKAGE**, Hiroshi **OHGURO**, Araya **UMETSU**, Megumi **WATANABE**, Masato **FURUHASHI**

**Purpose:** The aim of this study was to report significant contributions of the vitreous levels of FABP5 (Vt-FABP5) in the pathogenesis of retinal vascular diseases including proliferative diabetic retinopathy (PDR) or retinal vein occlusion (RVO).

**Methods:** A total of 48 patients (mean age 66 years  $\pm$  10 years, 19 males and 29 females) with PDR ( $n = 20$ ), RVO ( $n = 10$ ), or controls (epiretinal membrane,  $n = 18$ ) who underwent vitrectomies were enrolled in this study. The concentrations of Vt-FABP4, Vt-FABP5, and vascular endothelial growth factor A (Vt-VEGFA) were determined by enzyme-linked immunosorbent assays (ELISA). To assess the correlation analyses of Vt-FABP4, FABP5, and VEGFA with several systemic and ocular indices, the ocular blood flow by laser speckle flowgraphy (LSFG) and blood biochemistry were analyzed.

**Results:** The levels of Vt-FABP5 were significantly ( $P < 0.05$ ) elevated in PDR or RVO as compared to controls. Such elevation was more evident in RVO than with PDR. Vt-FABP5 was significantly correlated negatively or positively with all the LSFG indices or triglycerides ( $r = 0.31$ ,  $p = 0.031$ ), respectively. In contrast, the Vt-FABP4 and Vt-VEGFA levels were elevated more evidently in PDR ( $p < 0.05$ ) and those were correlated positively with Log fasting glucose and negatively with some of the LSFG indices. Multivariable regression analyses indicated that the optic disc of LSFG was an independent factor with Vt-FABP5 other than Vt-FABP4 and Vt-VEGFA.

**Conclusions:** Vt-FABP5 is involved in the pathogenesis of PDR or RVO in a manner that is different from that for Vt-FABP4 and Vt-VEGFA, presumably by regulating retinal circulation.

### Retina (Surgical)

#### A Case of Refractory Optic Disc Pit Macular Detachment Treated with a Novel Scleral Autograft Plug Technique

*First Author: Elaine Marie TAN*  
*Co-Author(s): Paolo Vicente PALADIO, Jocelyn SY*

**Purpose:** This study aims to present a rare case of optic disc pit maculopathy (ODP-M) in a young female patient, to report imaging findings, and to describe the surgical technique and its outcome. Because ODP-M is rare, there are currently no clear management guidelines, though various techniques have been reported. This paper describes a technique where a scleral autograft was used to cover the defect of the optic nerve head pit.

**Methods:** Case report.

**Results:** A 22-year-old female, who previously underwent pneumatic retinopexy with C3F8 gas and subthreshold laser therapy for ODP-M, presented with a recurrence of blurring of vision in her left eye 4 months after initial treatment. The best-corrected visual acuity (BCVA) of the left eye was 20/200. Optical coherence tomography of the macula and optic nerve head revealed a left optic disc pit with neurosensory detachment and foveoschisis. The patient underwent pars plana vitrectomy, internal limiting membrane peeling, plugging of optic disc pit with scleral autograft, and C3F8 gas tamponade. Three months postoperatively, BCVA of the left eye improved to 20/60 with significant improvement in retinal anatomy.

**Conclusions:** Optic disc pit is a rare congenital anomaly presenting with visual abnormalities when associated with maculopathy. Multiple surgical treatments have been reported but there is no established standard of treatment. The technique using scleral autograft has been shown to be effective, relatively easy to

perform, and readily available, which makes it an ideal treatment option even in previously treated and refractory maculopathies.

#### A Retrospective Study to Assess the Outcomes of Sequential Bilateral Rhegmatogenous Retinal Detachment

*First Author: Harshal SAHARE*

**Purpose:** To study the clinical outcomes in patients with sequential bilateral RRD in a tertiary care center.

**Methods:** Retrospective review of records of patients with sequential bilateral RRD between January 2011 and December 2019.

**Results:** A total of 79 cases were recruited for the study. The mean age at presentation was 44.82 years. PVR greater than grade B was seen in 22.78% of initial eyes and 15.18% of subsequent eyes at presentation. PPV was done in 22.78%, SB was done in 40.50%, and BB+PPV was done in 20.25% in the initial eye, while PPV was done in 17.72%, SB in 44.30%, and BB+PPV was done in 22.78% in the subsequent eye. In the initial eye, silicone oil was used in 31.64% and gas was used in 27.84%, while in the subsequent eye, silicone oil was used in 30.37% and gas was used in 25.31%. The single-operation success rate in the initial eye was 48.43%, while it was 60.86% in the subsequent eye. The mean number of surgeries performed was 1.58.

**Conclusions:** Band buckle + pars plana vitrectomy yielded a higher success rate of 77.77% compared with 57.14% for pars plana vitrectomy or scleral buckle alone.

#### Advanced Coats Disease in an Adult Filipino Male: A Case Report

*First Author: Maria Giselle DY*  
*Co-Author(s): Jazel VERDE*

**Purpose:** We aim to present a case of an adult Filipino male with advanced Coats disease.

**Methods:** This is a case report.

**Results:** This is the case of a 25-year-old Filipino male who presented due to progressive blurring

of vision accompanied by floaters in the right eye for one year. Visual acuity was 5/200 with a relative afferent pupillary defect, normal gross and anterior segment examination, gonioscopy, and intraocular pressure in the affected eye. Dilated fundus examination showed multiple telangiectatic vessels with areas of subretinal hemorrhage and exudation at the mid to far retinal periphery. There was focal tractional retinal detachment with subretinal fibrosis at the inferior retina. The macula was obscured by multiple yellowish crystalline-like lesions that appeared hyperreflective at the outer retinal layers on macular optical coherence tomography and exhibited blocked fluorescence on fluorescein angiography (FA). Multiple areas of capillary non-perfusion along the temporal periphery associated with retinal telangiectasia and microaneurysms were also noted on FA. Based on Shield's classification, the patient was assessed to have stage 3A1 disease with exudative and tractional retinal detachment and subretinal fibrosis in the right eye. Surgical management was contemplated, specifically placement of an encircling band with scleral buckle followed by pars plana vitrectomy, membrane peeling, air-fluid exchange, endolaser, and silicone oil tamponade.

**Conclusions:** In conclusion, this is an atypical case of Coats disease due to age of onset and insidious course that led to advanced presentation at the time of consultation. Surgery was a viable option to address the retinal detachment found in this case.

#### Analysis of Choroidal Thickness Changes in Recurrent Rhegmatogenous Retinal Detachment

First Author: Gyu Chul **CHUNG**  
Co-Author(s): Kang Yeun **PAK**

**Purpose:** This study aims to examine the central foveal choroidal thickness in patients with recurrent retinal detachment.

**Methods:** This retrospective study examined recurrent retinal detachment cases from November 2019 to March 2023. Thirty-three

patients (33eyes) were enrolled. All subjects underwent ophthalmologic examinations before treatment and 3 and 6 months after. Choroidal thickness was measured using swept-source optical coherence tomography (SS-OCT, ZEISS PLEX Elite 9000) in a horizontal section beneath the fovea.

**Results:** Choroidal thickness statistically significantly decreased till 6 months after surgery for recurrent rhegmatogenous retinal detachment under the center of the fovea ( $P = 0.021$ ). Subjects with proliferative vitreoretinopathy also showed statistically significantly decreased choroidal thickness till 6 months ( $P = 0.028$ ). Subjects who underwent plana vitrectomy with silicone oil tamponade showed statistically significantly decreased choroidal thickness till 6 months ( $P = 0.013$ ).

**Conclusions:** Choroidal thickness is decreased in eyes with recurrent rhegmatogenous retinal detachment. Complicated conditions such as proliferative vitreoretinopathy or surgical procedure with silicone oil tamponade may have an impact on the structure and proper functioning of the choroid. Further and larger study is needed to determine the pathophysiology of the decreased choroidal thickness in recurrent retinal detachment cases.

#### Anatomical and Functional Outcomes After Vitrectomy for Macular Holes in Highly Myopic Eyes: Internal Limiting Peel Versus Flap

First Author: Andrew **TSAI**  
Co-Author(s): Shu Yen **LEE**, Stanley **POH**

**Purpose:** To compare anatomical and functional outcomes of vitrectomy and internal limiting membrane (ILM) peeling versus flap in the treatment of high myopia macular holes (HMMH).

**Methods:** Retrospective series of patients who underwent vitrectomy for HMMH between 2018-2022. High myopia was defined by axial length (AL) of  $>26$ mm. Pre- and postoperative best corrected visual acuity (BCVA) and optical coherence tomography characteristics of HMMH up to 1 year were recorded. Macular



hole size was defined as minimum linear distance between hole edge. Intraoperative surgical technique of either ILM peel or flap were recorded. Restoration of external limiting membrane, ellipsoid zone, and interdigitation zone (IZ) were assessed up to one year post-operatively.

**Results:** 46 eyes were included (30 ILM peel, 16 ILM flap). There was no difference in macular hole size between groups (405.8  $\mu\text{m}$  vs 394.0  $\mu\text{m}$ ,  $p = 0.791$ ), but AL was longer in the flap group (29.75 mm vs 28.27 mm,  $p < 0.05$ ). Factors associated with poorer hole closure at 1 year were longer AL (OR = 0.194, 95% CI 0.047-0.803) and larger hole size (OR = 0.989, 95% CI 0.980-0.999). There was no significant difference in hole closure rates at 1 year (73.3% vs 93.8%,  $p = 0.96$ ), postoperative mean visual acuity at all time points, and BCVA change at 1 year (-0.22 vs -0.33,  $p = 0.418$ ) between groups. Rates of postoperative IZ restoration was higher in the peel group at 1 year (76.5% vs 33.3%,  $p < 0.05$ ).

**Conclusions:** Our study found no significant difference in hole closure rate and VA improvement between groups; however ILM peel group had better IZ restoration at 1 year.

#### Assessment of Changes in Macular Microvasculature Using Optical Coherence Tomography Angiography in Idiopathic Epiretinal Membrane

First Author: Nohae **PARK**  
Co-Author(s): Iksoo **BYON**

**Purpose:** To evaluate the change in the microvascular structure of the macula and its prognostic value in idiopathic epiretinal membrane (iERM).

**Methods:** Thirty-seven eyes of iERM that had been followed up for 6 months after membrane removal were included. All eyes were imaged using a 6x6 mm volume scan in swept source optical coherence tomography angiography (OCTA) (Topcon DRI OCT-1; Topcon Inc, Japan). The best-corrected visual acuity (BCVA, logMAR), the central macular thickness, the area of foveal avascular zone (FAZ), and the

vessel density (VD) within 1 mm (central VD) and 1-3 mm from the fovea (paracentral VD) were assessed.

**Results:** The central VD significantly decreased in SCP [31.7% to 29.0% ( $P < 0.001$ )] and DCP [29.9% to 24.8% ( $P < 0.001$ )], respectively, but the paracentral VD did not. The FAZ increased in SCP (0.093  $\text{mm}^2$  to 0.157  $\text{mm}^2$ ) and in DCP (0.131  $\text{mm}^2$  to 0.185  $\text{mm}^2$ ), respectively ( $P < 0.001$  in all). The baseline BCVA was correlated with the central VD ( $r = 0.420$ ,  $P = 0.010$ ) and inversely with FAZ ( $r = -0.413$ ,  $P = 0.011$ ). The postoperative BCVA was inversely correlated with the postoperative FAZ ( $r = -0.327$ ,  $P = 0.046$ ). The change in BCVA was associated with the change in FAZ ( $r = -0.482$ ,  $P = 0.003$ ). These associations were only observed in SCP.

**Conclusions:** In eyes with iERM, the OCTA parameters of central VD and FAZ area, in particular SCP, were associated with visual acuity. The increase of FAZ area indicating reduction of macular traction presented visual improvement.

#### Burden of Gas Tamponades: A Targeted Literature Review

First Author: Elizabeth **PERSAUD**  
Co-Author(s): Sandro **DI SIMPLICIO**, Omesh **GUPTA**, Jessica (sun-ming) **PAN**, Wendy Zhi **WANG**

**Purpose:** Intraocular gas tamponade preparation using a manual gas cylinder setup requires many steps, presenting opportunities for errors in gas concentration. A targeted literature review was conducted to investigate the burden and unmet needs in gas tamponade preparation for vitreoretinal procedures.

**Methods:** MEDLINE was searched in July 2021 for English articles and no date restriction. Clinical studies and reviews were included. Search terms included variations of gas tamponade and errors. Gas related complications, costs, and resource use outcomes were extracted.

**Results:** Twenty studies were identified ( $n = 5$  prospective, 11 retrospective, 4 narrative review). Miscommunication and improper

training were associated with gas preparation errors leading to complications. Incorrect gas concentration may be associated with increased or decreased IOP. Although IOP fluctuation is transient in most cases, there is a risk of serious complications in the posterior cavity (optic nerve damage, retinal ischemia, vision loss, intracranial migration) or the anterior chamber (cataract formation, gas migration, corneal edema, bullous keratopathy). Clinical management of gas-related IOP fluctuation may be needed in 4% to 30% of patients including IOP-reducing medication, cataract surgery, or therapeutic paracentesis. Gas-related vision loss may be associated with significant insurance payments; diagnosis and treatment of IOP-related retinal vein occlusion cases may cost 4 to 19 times more than control cases. Vision loss after elevated-IOP-related ischemia can negatively impact patient QoL.

**Conclusions:** Errors in gas tamponade preparation may be associated with IOP fluctuation and serious complications that may require clinical management and incur significant healthcare and insurance costs.

### Clinical Factors and Predictors for Spontaneous Self-resolution of Idiopathic and Secondary Epiretinal Membranes

First Author: Ju Seok **LEE**

Co-Author(s): Hyun Goo **KANG**, Sung Soo **KIM**

**Purpose:** To investigate the clinical characteristics, imaging features, and predictive factors for spontaneous self-resolution in patients with idiopathic or secondary epiretinal membranes (ERM).

**Methods:** In a series of 50 consecutive eyes with self-resolution of ERM, the overall cohort was divided into 2 subgroups: idiopathic ERM (28 eyes, 56.0%) versus secondary ERM (22 eyes, 44.0%), where the latter group was defined by association with certain ocular histories. Factors predicting complete ERM resolution and vision gain after resolution were assessed.

**Results:** Among the 50 eyes, self-resolution of ERM occurred over a mean duration of

28.1 ± 25.3 months (median: 25.4 months). The idiopathic group had a shorter interval to resolution (idiopathic vs secondary, 23.4 vs 34.1 months, respectively;  $P = 0.014$ ), better vision at both diagnosis ( $P = 0.009$ ) and resolution ( $P = 0.010$ ); in terms of OCT features, only intraretinal fluid (IRF) was more frequently observed in the secondary ERM group ( $P = 0.039$ ). Overall, in both subgroups, ERM resolution appeared to have been induced by posterior vitreous detachment (PVD) ( $P < 0.001$ ). Multivariate analysis revealed that the self-resolution interval (odds ratio [OR] 0.936) and IRF (OR 0.049) were significantly associated with complete ERM resolution and secondary ERM (OR 15.224) and lower initial BCVA (OR 267.589) were significantly associated with vision gain after self-resolution (all  $P < 0.05$ ).

**Conclusions:** Self-resolution of ERM appears to have been induced by PVD development in the majority of eyes. Accordingly, due to the possibility of complete spontaneous resolution, surgical membrane peeling can be delayed by up to 28 months in eyes without PVD, regardless of whether the cause is idiopathic or secondary.

### Clinical Profile and Outcomes of Modified Internal Limiting Membrane Peeling Technique in Management of Macular Hole

First Author: Sheetal **DIVATE**

Co-Author(s): Pushpanjali **BADOLE**, Amit **NENE**, Smitesh **SHAH**, Pratik **SHENOY**

**Purpose:** Macular hole (MH) is traditionally managed by pars plana vitrectomy combined with internal limiting membrane (ILM) peeling. However, its success rate is determined by size, duration, and macular indices. Various techniques have been used to achieve better success rates. Here we demonstrate modified ILM peeling techniques in the management of macular hole and its outcome.

**Methods:** This a retrospective analysis where subjects aged from 40-80 years who had undergone macular hole surgery repair using modified ILM peeling technique between January 2023 and June 2023 were enrolled. Subjects with type 2 closure of macular hole

or missing data were excluded. Pre-surgery visual acuity (VA), IOP, and macular indices such as MH height (MHH) and MH inner opening (MHIO), base diameter (BD), macular (MHI) and tractional hole index (THI), and post-surgery VA and IOP were recorded. Changes in VA and IOP were compared using paired t test.

**Results:** Twelve eyes of 12 patients with mean  $\pm$  SD age of  $60.64 \pm 16.90$  years were included. The mean  $\pm$  SD MHH, MHIO, BD, MHI, and THI were  $422.3 \pm 66.9$ ,  $499.3 \pm 180.9$ ,  $1269 \pm 557$ ,  $0.3743 \pm 0.1311$ , and  $0.959 \pm 0.386$ , respectively. We noted clinically significant improvement in visual acuity post-surgery, however it did not reach statistical significance (paired t test:  $p = 0.14$ ). Pre- and post-surgery IOP were similar (paired t test:  $p = 0.07$ ). In all cases the macular hole was closed. Increase in THI was associated with improvement in post-surgery VA.

**Conclusions:** Modified ILM technique is a safe, easy to perform, and effective technique with excellent anatomical and functional results.

### Clinical and Economic Burden of Sequential Vitrectomy and Phacoemulsification Compared with Phacovitrectomy: A Targeted Literature Review

First Author: Sun-ming PAN  
Co-Author(s): Sandro DI SIMPLICIO, Carine C.w. HSIAO, Elizabeth PERSAUD, Wendy Zhi WANG

**Purpose:** A literature review explored the clinical and economic burden of sequential vitrectomy and phacoemulsification (SEQ) compared with phacovitrectomy (PV).

**Methods:** MEDLINE was searched in September 2021 with no date limit for English-language articles reporting efficacy, safety, and economics of PV versus SEQ for any indication. Comparative clinical studies were included, with no limit on study size or patient characteristics including cataract status at time of vitrectomy. Outcomes extracted included efficacy (best-corrected visual acuity [BCVA]), mean absolute error of refraction [MAE]), safety (intraoperative

and postoperative complications), recovery time, surgery time, costs, and follow-up visits.

**Results:** Nineteen observational studies (prospective = 2, retrospective = 17) and a randomized study compared PV and SEQ. BCVA was significantly improved at 6 months ( $n = 4$ ), but not different at 12 months for PV compared with SEQ ( $n = 4$ ). MAE was significantly higher after PV compared with SEQ ( $n = 3$ ). PV had a significantly lower rate of posterior capsule rupture [PCR] ( $n = 2$ ) and macular hole opening ( $n = 1$ ) and similar rates of cystoid macular edema ( $n = 3$ ), iris trauma ( $n = 2$ ), and endophthalmitis ( $n = 1$ ) compared with SEQ. A significantly higher rate of fibrin formation occurred in PV compared with SEQ ( $n = 3$ ). PV had reduced recovery time ( $n = 1$ ), traveling expenses ( $n = 1$ ), surgical time ( $n = 1$ ), and costs ( $n = 3$ ) compared with SEQ.

**Conclusions:** A significant early benefit for BCVA and potentially lower rates of PCR and macular hole opening were observed for PV versus SEQ. SEQ may allow lower MAE and lower fibrin formation. Although case dependent, patients and providers may benefit from the efficiencies of PV compared with SEQ.

### Comparative Evaluation of 10k/25G Beveled-tip Probe and 5k/23G Flat-tip Probe in MIVS in Day Surgery for the Treatment of PDR Patients with Fibrovascular Proliferation

First Author: Yan Chun ZHANG

**Purpose:** To evaluate and compare the intraoperative precision of Advanced UltraVit 10k/25G beveled-tip probe (BTP) versus 5k/23G flat-tip probe (FTP) in MIVS in day surgery for the treatment of patients who have PDR with fibrovascular proliferation (FVP).

**Methods:** Ninety-nine eyes undergoing vitrectomy between April 2022 and March 2023 with type II diabetes mellitus and progressive FVP were included in the study. All subjects received MIVS in day surgery by the same surgeon randomly using a 10k/25G beveled-tip probe or a 5k/23G flat-tip probe with the Alcon CONSTELLATION Vision System and were followed up. The intraoperative data were

recorded by operation videos. The primary endpoint was the rate of electrocoagulation. Other data were analyzed, such as demographics, number of instrument changes, actual vitrectomy time, and postoperative complications. Statistical analysis was conducted with SPSS.

**Results:** There was no statistical difference between the 2 groups in terms of age, gender, preoperative visual acuity, and IOP. The total number of intraoperative electrocoagulation points, the utilization of membrane forceps, and the number of intraoperative iatrogenic tears showed significant statistical differences between the groups ( $p < 0.05$ ).

**Conclusions:** The high cut rates with low aspiration and beveled tip with more proximate opening allows it to operate closer to the retina and perform more precise cutting and dissection of the vascular fiber membrane adhered to the surface of the retina. Compared to the 23G/5k with suction to lift and remove the proliferative membranes, 10K/25G probes are safer to lower the risk of iatrogenic vascular and retinal rupture, reducing intraoperative bleeding and the use of intraocular electrocoagulation.

### Comparison of Safety and Efficiency Between Different Forceps for Peeling Internal Limiting Membrane

First Author: Yu-bai **CHOU**

**Purpose:** To compare the efficiency and safety of internal limiting membrane (ILM) peeling between the Sharkskin forceps and end-grasping forceps in various macular diseases.

**Methods:** This was a prospective cohort block-randomized study conducted in a tertiary medical center. Seventy subjects were equally divided into the Sharkskin forceps group and end-grasping forceps group. All patients diagnosed with vitreomacular interface disorders, including macular hole, epiretinal membrane, vitreomacular traction syndrome, and myopic tractional maculopathy underwent pars plana vitrectomy and ILM peeling surgery. Visual acuity and optical coherence

tomography were performed preoperatively and postoperatively at 2, 4-6 weeks, and 3 months. The duration of ILM peeling, the number of attempts to initiate peeling, and peeling-related retinal damage were evaluated by recorded video.

**Results:** We demonstrated significantly fewer attempts to initiate ILM peeling in the Sharkskin group compared to the end-grasping group ( $p = 0.0001$ ) and a lower incidence of retinal microstructural damage in the Sharkskin group ( $p < 0.0001$ ). The mean depth of retinal injury at the initiating site was shallower in the Sharkskin group at postoperative 2 weeks, 4-6 weeks, and 3 months compared to the end-grasping group ( $p = 0.009, 0.002, 0.001$ ). The findings consistently demonstrated that Sharkskin forceps resulted in less damage to the retina, even in high-myopic eyes. High-myopic eyes also showed visual improvement in the Sharkskin group ( $p = 0.049$ ).

**Conclusions:** Sharkskin forceps provide impressive advantages in ILM peeling surgery in patients with various vitreomacular interface diseases, including reduced risk of retinal injury and fewer attempts to initiate ILM flap especially in patient with high myopia.

### Conventional and Modified Pneumatic Displacement with Anti-VEGF Injections in Management of Submacular Hemorrhage due to PCV

First Author: Nishant **RADKE**

Co-Author(s): Zhizhao **PENG**, Snehal **RADKE**, Kuang **ZHAOXIA**

**Purpose:** To study the structural and functional outcomes of pneumatic displacement and a modified method for submacular hemorrhage management due to polypoidal choroidal vasculopathy (PCV).

**Methods:** Group 1 included 14 patients undergoing conventional pneumatic displacement (PD) using 0.3 cc of perfluoropropane (C3F8) with intravitreal anti-VEGF agent. Group 2 included 7 patients who underwent a single-port limited PPV to aspirate about 0.7 to 0.8 cc of vitreous followed by



injection of 0.6 cc C3F8 and anti-VEGF agent (modified PD). Retrospective interventional case series involving 14 eyes with SMH due to PCV. Other causes of SMH were excluded. Tests for normality, F test, t tests for paired and 2 sample unequal variance, and Pearson's correlation coefficients were calculated.

**Results:** Except for pre- and postoperative best-corrected visual acuities where the p value was statistically significant between the 2 groups, all other baseline parameters revealed no statistically significant difference between the 2 groups (preop BCVA groups 1-2:  $p = 0.04245$ ; postop BCVA groups 1-2:  $p = 0.04980191$ ). Weak positive correlations were noted between central-field subfoveal thickness (CST) with pre- and postop BCVAs as well as postop CST and final BCVA. Height of SMH had almost no correlation with final BCVA in either group. There was a weak positive correlation between duration of symptoms and final BCVA in group 1 and moderate positive correlation in group 2.

**Conclusions:** Modified method resulted in statistically significant structural outcomes but visual outcomes, although better, were not statistically significant.

### Development of Severe Ocular Disorders Following Vaccination Against COVID-19: A Case Series

First Author: Sanghamitra **KANUNGO**

**Purpose:** To report the occurrence of severe ocular illnesses in patients after receiving the adenoviral vector-based Covishield vaccine against COVID-19.

**Methods:** Best-corrected visual acuity (BCVA) measurement and dilated fundus examination were done during presentation and after treatment in all cases.

**Results:** In the first case, gross disc edema along with dilated vessels and retinal hemorrhages were observed by dilated fundus examination. Within a few days, the patient developed complete ophthalmoplegia. In the second case, dilated fundus examination

revealed dot blot hemorrhages with cotton wool spots, macular edema, and mild disc edema indicating microangiopathy. In the third case, dilated fundus examination showed cotton wool spots with microaneurysms and infiltration of anterior vitreous face (AVF) cells which indicated vitritis. The presence of AVF cells was further confirmed by optical coherence tomography (OCT). In all the cases, no other underlying causes of these disorders were found. Moreover, in all the cases, steroid treatment in tapering doses resulted in complete recovery.

**Conclusions:** Severe ocular disorders may develop after taking the adenoviral vector-based vaccine against COVID-19. Hence, people who develop ocular disturbances after vaccination should seek immediate medical treatment.

### Effect of Vitrectomy with or without Encircling Band on Choroidal Thickness and Mean Ocular Perfusion Pressure in Retinal Detachment: A Comparative Study

First Author: Gaganjeet **GUJRAL**

**Purpose:** To evaluate the effect of primary vitrectomy vs vitrectomy with encircling band on subfoveal choroidal thickness (SCT) and mean ocular perfusion pressure (MOPP) in macula off rhegmatogenous retinal detachment.

**Methods:** Prospective interventional single center study conducted at a tertiary eye hospital. Twenty-one patients who underwent vitrectomy with encircling band (group 1) and 19 patients who had primary pars plana vitrectomy (group 2) were studied for changes in SCT and MOPP over a period of 2 years. All the patients underwent surgery with silicone oil tamponade. Enhanced depth spectral domain optical coherence tomography was done to image the choroid and Goldmann applanation tonometer was used to measure the intraocular pressure (IOP). Blood pressure was monitored on all visits. SCT and MOPP were measured at 1 week (T1), 1 month (T2) after vitrectomy with or without encircling band, and 1 day (T3) and 3 months (T4) after silicone oil removal, and

the non-operative eye was used as an internal control.

**Results:** The SCT increased temporarily at T1 in the operated eye in group 1 compared to group 2 ( $P < 0.001$ ). Subsequently, no statistically significant difference in SCT was noted. MOPP was greater in group 2 than group 1 ( $P < 0.001$ ) at all visits.

**Conclusions:** Obstruction of venous drainage induced by compression force of encircling band leads to increased SCT in the acute postoperative phase and decrease in MOPP in the long run. With the development of advanced vitreous surgery techniques, the possible deleterious effect of an encircling band on visual function might be alleviated.

### Factors Predicting Late Redislocation or Suture Break in Eyes After Suture-fixed Intraocular Lens

*First Author:* Ju Seok **LEE**

*Co-Author(s):* Hyun Goo **KANG**, Sung Soo **KIM**

**Purpose:** To investigate predictive factors for late redislocation in patients with recurrent intraocular lens (IOL) dislocation following secondary suture-fixed IOL (SFIOL) surgery.

**Methods:** Patients undergoing SFIOL surgery were grouped into redislocation and no-redislocation groups. Medical records of consecutive patients who underwent SFIOL surgery between June 2014 and December 2019 at 2 tertiary high-volume referral centers were reviewed. Data regarding patient demographics, treatment factors, anatomical and functional outcomes, and postoperative complications were recorded.

**Results:** We included 237 eyes of 225 patients (169 [75.1%] men). The redislocation group was more likely to have a younger mean age at the initial SFIOL surgery (redislocation vs no-redislocation, 55.4 vs 62.0 years, respectively;  $P = 0.008$ ), have a prior history of a previous suture break (52.3% vs 0.5%;  $P < 0.001$ ), and have undergone the initial SFIOL surgery using only  $<2$  mm-sized side-port incisions (16.5% vs 38.6%;  $P = 0.002$ ) than the no-redislocation group. Additionally, the redislocation group

had a higher occurrence of complications ( $P < 0.001$ ). Multivariable regression revealed that age (odds ratio [OR] 0.972), left eye involvement (OR 2.321), aphakic status prior to the initial SFIOL surgery (OR 0.177), unremarkable primary IOL dislocation cause (OR 0.173), need for ocular hypertension treatment and glaucoma surgery (OR 3.403), and no large incision during the initial SFIOL surgery (OR 3.653) were significantly (all  $P < 0.05$ ) associated with late redislocation.

**Conclusions:** We have identified patient-specific and surgical factors associated with higher late redislocation rates. Primary IOL dislocation may require aggressive management using larger incisions to ensure improved long-term durability of the suture fixation.

### Focal Laser Photocoagulation for Central Serous Chorioretinopathy Impact on Subfoveal Choroidal Thickness and Choroidal Vascular Index

*First Author:* Md. **RAHMAN**

*Co-Author(s):* Abrar **AHMED**, Abu Faisal Md Jahangir **ALAM**, Mohamed **AZZAM**, Muhammad **MONIRUZZAMAN**, Mst **SAYEDATUNNESSA**

**Purpose:** To assess the visual and anatomical outcomes of focal laser photocoagulation for central serous chorioretinopathy (CSCR) and subsequent changes to subfoveal choroidal thickness (SFCT) and choroidal vascular index (CVI).

**Methods:** This case series was carried out in a tertiary level referral center in Bangladesh, retrospectively evaluating patients who underwent focal laser for CSCR. Baseline visual acuity (VA), central macular thickness (CMT), SFCT, and CVI were recorded and calculated and compared with baseline and 4 weeks post focal laser. Data was compared using Wilcoxon signed-rank tests after using Shapiro-Wilk tests to determine normality.

**Results:** Twenty-five eyes of 24 patients with CSCR that underwent focal laser photocoagulation were included in this study. Patients were followed for a median of 1.5

months (range, 1.0–2.0 months) after treatment. Male and female ratio was 7:1. The visual acuity was significantly improved ( $0.55 \pm 0.24$  to  $0.87 \pm 0.21$ ,  $p < 0.001$ ). The mean pre-laser CMT was  $475.24 \mu\text{m}$  and the mean post-laser  $177.08 \mu\text{m}$ . While there was significant change in SFCT ( $4141.40 \pm 58.72$  to  $356.12 \pm 53.94$ ,  $p < 0.001$ ), the change in CVI was not significant statistically ( $65.31 \pm 2.11$  to  $66.21 \pm 2.37$ ,  $p > 0.05$ ). Of the 25 eyes, 4 had persistent SRF following laser, and of the 21 eyes with complete resolution of SRF, 2 developed recurrent SRF.

**Conclusions:** Focal laser photocoagulation is an effective treatment for CSCR. The choroid plays a large role in the pathogenesis and disease process of CSCR, which shows significant changes associated with resolution of the fluid and changes to the visual acuity. To study changes in choroidal vascular index, larger study numbers are required and more standardized methods of CVI calculation must be adopted.

#### From Perforation to Clarity: Navigating Visual Recovery Post Globe Perforation in Cataract Surgery

First Author: Neha **BIJLANI**

Co-Author(s): Gajendra **CHAWLA**

**Purpose:** To report the management of inadvertent globe perforation during peribulbar anesthesia for cataract surgery.

**Methods:** A 56-year-old, non-diabetic, healthy female presented with decreased vision in her right eye post cataract surgery 1 month prior elsewhere. Ocular evaluation of the right eye revealed well centered intraocular lens (IOL) with vitreous hemorrhage obscuring retinal details. B-scan of the right eye suggested attached retina beneath vitreous hemorrhage. Pars plana vitrectomy was undertaken during which, after clearing vitreous hemorrhage, a large area of subretinal hemorrhage plugged with vitreous was noticed in the inferonasal quadrant which was the possible globe perforation site. Laser barrage was done around perforation site and fluid-air exchange performed to conclude the surgery.

**Results:** At 2 months post-vitrectomy, right eye best-corrected visual acuity (BCVA) improved to 20/20P with a quiet eye and stable retina.

**Conclusions:** Inadvertent globe perforation is a rare but serious complication that can occur during peribulbar anesthesia for cataract surgery. Presence of unexplained vitreous hemorrhage in the early postoperative period following uneventful cataract surgery should arouse suspicion of globe perforation. Prompt recognition and immediate referral to a vitreo-retinal specialist is crucial for appropriate management and optimal visual outcomes.

#### From Retrobulbar to Intraocular: Using a Retrofitted 25G Needle in the Surgical Management of Retained Subretinal Perfluorocarbon Liquid

First Author: Ruth Camille **ANTOLIN**

Co-Author(s): Amadeo Jr **VELOSO**

**Purpose:** To present an innovative approach for removing subretinal perfluorocarbon liquid (PFCL) using a 25G needle.

**Methods:** This is a case report.

**Results:** A 25-year-old female presented with bilateral giant retinal tear (GRT) following a mauling incident. Initial examination revealed cataract in both eyes with GRT at 3 to 9 o'clock in the right eye and 10 to 2 o'clock in the left eye. The visual acuity on initial examination was counting fingers at 1 foot in the right eye and 20/40 in the left eye. Both eyes underwent phacovitrectomy with silicone oil with an encircling band placed on the left eye. Postoperatively, retained subretinal PFCL was observed gravitating towards the macula in the right eye which prompted removal. A retrofitted needle consisting of 25G as a base and a 30G needle on its tip was used to create an atraumatic retinotomy at the anterior edge of the site. PFCL was then removed under oil via active aspiration. In other areas of the retina, retained PFCL was removed using the same procedure. After surgery, restoration of macular contour was appreciated until development of epiretinal membranes was observed in the third month post surgery.

**Conclusions:** A 25G retrobulbar needle can be a convenient tool in removing retained subretinal PFCL. Additional tools may be added to retrofit the needle and be safely used intraocularly.

## Hemorrhagic Retinal or Macular Detachment Outcomes in PCV

*First Author:* Nishant **RADKE**  
*Co-Author(s):* Lizhen **CHEN**, Snehal **RADKE**, Peng Zhi **ZHAO**

**Purpose:** To study the structural and functional outcomes of the management of submacular hemorrhage (SMH) and massive hemorrhagic retinal detachments (HRD) due to polypoidal choroidal vasculopathy (PCV).

**Methods:** Retrospective interventional case series of patients with confirmed diagnosis of PCV-related SMH and massive HRDs. At least 3 months follow-up needed. Exclusion criteria: SMH less than 2 disc diameters, retinal arteriolar macroaneurysm (RAM), non-PCV wet age-related macular degeneration (AMD), trauma, and high myopia. Eleven cases underwent conservative management with intravitreal anti-VEGF and expansile gas +/- PDT (group 1). Seven cases underwent pars plana vitrectomy (PPV) with SMH evacuation, endotamponade, and anti-VEGF agents (group 2). Student t-test was used for test of significance and p value of <0.05 was considered statistically significant. Pearson's correlation coefficient was calculated for duration of symptoms from onset and final visual outcomes.

**Results:** Ten patients were males out of a total 18 patients in both groups. Average age in group 1 was 69.45 years and that in group 2 was 66.14 years. Cumulative vision outcomes of groups 1-2 assessed pre- and post-treatment were statistically significant ( $p = 0.0001$ ). Pearson's correlation coefficient was calculated between duration of onset of symptoms and final visual outcome. Group 1:  $r = 0.71741512$  suggested a linear correlation: If duration of symptoms was longer, the final visual outcome was less. Group 2:  $r = 0.30981172$  which revealed weaker correlation compared to group 1.

**Conclusions:** Both groups 1 and 2 had satisfactory anatomical and functional outcomes. Extensive HRDs improved despite a mean duration of onset of about 3 weeks.

## Lens Capsular Flap Transplantation in the Management of Macular Hole

*First Author:* Liu **GUANGFENG**

**Purpose:** To report the clinical results of lens capsular flap transplantation in macular hole (MH).

**Methods:** This retrospective, interventional, consecutive case series included 3 eyes with persistent MH after previous standard MH surgery. All eyes underwent vitrectomy, lens anterior or posterior capsule transplantation into the MH, air tamponade, and a 3-day postoperative head down positioning. Structural and functional changes were evaluated.

**Results:** Macular hole was closed in all 3 eyes receiving anterior capsular flap transplantation. One eye had posterior capsular flap transplantation, 2 eyes had anterior capsular flap transplantation. Visual acuity in logarithm of the minimal angle of resolution improved from  $1.57 \pm 0.39$  preoperatively to  $1.06 \pm 0.43$  postoperatively.

**Conclusions:** Lens capsular flap transplantation may close the MH and improve visual outcome in cases of refractory MH.

## Macular Hole Development After Vitrectomy for Rhegmatogenous Retinal Detachment

*First Author:* Jong-uk **LEE**  
*Co-Author(s):* Young Joon **JO**

**Purpose:** To report the occurrence of macular hole after vitrectomy for rhegmatogenous retinal detachment and to hypothesize the mechanism of MH development with ERM.

**Methods:** A retrospective analysis was conducted on a cohort of patients who underwent vitrectomy for RRD and subsequently developed ERM. The patients were categorized into 2 groups: ERM with MH progression group (MH group) and the age matched ERM-only group (ERM group) after VT



for RRD. To compare between the 2 groups, medical records were reviewed including patient demographics, preoperative clinical findings, central macular thickness (CMT), characteristics and changes of ERM with optical coherence tomography (OCT).

**Results:** Fifteen eyes were in the MH group, and 24 eyes were in ERM group. There were no statistically significant differences in the duration of ERM occurrence, preoperative axial length, macular involving RRD, and recurrent RRD between the 2 groups. CMT measured after the ERM development was significantly lower in the MH group ( $299.23 \pm 69.56 \mu\text{m}$ ) compared to the ERM group ( $445.8 \pm 118.34 \mu\text{m}$ ,  $p < 0.01$ ). The foveal contour in the MH group was mainly flat, whereas in the ERM group, cystoid macular edema was predominantly observed ( $p = 0.01$ ). Epiretinal proliferation and foveal crack sign were mostly observed in the MH group, with statistically significant differences between the 2 groups ( $p < 0.01$ ).

**Conclusions:** After retinal detachment surgery, epiretinal membrane may precede macular hole development. Timely follow-up and treatment are crucial to manage this distinct progression effectively.

#### **Nd:YAG Laser Membranotomy for Valsava Retinopathy Treatment in Pregnant Women**

*First Author: Diandra **ASTARIDEWI**  
Co-Author(s): Sauli **ARI WIDJAJA**, Muhammad **FIRMANSJAH**, Ady **PRAKOSA**, Wimbo **SASONO**, Ima **YUSTIARINI***

**Purpose:** This study aims to provide a case of Valsalva retinopathy during pregnancy that was managed with Nd:YAG laser membranotomy.

**Methods:** A 27-year-old woman in her sixth month of pregnancy presented with a week's history of sudden, painless vision loss in her left eye. Patient had no history of trauma, anticoagulant medication, abnormal bleeding, or hypertension. Examination of the affected eye showed visual acuity (VA) was 1/60. Fundoscopy showed pre-macular hemorrhage with "double ring" sign, consisting of outer ring caused by subhyaloid bleed and inner ring

caused by the sub-internal limiting membrane (ILM) bleed. Those findings were confirmed by optical coherence tomography examination. Therefore, the patient was diagnosed with Valsava retinopathy. Blood test resulted in normal coagulation function. Following a period of 6 days of monitoring, the patient's VA demonstrated improvement to 4/60. Subsequently, the patient underwent Nd:YAG laser membranotomy with power 3.3 mJ.

**Results:** Following the Nd:YAG laser procedure, the sub-hyaloid bleed was observed to have exited into the vitreous cavity. The patient is anticipated to attend the outpatient clinic in the near future.

**Conclusions:** Valsava retinopathy causes abrupt and significant impairment of vision loss. The management of the condition might involve either a conservative approach, which may span many weeks to months, or intervention using Nd:YAG laser membranotomy to enable rapid diffusion of pre-macular hemorrhage.

#### **Novel Morin-Devin T Macular Buckle Derived from 41 and 287WG Scleral Buckle Band**

*First Author: Nitee **RATPRASATPORN**  
Co-Author(s): Chirat **SAOVAPRUT***

**Purpose:** To introduce and assess the effectiveness of a new surgical innovation: the custom-made Morin-Devin T macular buckle, constructed from the 41 and 287WG scleral buckle band.

**Methods:** A 72-year-old patient with pathologic myopia and macular detachment underwent this innovative surgery. Due to the unavailability of the standard Morin-Devin T macular buckle, a custom-made version was constructed using the 41 and 287WG scleral buckle bands and secured with Prolene 6-0. Preoperative and postoperative optical coherence tomography (OCT) scans and wide-field fundus photography were utilized to evaluate the macular anatomy and the position of the buckle. The primary outcome was the anatomical reattachment of the macular detachment at 3 months, while secondary outcomes evaluated visual

acuity improvements and postoperative complications.

**Results:** Following surgery with the self-made Morin-Devin T macular buckle, the patient exhibited nearly complete anatomical reattachment of the macular detachment on OCT at 3 months. Snellen visual acuity showed improvement from 20/500 to 20/100 at 3 months postoperatively. Only minor postoperative complications including eyelid edema and pain were observed, which resolved within a week. The buckle remained in stable positioning throughout the 3-month follow-up period.

**Conclusions:** The innovative Morin-Devin T macular buckle made from the 41 and 287WG scleral buckle band showed encouraging results in a single-patient trial for treating a macular detachment and potentially a macular hole associated with retinal detachment. The procedure signifies a potential surgical approach to this condition when only regular scleral buckle bands are available.

### Outcome of the Management of Aggressive Retinopathy of Prematurity

*First Author: Tanzina ISLAM*

**Purpose:** To compare the efficacy and safety between laser therapy and anti-vascular endothelial growth factor (VEGF) agents for aggressive retinopathy of prematurity (A-ROP).

**Methods:** A comparative study of laser, anti-VEGF with laser, and anti-VEGF monotherapy for A-ROP treatment. Study period was 2016 to 2020 at BIRDEM General Hospital. We included 15 A-ROP babies with 30 eyes. Ten eyes were treated with laser, 10 eyes were treated with anti-VEGF with laser, and 10 eyes were treated with anti-VEGF. We used bevacizumab as anti-VEGF. We compared efficacy, safety, complications, and retreatment between these three groups.

**Results:** Complication incidences were significantly higher in the laser therapy group. 20% of infants needed retreatment with laser therapy of more than two sessions. In the anti-

VEGF and laser therapy group, 6.7% of infants needed retreatment and in the anti-VEGF group (group 1) 3.3% of infants needed retreatment. The P value was 0.005 which was significant. Development of myopia was significantly higher in the laser therapy group (group 3). About 100% of infants developed myopia. In group 2 30% of infants developed myopia. In group 1 no infants developed myopia. The P value was highly significant at 0.01.

**Conclusions:** This analysis indicates that anti-VEGF agents are as effective as laser treatment and safer than laser. The degree of myopia in A-ROP in the laser group was higher than in the anti-VEGF monotherapy group. The decreased incidence of early unfavorable refractive and functional outcomes in the intravitreal bevacizumab (IVB) group compared with the laser group showed a potential benefit for patients treated with IVB.

### Outcomes of Vitreoretinal Surgery in Eyes with Retinitis Pigmentosa Without Retinal Detachment

*First Author: Abhishek UPADHYAYA*

*Co-Author(s): Deepika C PARAMESWARAPPA, Saarang HANSRAJ, Hardik KIRI*

**Purpose:** To understand the outcomes of vitreoretinal (VR) surgery in retinitis pigmentosa (RP) for indications excluding retinal detachment (RD).

**Methods:** This is a retrospective study that includes data from January 2013 to December 2021. Patients with RP who were treated with VR surgical intervention (excluding RD) were included in the study. The primary outcome of the study was to assess the change in best-corrected central visual acuity.

**Results:** Forty-four eyes of 40 patients with RP were included. Nearly half of the eyes (43%, 19/44) presented with a diminished vision of duration ranging from 1 month to 1 year with or without floaters. The mean  $\pm$  standard deviation (SD) best-corrected visual acuity (BCVA) at presentation was  $1.30 \pm 0.79$  logMAR (20/400p  $\pm$  20/125). The major surgical indications were vitreous opacities (43.2%, 19/44) and

subluxated/dislocated cataractous lens (25%, 11/44). The median follow-up duration was 8 months [IQR: 1.5, 27]. 77% (34/44) of the eyes had improvement in vision. The mean  $\pm$  SD postoperative BCVA at the last follow-up was  $0.95 \pm 0.73$  logMAR ( $p = 0.03$ ).

**Conclusions:** Most eyes with RP did well following VR surgical interventions with resulting improvement in visual acuity in the short term. It may be crucial to address the vitreous opacities and membranes as they hinder the residual central island of vision in RP. However, appropriate counseling is of essence regarding the otherwise progressive nature of retinal neuronal degeneration.

#### Pars Plana Vitrectomy with or without Internal Limiting Membrane Peel for Epiretinal Membrane: A Systematic Review and Meta-analysis

First Author: Andrew **MIHALACHE**  
Co-Author(s): Ryan S. **HUANG**, Peter J. **KERTES**, Rajeev **MUNI**, Nikhil S. **PATIL**, Marko M. **POPOVIC**

**Purpose:** To compare the safety and effectiveness of PPV with and without ILM peeling for idiopathic ERM.

**Methods:** A systematic literature search was conducted on Ovid MEDLINE, Embase, Cochrane Library, and Google Scholar from January 2000-2023 for comparative studies reporting visual and anatomical outcomes for ERM patients that received PPV with or without ILM peeling. Primary outcomes included best-corrected visual acuity (BCVA) at last study observation and change in BCVA from baseline. Secondary outcomes included retinal thickness (RT) at last study observation, risk of ERM recurrence, and adverse events. A random effects meta-analysis was performed on Review Manager 5.4. The certainty of evidence of outcomes were evaluated using GRADE criteria.

**Results:** Nineteen studies reporting on 1,291 eyes at baseline were included. PPV with and without ILM peel achieved a similar BCVA at last study observation ( $p = 0.68$ ) and change in BCVA from baseline ( $p = 0.79$ ). RT at last

study observation was significantly thicker in the ILM peel group relative to the non-ILM peel group (WMD =  $11.97 \mu\text{m}$ , 95% CI = [1.64, 22.30],  $p = 0.02$ ). PPV with ILM peel achieved a significantly lower incidence of ERM recurrence and additional surgery compared to PPV without ILM peel.

**Conclusions:** PPV with and without ILM peel achieved a similar BCVA at last study observation in idiopathic ERM patients; however, PPV without ILM peel achieved a lower RT at last observation. Patients treated with ILM peeling also had a reduced risk of ERM recurrence and lower re-operation risk. These conclusions are associated with a moderate certainty of evidence and potential for bias from multiple non-randomized studies.

#### Pars Plana Vitrectomy with or without Internal Limiting Membrane Peel for Macular Hole: A Systematic Review and Meta-analysis

First Author: Andrew **MIHALACHE**  
Co-Author(s): Ryan S. **HUANG**, Peter J. **KERTES**, Rajeev **MUNI**, Nikhil S. **PATIL**, Marko M. **POPOVIC**

**Purpose:** To compare the efficacy and safety of pars plana vitrectomy (PPV) with and without internal limiting membrane (ILM) peeling for macular hole (MH).

**Methods:** We performed a systematic literature search on Ovid MEDLINE, Embase, Cochrane Library, and Google Scholar from January 2000-2023. Our primary outcome was the final best-corrected visual acuity (BCVA). Secondary outcomes included MH closure rates and the need for repeat surgery. We performed a random effects meta-analysis on Review Manager 5.4.

**Results:** Fourteen studies collectively reporting on 880 eyes were included. PPV with and without ILM peel achieved a similar final BCVA ( $p = 0.66$ ). However, PPV without ILM peeling achieved a significantly better final BCVA in eyes with closed MHs (WMD =  $0.05$  logMAR, 95% CI = [0.01, 0.10],  $p = 0.02$ ). PPV with ILM peeling achieved a significantly higher primary MH closure rate (RR = 1.21, 95% CI = [1.04,

1.42],  $p = 0.02$ ) and lower incidence of MH reoperation (RR = 0.19, 95% CI = [0.11, 0.33],  $p < 0.001$ ). The final MH closure rate ( $p = 0.12$ ) and incidence of MHs recurring ( $p = 0.25$ ) were similar between groups.

**Conclusions:** PPV with and without ILM peel achieved a similar final BCVA. However, PPV without ILM peeling achieved a better final BCVA in eyes with closed MHs. ILM peeling achieved a greater primary MH closure rate and reduced need for reoperation.

### Results of Submacular Hemorrhage Treatment with Pneumatic Displacement and Intravitreal Anti-VEGF Injection with or without Intravitreal Tissue Plasminogen Activator Injection

First Author: Pataramon

**CHOTIKKAKAMTHORN**

Co-Author(s): Patama **BHURAYANONTACHAI**,

Wantanee **DANGBOON**, Pichai

**JIRARATTANASOPA**, Mansing

**RATANASUKON**, Thada **TANTISARASART**

**Purpose:** To evaluate the outcomes of intravitreal gas, anti-vascular endothelial growth factor (VEGF) with or without tissue plasminogen activator (tPA) injection for submacular hemorrhage (SMH).

**Methods:** The patients who were diagnosed with SMH and underwent intravitreal gas, anti-VEGF with or without tPA injection from 2014 to 2021 were enrolled. Data was collected at preoperative visit and 1, 3, 6, and 12 months after treatment. The primary outcome was the best-corrected visual acuity (BCVA) at 12 months after treatment. The secondary outcomes were the changes in central subfield thickness (CST), degree of blood displacement, and incidence of complications such as vitreous hemorrhage (VH) after treatment.

**Results:** From 138 eyes of 138 patients, 43 eyes received intravitreal gas, anti-VEGF, and tPA injection (tPA group) whereas 95 eyes received intravitreal gas and anti-VEGF injection (non-tPA group). At 12 months, the BCVA improvement was not significantly different between groups ( $p = 0.818$ ) whereas the decrement of CST was higher in the non-tPA group ( $p = 0.042$ ).

Forty eyes (93%) in the tPA group and 86 eyes (91.5%) in the non-tPA group had complete displacement of SMH. Overall, the incidence of VH after the treatment was higher in the non-tPA group (OR 7.32,  $p = 0.009$ ).

**Conclusions:** The use of tPA as an adjunctive medication in pneumatic displacement with anti-VEGF injection does not improve visual and anatomical outcomes in patients with SMH.

### Revolutionizing Vitrectomy: The 3A (Anyone, Anytime, Anywhere) Air Bubble Technique for Simplified and Effective Procedures

First Author: Takahiro **MATSUOKA**

**Purpose:** In vitreoretinal surgery, a more detailed assessment and treatment within a broader surgical field are essential. Scleral indentation can lead to patient discomfort, inflammation, and surgical complexity. The air bubble technique enables safe and easy acquisition of an expansive surgical field, anytime, anywhere, for anyone, and is reported here.

**Methods:** This study encompasses cases with intraocular lens implantation or aphakic eyes. A small air injection into the post-capsular space, aided by a fundus observation system, is employed.

**Results:** A small air bubble induces changes in light refraction, facilitating the acquisition of an extensive surgical field. Observation up to the ora serrata becomes effortless without scleral indentation. Vitreous removal using a cutter and laser photocoagulation are feasible. The technique is user-friendly, minimally invasive, and reduces patient discomfort.

**Conclusions:** Requiring no special techniques or tools, the 3A (anyone, anytime, anywhere) air bubble technique is highly valuable as an option for retinal intervention, applicable to various retinal cases. It expands the surgeon's treatment choices, proving to be an easily accessible and advantageous approach.



### Self-induced Retinal Detachment and Redetachment in a Patient with Tourette Syndrome

First Author: Ruth Camille **ANTOLIN**  
Co-Author(s): Amadeo Jr **VELOSO**

**Purpose:** To report a case of self-induced retinal detachment in a patient with Tourette syndrome and the challenges in its management.

**Methods:** Case report.

**Results:** A 23-year-old male with Tourette syndrome presented with sudden blurring of vision in the left eye. His guardian reported that the patient had motor tics which were poorly controlled even with medications. His motor tics would include sudden headbanging and eye hitting. His presenting best-corrected visual acuity was 20/20 in the right eye and 20/400 in the left eye. Eye examination showed bilateral mild cataracts and a giant retinal detachment 9 to 4 o'clock in the left eye. He underwent phacovitrectomy with silicone oil and encircling band with an unremarkable postoperative course. Silicone oil was removed after 8 months but redetached less than a month after. Repair of detachment with methotrexate infusion, inferior retinectomy, and silicone oil was undertaken. Postoperative follow ups showed gradual slipping of the inferior retina towards the macula. Patient opted for no additional surgical intervention on the affected eye.

**Conclusions:** This case highlights the difficulty of managing a retinal detachment in a patient with poorly managed Tourette's. It is essential that Tourette patients with motor tics are stable and well controlled prior to surgery to avoid postoperative complications and surgical failure.

### Sphingosine-1-phosphate Expression in Human Epiretinal Membranes

First Author: Sohee **JEON**

**Purpose:** To evaluate the expression of sphingosine-1-phosphate (S1P) in human epiretinal membranes (ERM) and to correlate this with clinical data.

**Methods:** We prospectively recruited patients with ERM. Twenty-four human ERM specimens were immunolabeled with anti-S1P antibody and the number of total cells/hyperfield (HF), S1P (+) cells/HF, and the percentage of S1P (+) cells/total cells were calculated. We evaluated the interrelationship of cellular properties and clinical findings, such as central subfield thickness, presence of intraretinal cysts, lamellar hole, pseudoholes, paravascular abnormality, or ellipsoid zone (EZ) defects.

**Results:** Among 24 ERM specimens, 7 specimens (29.2%) exhibited S1P expression. Patients with secondary ERM or EZ defects, which suggest strong vitreoretinal traction, presented a significantly higher S1P+ cell density and percentage of S1P+ cells ( $p = 0.002$  for S1P+ cells/HP and  $p = 0.001$  for S1P+ cells/total cells for secondary ERM;  $p = 0.036$  for S1P+ cells/HP and  $p = 0.022$  for S1P+/total cells for EZ defects). The addition of S1P increased the migrative ability and expression of N-cadherin and  $\alpha$ -SMA in human Muller glial cells, suggesting S1P is a potential causative molecule for the development of ERM during vitreoretinal traction.

**Conclusions:** S1P expression was detected in ERM specimens from eyes with signs of vitreoretinal traction. S1P may have a role in the pathogenesis of ERM from vitreoretinal traction.

### Surgical Outcomes of Vitrectomy for Advanced Stages of Retinopathy of Prematurity: A Systematic Review

First Author: Seruni Hanna **ARDHIA**  
Co-Author(s): Andini **RAHMAWATI**

**Purpose:** To comprehensively review the surgical outcomes following vitrectomy for advanced stages of retinopathy of prematurity (ROP) and factors affecting the outcomes.

**Methods:** A systematic literature search was performed on 5 databases: PubMed, Embase, Scopus, Wiley, and Cochrane. Original articles that evaluate anatomical and functional outcomes following vitrectomy in stage 4 and 5 ROP until July 2023 were included in the study. The review was based on the Preferred

Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines.

**Results:** Four retrospective studies and 1 prospective case series with a total of 331 eyes were included in the study. Lens-sparing vitrectomy or combined lensectomy-vitrectomy were the preferred types of surgery in managing advanced stages of ROP. Surgical outcomes were better in stage 4 ROP, ranging from 65.1% to 91.3% for anatomical success and 47.8% to 87.4% for functional success, compared to anatomical (19-46.8%) and functional (9-35.5%) success in stage 5 ROP. Lens-sparing vitrectomy, earlier stages of ROP, and preoperative treatments were the factors associated with better surgical outcomes.

**Conclusions:** Surgical outcomes following vitrectomy were favorable for stage 4 ROP. Retinal reattachment allowed an achievement of better visual outcomes. The most effective approach for managing advanced ROP stages is preventing its progression into stage 5.

### The Ability of Artificial Intelligence Chatbots ChatGPT and Google Bard to Accurately Convey Preoperative Information for Patients Undergoing Ophthalmological Surgeries

*First Author:* Nikhil S. **PATIL**  
*Co-Author(s):* Ryan **HUANG**, Peter **KERTES**, Eli **KISILEVSKY**, Jason **KWOK**

**Purpose:** To determine whether 2 popular artificial intelligence (AI) chatbots, ChatGPT and Bard, provide high-quality information concerning procedure description, risks, benefits, and alternatives of various ophthalmological surgeries.

**Methods:** ChatGPT-4 and Bard were prompted with questions pertaining to the description, potential risks, benefits, alternatives, and implications of not proceeding with various surgeries in different subspecialties of ophthalmology. Six common ophthalmic procedures were included in our analysis. Two comprehensive ophthalmologists graded each response independently using a 5-point Likert scale.

**Results:** Likert grading for accuracy was significantly higher for ChatGPT-4 in comparison to Bard ( $4.5 \pm 0.7$  vs  $3.8 \pm 0.8$ ,  $p < 0.001$ ) across a total of 30 prompts. Generally, ChatGPT-4 performed better than Bard even when questions were stratified by type of ophthalmic surgery. There was no significant difference between ChatGPT-4 and Bard for response length ( $2104.7 \pm 271.4$  characters vs  $2441.0 \pm 633.9$  characters,  $p = 0.12$ ). ChatGPT-4 responded significantly slower than Bard ( $46.0 \pm 3.0$  seconds vs  $6.6 \pm 1.2$  seconds,  $p < 0.0001$ ). There was substantial agreement between reviewers (kappa Cohen coefficient 0.726 for ChatGPT-4 grading and 0.613 for Bard).

**Conclusions:** Both ChatGPT-4 and Bard may offer accessible and high-quality information relevant to the informed consent process for various ophthalmic procedures, with ChatGPT-4 outperforming Google Bard. Nonetheless, both AI chatbots did not convey the probability of adverse events, hence limiting their potential and introducing patients to potentially misinterpretable information.

### Translational Medicine

### Assessing Eligibility for a Clinical Trial of Submacular Photoreceptor Stem Cell Therapy in a Prospective Cohort of Inherited Retinal Disease Patients

*First Author:* Tien-en **TAN**  
*Co-Author(s):* Choi Mun **CHAN**, Beau **FENNER**, Ranjana **MATHUR**, Stephen **RUSSELL**, Rachael Wei Chao **TANG**

**Purpose:** To establish selection criteria for enrolment of inherited retinal disease (IRD) patients into clinical trials of submacular photoreceptor stem cell therapy.

**Methods:** IRD patients were consecutively enrolled in a prospective cohort. Patients underwent phenotyping with visual acuity (VA) assessment, Goldmann kinetic perimetry, color fundus photography, fundus autofluorescence imaging, and macular optical coherence tomography (OCT). Primary inclusion criterion

was VA of hand motions or worse in the candidate eye. Systemic eligibility was based on life expectancy, and absence of major systemic disease. Ocular exclusion criteria included visual field sensitivity in the central 20°, asymmetric disease, and vision-limiting co-morbidities. Structural criteria aimed at excluding cases with OCT features precluding successful submacular surgery, or that would limit visual outcome. The proportion of eligible patients was extrapolated with epidemiologic data to estimate the size of the treatable population in Singapore.

**Results:** The cohort consisted of 500 patients with 20 distinct IRD phenotypes, of which retinitis pigmentosa (n = 299, 59.8%) was the most common. Ninety-four eyes of 64 patients met VA eligibility. After application of systemic, ocular, and structural criteria, 16 eyes of 15 (3.0%) patients remained eligible for trial participation. The treatable population in Singapore was estimated at 156 cases.

**Conclusions:** In a large Singaporean cohort of IRD patients, 3% were eligible for a clinical trial of submacular photoreceptor stem cell therapy. This represents a significant proportion of potentially treatable patients with end-stage disease not amenable to gene therapy. The objective eligibility criteria proposed here can be used for other trials investigating similar therapeutic approaches for end-stage IRD.

### Mechanisms of Blue Light Retinopathy in the Cell and Mouse Models

First Author: Yi-sheng **CHANG**

**Purpose:** To investigate blue light retinopathy in the cell and mouse models.

**Methods:** Cultured human retinal pigment epithelial (ARPE-19) cells and mouse cone photoreceptor (661W) cells were exposed to blue-light LED (50, 100, 250, 500, or 1000 lux) or none for 4 hours. BALB/c mice were exposed to blue-light LED 500 lux for 6 hours/day for 20 days.

**Results:** On trypan blue in situ staining, ARPE-19 cells and 661W cells were damaged since 100 lux. On CellTiter-Blue cell viability

assay, cell viabilities were reduced at a dose-dependent manner since 50 lux. On TUNEL staining, apoptosis was seen at 1000 lux for 4 hours. On annexin V-propidium iodide flow cytometry, apoptosis and necrosis showed a dose relationship. On MTT assay, proportions of functional cells were reduced at a dose-dependent manner since 50 lux. On rhodamine 123 efflux assay, mitochondrial transmembrane potentials were decreased since 50 lux. On H2DCF assay measuring free radicals, reactive oxygen species (ROS) were induced at a dose-dependent manner since 250 lux. On H&E staining of the mouse retina exposed to blue light, the photoreceptors were remarkably shortened. In addition, outer plexiform layer, inner plexiform layer, and ganglion cell layer also became slightly thinner. On TUNEL/DAPI staining, many of the photoreceptors showed apoptosis.

**Conclusions:** Blue light damages cultured human RPE cells and mouse cone photoreceptors at a dose-dependent manner through apoptosis and necrosis. The thresholds of injury between both cells were similar. Mitochondria and oxidative stress are involved. In the mouse model, blue light induces retinal necrosis and apoptosis, particularly in photoreceptors.

## VIDEOS

## Eye Trauma, Emergencies &amp; Infections

**Combined Cataract Extraction with Vitrectomy in Retained Intraocular Foreign Body**

*First Author:* Nawazish **SHAIKH**  
*Co-Author(s):* Shorya **AZAD**, Avilasha **MOHAPATRA**

**Purpose:** To show the surgical procedure of combined cataract extraction with retained intraocular foreign body (RIOFB) removal with intraocular implant in 2 different clinical scenarios.

**Methods:** Two patients with RIOFB were included in the video. The first patient had a total cataract with RIOFB confirmed on ocular imaging. Combined cataract extraction with IOFB removal and IOL implantation with optic capture was done. The second patient had an inferior retinal detachment with RIOFB and underwent combined phacoemulsification with IOFB removal, IOL implantation with optic capture, and silicone oil tamponade.

**Results:** Both patients had significant gain of visual acuity in the postoperative period with a well-attached retina despite patient 1 showing signs of siderosis and patient 2 having retinal detachment.

**Conclusions:** Despite the relatively longer surgical period, combined cataract extraction and IOFB removal with an IOL implant was safe and effective procedure in both our cases.

**Direct Extraction of Metallic Intraocular Foreign Bodies from Posterior Segment Though Clear Corneal Incision in Phacovitrectomy**

*First Author:* Haoyu **CHEN**

**Purpose:** Extraction of intraocular foreign body (IOFB) from the posterior segment is challenging. Conventional techniques require exchange of IOFB between 2 hands or temporally set on top of the iris of capsule.

There is a risk of IOFB dropping and damage to the retina. Here we introduce a novel surgical technique to extract metallic IOFB directly from clear corneal incision.

**Methods:** This was a retrospective study. The patients with metallic IOFB in the posterior segment and traumatic cataract were included. The cataracts were removed using 2.8-mm clear corneal incision. Corneal incision was enlarged and posterior capsulotomy was made if needed. Then a 19G intraocular magnet was inserted from the clear corneal incision and approached the surface of the retina under non-contact wide-angle lens. After the metallic IOFB was attracted, the intraocular magnet was retrieved and the IOFB was extracted directly from the corneal incision.

**Results:** A total of 11 cases were included. All the IOFBs were extracted directly from the corneal incision. There was no complication such as IOFB dropping or retinal detachment. The best-corrected visual acuity of all patients improved.

**Conclusions:** Direct extraction of metallic IOFB from the posterior segment though clear corneal incision is a simple and safe technique.

**Early is Better: Vitrectomy Restores Vision in Early Endophthalmitis**

*First Author:* Mae-lynn **BASTION**  
*Co-Author(s):* Ainal **ADLIN NAFFI**, Lhacha **WANGDI**

**Purpose:** To share an experience of a favorable result after early vitrectomy in 1 case of exogenous postoperative endophthalmitis operated within 24 hours of detection.

**Methods:** Review of surgical records and fundus photography involving 1 lucky case.

**Results:** A 58-year-old woman who underwent uneventful phacoemulsification with intraocular lens implantation bilaterally 4 days previously at another center was reviewed. She complained of eye discomfort, floaters, and decreased



vision for 2 days in her left eye only. Vision was 6/24. Examination revealed strip of hypopyon and vitritis with hazy view of fundus. Intravitreal injection of moxifloxacin was given and she was referred to our center. She immediately underwent tap and intravitreal injection of 1 mg/0.1 mL vancomycin and 0.4 mg/0.1 mL amikacin. Nine hours later, her vision had dropped to 6/60. B scan showed vitritis. She agreed to proceed with vitrectomy and anterior chamber washout as well as intracameral irrigation of cefuroxime, performed the same evening. The intraocular lens was not removed. Intraoperative fundus appearance showed widespread retinal hemorrhages and vasculitis. Careful core vitrectomy and removal of visible pus was attempted, followed by intravitreal antibiotics. Three months postoperatively, she had vision of 6/12, N8 and the hemorrhages had resolved, with flat retina. Nevertheless, all her cultures were negative.

**Conclusions:** Early vitrectomy for endophthalmitis where feasible is an effective way in selected cases of recent symptoms to restore vision, reverse signs of retinal damage, and overcome the infection.

### **In Hindsight: Iridodialysis Repair, Pars Plana Vitrectomy, and the Yamane Technique in an Eye with Previous Blunt Trauma**

*First Author: Maria Giselle DY*  
*Co-Author(s): Erika Jean SALVAME*

**Purpose:** We aim to present a surgical case on how to manage iridodialysis and dislocated lens due to blunt eye trauma.

**Methods:** This is a surgical video case presentation.

**Results:** A 38-year-old Filipino male presented with blurring of vision in the left eye due to blunt trauma. Ophthalmologic examination showed uncorrected visual acuity (VA) of hand movements with good light projection, clear cornea, significant superior iridodialysis which shifted the pupil inferiorly, vitreous in the anterior chamber, elevated intraocular pressure (IOP), inferiorly dislocated cataractous lens, and unremarkable dilated fundus findings in

the visible retinal areas of the affected eye. The right eye was normal. Surgical plan for the left eye was to perform iridodialysis repair, cataract removal via pars plana vitrectomy, and secondary intraocular lens (IOL) implantation. Iridodialysis repair was done using 2 double-armed straight needle prolene 10-0 sutures via the McCannel technique, with the needles passing directly through the iris tissue to the sclera or docked into a gauge 30 needle to guide placement. Improvisation using a double-flanged prolene 10-0 suture was also used for the repair. Complete pars plana vitrectomy was subsequently done with removal of the dislocated lens using the vitrectomy cutter, followed by scleral indentation, endolaser barricade of a suspicious retinal tear, and laser cerclage. Lastly, secondary IOL implantation was performed using the Yamane technique.

**Conclusions:** Postoperatively, the patient had improved pinhole VA of 20/40 with an intact iridodialysis repair site, stable IOL though with slight superior decentration, normal IOP, and an attached retina.

### **The Surprises Kept Coming: My Experience with a Case of Ocular Trauma**

*First Author: Obuli N*  
*Co-Author(s): Soumya JENA, Anuja PATIL, Kritika SINGH, Gauri KHARE*

**Purpose:** To elucidate the difficulties we encountered in a case of blunt globe injury with traumatic cataract and the surprises that kept coming intraoperatively.

**Methods:** A 27-year-old patient presented with a history of trauma with tennis ball 3 hours before with sudden painful loss of vision. At presentation he had traumatic mydriasis with total traumatic cataract; B-scan showed VH with retinal detachment not involving the macula. The patient was taken up for surgery, and intraoperatively the patient was found to have received VR surgery in childhood (which the patient had no memory of) and retinal detachment occurred due to internal choroidal rupture and retinal break at the edge of buckle indent. The patient was successfully operated. Postoperatively at 1 month due to

## VIDEOS

elevated IOP, silicone oil started leaking via the inner choroidal rupture and accumulating subconjunctivally.

**Results:** We show in the video our ordeals in managing the patient and how we were eventually able to provide a successful visual outcome to the patient.

**Conclusions:** This video shows how surgeons should always be thinking on their feet and ready to expect even the most unusual complications postoperatively.

### Intraocular Inflammation, Uveitis & Scleritis

#### Gone Through a Rough Patch: Deroofing the Journey of a Case of *Mycobacterium leprae* Associated Scleritis and Intercalary Staphyloma

*First Author: Vishal JADHAV*  
*Co-Author(s): Soumyava BASU, Jyoti GOYAL, Anup KELGAONKAR*

**Purpose:** To describe the surgical management of a large intercalary staphyloma, a complication of scleritis, in inadequately treated Hansen's disease.

**Methods:** A 55-year-old male, previously diagnosed with Hansen's disease, presented to us after 3 months of diminution of vision in the left eye. He had nodular scleritis and non-granulomatous anterior uveitis, which was medically managed. The patient was lost to follow-up for 9 months and discontinued his systemic anti-leprosy therapy. The patient presented again with nodular scleritis, a secondary large mass lesion-like outpouching intercalary staphyloma, and advanced cataract.

**Results:** The patient was restarted on topical steroids, cycloplegics, and anti-leprosy drugs. The intercalary staphyloma was excised after removing the overlying conjunctiva and scleral complex (deroofing) using a double free-thaw technique, while hemostasis was achieved using diathermy. The scleral defect was approximated with double breasting of the surrounding tissue with ragged edges using absorbable 7-0 polyglactin-interrupted sutures. An additional

overlying scleral patch graft of size 5 x 4 mm was sutured to the sclera and adjacent limbus, with bandage contact lens to maintain the tectonic integrity of the globe. After starting postoperative medications, the scleral patch graft was intact with well-approximated wound edges and formed anterior chamber.

**Conclusions:** Lepromatous scleritis is usually a recurrent entity, with rare cases warranting surgical correction. Scleral deroofing and tectonic patch graft under oral anti-leprosy drugs may be an effective treatment alternative for large outpouching intercalary staphyloma.

### Ocular Oncology & Pathology

#### Intraoperative OCT-guided Subretinal Aspiration Biopsy for Primary Vitreoretinal Lymphoma

*First Author: Vishal RAVAL*

**Purpose:** Vitreous and/or subretinal biopsy of lymphoma infiltrates is imperative for clinching the diagnosis of PVRL. We have described a novel technique of using intraoperative OCT and a modified beveled soft-tip cannula to increase the yield of the biopsy.

**Methods:** Video-based description.

**Results:** This film describes a novel technique of OCT-guided subretinal biopsy using a soft-tip cannula. A 47-year-old women presented with diminution of vision in the left eye. Fundus examination revealed multiple yellowish discrete lesions in the subretinal space, which raised the suspicion of primary vitreoretinal lymphoma (PVRL). To confirm the diagnosis, 25G pars plana vitrectomy-based subretinal biopsy was obtained using a novel soft-tip cannula which was cut at an angle to give it a beveled end. It was attached to a 2-mL syringe with the cannula guided into the subretinal space. The plane of the beveled tip was confirmed with intraoperative OCT. The pathology of the aspirated sample confirmed the diagnosis of PVRL.

**Conclusions:** This video highlighted 2 novel ideas, OCT-guided subretinal biopsy and a

beveled soft-tip cannula, ensuring adequate cellular samples obtained nontraumatically, thereby increasing the overall positivity of the test.

### Pediatric Retina

#### Contractile Morning Glory Syndrome in a Patient

*First Author: Jinghua LIU*

**Purpose:** To present widefield images and fundus fluorescence angiographic manifestations of a female pediatric patient with contractile morning glory syndrome.

**Methods:** A 3-year-old girl presented to the retinal clinic with a 6-month history of esotropia in her right eye. At presentation, her best-corrected visual acuity was hand movements in the right eye and 20/20 in the left eye. The anterior segment and intraocular pressure were unremarkable. Fundus of the right eye revealed total retinal detachment with deep funnel-shaped excavation of the optic disc. Widefield fundus examination and fundus fluorescence angiography under general anesthesia using Retcam III was performed and contractile movement of the disc, hyperfluorescence of the optic disc, and leakage of fluorescence liquid were revealed; the disc movement was not synchronized with breathing or heart pulsation nor was it induced by massage of the eyeball or light stimulation.

**Results:** Because achieving choroid-retinal adhesion with contractile disc seemed impossible, laser photocoagulation on the peripapillary edge was not performed and retinal detachment seemed to be stable in the following 1.5 years.

**Conclusions:** The etiology of the movements of the contractile disc of our patient may include a misbalance between intraocular pressure and orbital cerebrospinal fluid pressure. These observations may give information about the physiology and pathophysiology of the contractile disc.

#### Heads-up 3-dimensional Visualization System and Integrated Intraoperative Optical Coherence Tomography in Infantile Vitreoretinal Surgeries

*First Author: Akash BELENJE*

*Co-Author(s): Subhadra JALALI, Brijesh TAKKAR*

**Purpose:** To demonstrate the applications of heads-up 3-dimensional visualization system and integrated intraoperative optical coherence tomography (iOCT) in a spectrum of complex infantile vitreoretinal surgeries.

**Methods:** Two different 3D visualization systems were used during surgery on a case-to-case basis and iOCT was used as needed. The same vitrectomy system was used for all the surgeries. Disease spectrum included retinal disorders due to retinopathy of prematurity, familial exudative vitreoretinopathy, and retinitis.

**Results:** A total of 10 eyes of 7 cases were included; out of which 5 eyes of 4 unique cases were operated under 3D visualization system and the remaining 5 eyes of the other 3 cases under the conventional microscope. The cases present our initial experience of the 3D visualization and iOCT system over the conventional microscope with appropriate imaging and surgical videos.

**Conclusions:** Infantile vitreoretinal surgeries are difficult to teach, require an ergonomically friendly surgical environment and unpredictable surgical adjustments, which are the chief advantages of the discussed technologies. Heads-up 3D visualization system and iOCT appeared to be powerful new tools that can be explored further for use in complex infantile vitreoretinal surgeries.

## Retina (Surgical)

**A Novel Sutureless T-shaped Haptic Scleral Fixated Intraocular Lens**

*First Author: Sheetal DIVATE  
Co-Author(s): Pushpanjali BADOLE, Amit NENE, Smitesh SHAH, Pratik SHENOY*

**Purpose:** To demonstrate the technique and visual outcomes of a foldable T-shaped haptic scleral fixated intraocular lens (SFIOL) in different case scenarios.

**Methods:** In our retrospective study 20 eyes with inadequate capsular support were included. The CM-T Flex IOL with scleral fixation was used in these cases. Here we present 3 cases: first case of a 65-year-old male with surgical aphakia, second case of a 65-year-old male with lens dislocation, and third with subluxated iris claw IOL. Surgical technique with clinical pearls have been described.

**Results:** We have described visual outcomes in patients implanted with SFIOL.

**Conclusions:** T-shaped haptic SFIOL is a viable option for cases with inadequate capsular support. IOL implantation with T-shaped haptic is sutureless, less damaging to ocular structures, and has a shorter learning curve making it easier for implantation.

**Aniridia Scleral Fixated Intraocular Lens in Traumatic Aniridia by 2 Different Techniques**

*First Author: Sheetal DIVATE  
Co-Author(s): Pushpanjali BADOLE, Amit NENE, Smitesh SHAH, Pratik SHENOY*

**Purpose:** To describe the utility of aniridia scleral fixated intraocular lens (SFIOL) in traumatic aniridia by 2 different techniques.

**Methods:** Case 1 was done with 4-point fixation technique using 5-0 prolene while in case 2, 9-0 polypropylene suture was used.

**Results:** Patients had significant improvement in postoperative visual acuity and were symptomatically better with reduced glare.

**Conclusions:** Aniridia SFIOL mimics the function of the natural iris by regulating the

amount of light entering the eye and improving visual acuity. Favorable anatomical, functional, and cosmetic results were achieved by using this IOL.

**Autologous Scleral Graft Technique for Refractory Optic Disc Pit Maculopathy**

*First Author: Paolo Vicente PALADIO  
Co-Author(s): Jocelyn SY*

**Purpose:** To present the autologous scleral graft technique in plugging the optic disc pit (ODP), a novel method to obstruct the pathway of fluid going through the optic nerve defect that would otherwise induce maculopathy.

**Methods:** This is a video case presentation of a 22-year-old female who, 8 months prior, noted metamorphopsia and progressive blurring of vision in the left eye. She initially went to another institution for consultation. There, ODP-associated maculopathy was identified and treated with focal laser photocoagulation and C3F8 pneumatic retinopexy. Slight improvement in vision was noted initially but symptoms recurred and worsened. On first consultation at our institution, vision was 20/200 and macular optical coherence tomography showed neurosensory detachment with foveoschisis. The patient underwent pars plana vitrectomy making sure that the posterior vitreous face was removed. Internal limiting membrane peeling was performed releasing forces which contributed to schisis formation. Fluid-air exchange was performed over the ODP, then superior conjunctival peritomy was done. A partial scleral flap was dissected, inserted into the vitreous cavity, and positioned on the ODP under air. 14% C3F8 gas was then placed.

**Results:** Three months postoperatively, vision improved significantly to 20/60 as well as noted significant improvement in retinal architecture.

**Conclusions:** Although numerous surgical methods have been documented for treating this problem, no standard of care has been developed. Autologous scleral graft is an ideal option, especially for refractive optic disc pit maculopathies that have already undergone



treatment because of how simple, effective, and readily accessible it is.

### Buck to the Future: Revisiting Buckling Techniques

*First Author: Jose Timothy Martin CHUA*  
*Co-Author(s): Maria Cecilia GARCIA-ARENAL, Janice Marie JORDAN-YU, Carlo NASOL*

**Purpose:** Scleral buckling is now being practiced less and less, and might one day be a lost art form. Some retina surgeons were not even exposed to buckling during training. This presentation aims to convince more retina surgeons and trainees to add buckling and our modified techniques into their arsenal.

**Methods:** In this presentation, various techniques of buckling are shown along with variations on how to do them with regards to different patient cases. Specifically: 1) Scleral band and buckle with polyester 4-0 sutures, 2) Intrasceral belt loop buckle using crescent knife, 3) Intrasceral belt loop buckle using G18 needle, 4) Segmental buckling with polyester 4-0 sutures. The final case will be a deep dive into a 26-year-old female who suffered blunt trauma on the left eye and was diagnosed with rhegmatogenous retinal detachment. Due to the patient being young and phakic, with a single retinal hole, this warranted a conservative approach. Segmental buckling using scleral foam was used.

**Results:** This proved to be a successful segmental buckling procedure as the patient's vision improved from 20/100 to 20/60. Retinal detachment decreased on next follow-ups and the patient did not need to undergo pars plana vitrectomy and lens surgery.

**Conclusions:** Buckling, and all its forms, must still be part of the retina surgeon's arsenal. The techniques and modifications discussed are especially useful in young, phakic patients for a conservative approach. Local and international conferences and institutions should still encourage buckling to be able to cater to all types of patient profiles for best outcomes.

### Deflating but not Deflated: Surgical Management of Choroidal Detachment

*First Author: Adrian FUNG*  
*Co-Author(s): Eduardo RODITI*

**Purpose:** Choroidal detachment (serous or hemorrhagic) is a rare ocular pathology often associated with chronic retinal detachment, inflammation, ocular surgery, or trauma. This video will demonstrate newer vitreoretinal techniques to manage this serious ocular condition.

**Methods:** Two patients cases will be discussed demonstrating the following techniques: 1. External illumination with a light pipe encased in a cannula to identify the highest point of the choroidal detachment; 2. Use of a non-valved cannula to safely drain serous and hemorrhagic suprachoroidal fluid; 3. Use of a scleral cut-down to remove suprachoroidal hemorrhagic clot.

**Results:** All patients demonstrated significant anatomical and functional improvement using the newer surgical techniques.

**Conclusions:** Newer surgical techniques can be used to optimize management of choroidal detachments.

### Double Trouble: Contemporaneous Management of Dislocated Lens and Retinal Detachment in Marfan Syndrome Brothers

*First Author: Harsh JAIN*  
*Co-Author(s): Mounika BOLISETTY, Subhasree DUTTA, Aditya KELKAR*

**Purpose:** This video demonstrates the management strategy for treating simultaneous lens dislocation and retinal detachment in 2 siblings with Marfan syndrome.

**Methods:** A 29-year-old male with Marfan syndrome presented with bilateral vision deterioration. The right eye exhibited subluxated lens and myopic retinal degeneration, while the left eye showed a dislocated cataractous lens and total retinal detachment. The left eye underwent a 25-gauge pars plana vitrectomy, nucleus fragmentation, endolaser, and silicone oil

injection. Iris claw lens implant retrofixation was subsequently performed. A month later, the 30-year-old brother with similar findings was treated similarly.

**Results:** Postoperatively, both brothers achieved a best-corrected visual acuity of 6/12 on Snellen chart.

**Conclusions:** Marfan syndrome's connective tissue anomalies can lead to lens dislocation through fibrillin-related zonular weakness. Ocular manifestations, including retinal detachment, result from factors like long axial length and vitreoretinal adhesion abnormalities. Managing retinal detachment in Marfan syndrome presents challenges due to thin sclera, miotic pupil, multiple retinal breaks, and cardiac risks. Regular ophthalmic examination and timely surgical intervention, utilizing modern techniques, promise favorable outcomes in such complex retinal detachments.

### Double Trouble: Recurrent Retinal Detachment with PVR and Macular Hole

First Author: Shishir **VERGHESE**

**Purpose:** To report the use of retinal autografts for the management of recurrent retinal detachments (RD) complicated by proliferative vitreoretinopathy (PVR) and macular hole.

**Methods:** Video-based report of 2 cases with recurrent RD complicated by PVR and macular hole, where PVR membranes were peeled and retinal autograft was used for hole closure followed by retinal re-attachment using silicone oil.

**Results:** Case 1: A 68-year-old woman post multiple pars plana vitrectomies, presented with recurrent RD and macular hole in the left eye. She underwent a repeat vitrectomy with superior PVR removal followed by fashioning a neurosensory retinal autograft which was subsequently placed over the macular hole. A relaxing retinectomy was done followed by silicone oil injection. Three months postoperatively her vision improved to 6/36 in the left eye with retina attached along with presence of the integrated autograft

under silicone oil. Case 2: A 66-year-old woman with total RD, PVR, and macular hole post PPV underwent 360-degree relaxing retinectomy and retinal autograft for macular hole followed by silicone oil injection. Two months postoperatively her retina was well attached under silicone oil with integration of the neurosensory graft and visual improvement from hand movements to 3/60.

**Conclusions:** Autologous retinal grafting can be performed in complicated macular holes (with RD) when other alternative methods are not possible. This technique can provide anatomical and functional improvement with closure rate similar to other methods. We expand the use of this technique in recurrent retinal detachments with macular holes.

### Giant Retinal Tear with Severe Proliferative Vitreoretinopathy

First Author: Bhuvan **CHANANA**

**Purpose:** To describe a 2-stage technique for management of giant retinal tear (GRT) with severe proliferative vitreoretinopathy (PVR).

**Methods:** A 20-year-old male patient presented with 270-degree GRT with an inverted flap and extensive PVR, following penetrating injury 1 month back. Vitreoretinal surgery was performed with removal of proliferative membranes and relaxing retinotomies. The fovea was also displaced below the optic disc due to severe traction by PVR. At the end of surgery PFCL was decided to be retained to prevent slippage of GRT and redetachment. A second surgery was performed after 10 days, in which PFCL was replaced by silicone oil.

**Results:** With this 2-stage surgical technique, successful anatomical outcomes were achieved. The vision improved from PL+ve preoperatively to 20/200 at 8 weeks postoperative. PFCL tamponade for a few days not only prevented slippage of GRT flap and redetachment, but also helped the retina to regain its normal healthy state.

**Conclusions:** In certain poor prognosis cases like GRT with extensive PVR or chronic retinal

detachments, this 2-stage technique might help to salvage some eyes.

### Low-cost Illuminated Scleral Indentor

First Author: Wilson **WONG JUN JIE**

**Purpose:** To showcase a low-cost alternative to commercially available illuminated scleral indentor.

**Methods:** A low-cost cotton bud and light pipe was used to provide external illumination during the stage where peripheral vitrectomy is performed in the treatment of retinal detachment.

**Results:** No complications were noted.

**Conclusions:** The low-cost illuminated scleral indentor is a safe method to assist the surgeon in performing independent peripheral vitreous shave.

### Macular Buckling Through Ab Externo Approach for Repair of Myopic Traction Maculopathy

First Author: Joy Sheril **VILLAFLOR**

**Purpose:** To show and emphasize the effectiveness of macular buckling as a surgical intervention of choice in the repair of myopic traction maculopathy.

**Methods:** The patient was a 52-year-old female, highly myopic with posterior staphyloma who had progressive blurring of vision in both eyes, more in the right eye. Best-corrected visual acuity was 20/100 right and 20/80 in both eyes. Refraction of the right eye was -10.0 diopters sphere while -8.00 diopters sphere in the left eye. Anterior segment exam, intraocular pressure, and extraocular muscles were all normal. Fundus exam revealed myopic tessellated fundus in both eyes. The right eye showed extensive myopic chorioretinal atrophy in the macula with RPE changes. OCT of the macula of the right eye showed increased scleral concavity, foveo-maculoschisis, foveal detachment, and full thickness macular hole. Based on these findings, the surgical treatment of choice was macular buckle.

**Results:** The patient underwent macular buckling through ab externo approach using a T-shaped NPB buckle on the right eye. Postoperative evaluation showed stable visual acuity at 20/100 and significant anatomic change to convexity of the scleral contour, addressing the pathologies seen on MTM of her right eye.

**Conclusions:** Macular buckling through ab externo approach holds great promise as a procedure of choice for patients with myopic traction maculopathy offering a solution for stabilizing, if not restoring, vision and functional outcomes.

### Management of Complicated Rhegmatogenous Retinal Detachment Associated with Choroidal Detachment, Hypotony, and Giant Retinal Tear

First Author: Rajiv **GANDHI**

**Purpose:** To show the management of a complicated rhegmatogenous retinal detachment associated with choroidal detachment, hypotony, and giant retinal tear in 2 stages. The first stage included vitrectomy with short-term use of PFCL tamponade for 4 days, followed by the second stage involving PFCL exchange and silicone oil tamponade.

**Methods:** A patient who underwent vitrectomy surgery in 2 stages for rhegmatogenous retinal detachment associated with choroidal detachment, hypotony, and giant retinal tear was recorded after receiving due consent from the patient; consent for presenting the video was also obtained from the patient.

**Results:** After the first stage of surgery which was vitrectomy with short-term tamponade with PFCL for 4 days, the patient's retina was completely attached and settled with resolution of choroidal detachment and no untoward complications like IOP rise or inflammation. On the fifth day, the patient underwent PFCL removal with silicone oil exchange and the retina was well attached postoperatively. The visual acuity improved from light perception preoperatively to 20/200 1 week postoperatively after the second stage.

**Conclusions:** Retinal detachment associated with complications like choroidal detachment, hypotony, giant retinal tear, PVR, etc. usually have poor surgical outcomes. The gold standard procedure of choice in such complicated RDs is giving steroids to resolve hypotony and then scleral buckling combined with vitrectomy with intraoperative perfluorocarbon liquids (PFCL) and silicone oil tamponade. However, sometimes waiting for hypotony to resolve before operating may cause a delay, which may lead to PVR and in turn increase the chances of failure. This technique has shown promising results for the treatment of chronic and complicated RRD.

### Management of Retinal Detachment in Pathologic Myopia and Nanophthalmos

*First Author: Vishal AGRAWAL*

**Purpose:** To demonstrate innovative and reproducible surgical techniques for the management of retinal detachment in pathologic myopia and nanophthalmos.

**Methods:** Bullous retinal detachment secondary to nanophthalmos was treated with 2-quadrant scleral resection. The resection was not accompanied with any drainage and led to complete retinal re-attachment in a few weeks. The second case was of pathologic myopia with macular hole and posterior pole fluid. Inverted ILM peeling was performed under PFCL. The retina was attached in the postoperative period without the need of an additional retinotomy.

**Results:** Both cases of retinal detachment had anatomical reattachment with excellent gain in visual acuity.

**Conclusions:** Retinal detachment in extreme variation of axial length (nanophthalmos and high myopia) can be challenging to manage. Innovative surgical techniques can lead to optimum outcomes in these rare and unique cases.

### Membrane Dissection and Removal with PFCL Assistance in Diabetic Vitrectomy

*First Author: Bhuvan CHANANA*

**Purpose:** To describe the use of perfluorocarbon liquids (PFCL) in different situations during diabetic vitrectomy.

**Methods:** Video clips demonstrating the role of PFCL in difficult situations during diabetic vitrectomy will be shown. The videos will highlight when to use PFCL to have a successful surgical outcome.

**Results:** PFCL was shown to be extremely helpful in certain situations. Removal of firmly adherent membranes from retina was successfully performed under PFCL. PFCL acts as a third hand, tamponading and pushing the retina behind. PFCL if injected in the proper plane can even help to perform membrane dissection and en-block removal of taut adherent membranes. Lastly, PFCL also pressure tamponades bleeders and provides a clear media for further surgery and panretinal photocoagulation.

**Conclusions:** PFCL works as magic in certain tricky situations like pressure tamponade of uncontrolled bleeders and en-block removal of membranes. If used judiciously, PFCL can be an extremely helpful tool in diabetic vitrectomy.

### Modified Surgical Technique for Lamellar Macular Holes with Lamellar Hole-associated Epiretinal Proliferation

*First Author: Kshitiz KUMAR*

**Purpose:** This surgical video elucidates the steps of modified lamellar hole-associated epiretinal proliferation (LHEP) embedding technique in the management of lamellar macular holes (LMH).

**Methods:** Briefly post core vitrectomy PVD induction and peripheral vitrectomy, LHEP was observed on the surface of the macula and re-confirmed as yellowish thick atypical ERM. Next BBG was used to stain the surrounding ILM. Centripetal peeling of LHEP around LMH was done to raise LHEP flaps. ILM peeling with



creation of ILM flaps circumferentially around the LHEP flaps and LMH was done. Fluid-air exchange was performed with massaging of LHEP and ILM flaps to fill the LMH defect.

**Results:** Two eyes were operated by modified LHEP embedding technique in this video. One eye had degenerative LMH with LHEP and the other eye had LMH with LHEP secondary to branch retinal vein occlusion (BRVO). Mean age was  $66.8 \pm 4.3$  years with 1:1 male to female ratio. Mean follow-up duration was  $8.9 \pm 0.87$  months. Both eyes had improvement in foveal contour to normal appearance with increase in residual foveal thickness from  $90.2 \pm 26.83 \mu\text{m}$  to CFT of  $226 \pm 35.44 \mu\text{m}$  at 6 months. Mean BCVA improved from  $0.69 \pm 0.19$  logMAR to  $0.32 \pm 0.29$  logMAR. None of the eyes progressed to full-thickness macular hole following surgery.

**Conclusions:** The modified surgical technique of LHEP embedding with ILM inversion is demonstrated to provide satisfactory results with reduced risk of complications for LMH.

### Nightmare Alley

*First Author: Aditya KELKAR*  
*Co-Author(s): Mounika BOLISETTY, Apoorva JADHAV, Harsh JAIN, Sukanya MONDAL*

**Purpose:** This abstract introduces a video presentation focusing on the identification, prevention, and management of macular complications arising during vitrectomy.

**Methods:** To demonstrate with the help of this video a series of prevention and management strategies of macular complications encountered during vitrectomy which include iatrogenic macular injury, iatrogenic macular hole with subretinal migration of perfluorocarbon liquid (PFCL), and blow out macular hole during subretinal rTPA injection.

**Results:** This video showcases various strategies for preventing complications, encompassing meticulous surgical maneuvers, precise instrument control, and optimal visualization techniques. Moreover, the video underscores the significance of on table intervention

strategies and adaptive approaches in addressing complications.

**Conclusions:** This video serves as an invaluable educational tool. By shedding light on potential macular complications and offering expert guidance for their avoidance and effective management, the video strives to elevate surgical proficiency, foster safer practices, and ultimately enhance patient outcomes.

### Novel Indication for the Innovative Technique of Glue-assisted Retinopexy for Rhegmatogenous Retinal Detachment Surgery in Recurrent Detachment with Proliferative Vitreoretinopathy

*First Author: Anjali MAHESHWARI*  
*Co-Author(s): Subhadra JALALI, Mudit TYAGI*

**Purpose:** Fibrin glue retinopexy (GuARD) is an advancement in the shifting paradigm for retinal detachment surgery. Its use in primary uncomplicated rhegmatogenous retinal detachments has been reported. We report a novel indication for its usage in a complicated recurrent retinal detachment with proliferative vitreoretinopathy (PVR), obviating the need for prolonged retinal tamponade or re-surgery.

**Methods:** A 28-year-old male with total rhegmatogenous retinal detachment and PVR following a penetrating trauma to the right eye underwent lensectomy, vitrectomy, membrane peeling, PFCL usage with silicone oil injection, and endolaser. Six weeks after the initial surgery, there was re-detachment, PVR grade C3, and anterior PVR. He underwent silicone oil removal and careful membrane peeling. A single inferonasal open break was discovered, which was treated with fluid air exchange, retinal reattachment, endolaser followed by fibrin glue retinopexy of the break. Planned reinjection of oil was avoided.

**Results:** Fibrin glue remained an excellent adjunct to seal the break and no tamponade was required. The technique was very useful in avoiding the need for re-surgery for further oil removal. The patient at 9 months follow-up has no complications so far. The fibrin glue has completely reabsorbed, retina remains

attached, and the corrected aphakic visual acuity is 20/250.

**Conclusions:** With better understanding and improved techniques of fibrin glue usage, this can be used in select complicated retinal detachment surgeries that might obviate need for prolonged retinal tamponade.

### Pars Plana Vitrectomy for Live Vitreous Cysticercus Cyst with Retinal Detachment

*First Author:* Ayushi **SINHA**  
*Co-Author(s):* Sushil **KUMAR**

**Purpose:** To demonstrate the challenges of pars plana vitrectomy for live vitreous cysticercus cyst with retinal detachment.

**Methods:** Presenting a challenging surgical case of pars plana vitrectomy for a live vitreous cysticercus cyst with retinal detachment. The patient was a 48-year-old man who had undergone treatment for neurocysticercosis 5 months prior when he noticed a sudden onset diminution of vision in one eye. On presentation, visual acuity was hand movements close to face. Posterior segment evaluation showed a vitreous cyst with a live scolex with retinal detachment with temporal tractional detachment. Post-surgery, an attached retina with visual gain was noted.

**Results:** During surgery, movement of the scolex within the cyst was noted and the cyst was removed with vitrectomy cutter. Vitreoretinal surgery was done with silicone oil tamponade. Post-surgery, an attached retina with visual gain was noted.

**Conclusions:** Although challenging, vitreoretinal surgery for cysticercus can give beneficial results.

### Posterior Pole Rhegmatogenous Retinal Detachment in a Pathologic Myopic Patient

*First Author:* Wilson **WONG JUN JIE**

**Purpose:** To showcase simple alterations in surgical steps to make the surgery easy.

**Methods:** The pars plana was measured with a caliper prior to introduction of the trocar at

the pars plana, indenting and having direct visualization of the broader pars plana in these eyes. Other surgical steps were performed as per normal.

**Results:** This was an uneventful safe surgery.

**Conclusions:** Introducing the trocar further posteriorly at the pars plana in a highly myopic eye is an effective way to ensure surgical instruments reach the posterior pole.

### SFIOL Implantation in Complicated Surgical Scenarios

*First Author:* Gaurang **SEHGAL**  
*Co-Author(s):* Poornachandra **B**, Ayushi **CHOUDHARY**, Nikhil **GOPALAKRISHNAN**, Aishwarya **JOSHI**

**Purpose:** A case series of SFIOL (scleral-fixated intraocular lens) implantation using a sutureless glueless technique in various simple and complicated surgical scenarios, along with a case demonstrating variation in the original technique by use of foldable 3-piece IOL.

**Methods:** A series of surgical scenarios operated on by the same surgeon, showcasing successful SFIOL implantation using VRS technique. This sutureless, glueless technique involves first construction of partial thickness scleral side pockets. After completing vitrectomy, a foldable or rigid 3-piece IOL is placed inside the anterior chamber, the haptics are exteriorized through these ends and buried into the side pockets. SFIOL implantation to manage various complicated cases like a dropped nucleus, dropped foldable lens is first shown. Use of the same dropped 3-piece foldable IOL is also shown. We also demonstrate how an SFIOL is implanted in the presence of a trabeculectomy bleb and a SICS tunnel which frayed open secondary to blunt trauma.

**Results:** A desirable final postoperative outcome with improved visual acuity, patient comfort, and lower risks of complications. This minimizes major and common complications of other methods, such as suture breakage, slippage, IOL tilt/instability, and exposure. It leaves the ocular surface looking impeccable, making it almost impossible to identify and

differentiate from a posterior chamber IOL implantation as the incisions heal.

**Conclusions:** SFIOL implantation is an invaluable procedure for lens replacement in case of absence or a major deficiency of capsular support. This sutureless glueless technique can be adapted to minimize the suture-related problems of sutured SFIOL.

### Subfoveal Cysticercosis: The Curse of the White Pearl!

*First Author:* Veer **SINGH**

*Co-Author(s):* Arjan **SINGH**, Preetam **SINGH**

**Purpose:** As retina surgeons, we are occasionally presented with rare and distinctive cases, that we may only encounter and manage once throughout our entire professional career. The case of a young female patient with subfoveal cysticercosis with a recent drop in vision in her right eye is showcased in this film.

**Methods:** Surgical intervention involved internal limiting membrane (ILM) peeling (to reduce postoperative macular drag), creating a macular detachment, cyst displacement with PFCL, and removal via a temporal retinotomy. However, during subretinal injection a complication occurred when the cyst exploded out of the fovea and caused a blow-out macular hole. As the ILM had already been peeled, no further action was taken, and the case was closed with gas tamponade.

**Results:** Despite ILM peeling and gas tamponade, the macular hole persisted and a second surgery was required to close it. Subsequent follow-up assessments indicated positive outcomes, and the patient's overall condition improved.

**Conclusions:** This case underscores the challenges encountered during the surgical management of subfoveal cysticercosis and highlights the unexpected complication of macular hole formation. It emphasizes the importance of careful preoperative planning and execution to minimize such complications. Additionally, the successful closure of the macular hole demonstrates the effectiveness of the second surgical intervention in restoring

visual function. Further research and experience in managing similar cases will contribute to improving the outcomes for patients with subfoveal cysticercosis and associated complications.

### Subretinal Gliosis Removal: An Unconventional Surgical Approach

*First Author:* Naresh **KANNAN**

*Co-Author(s):* Avik **DEY SARKAR**, Muthukrishnan **VALLINAYAGAM**

**Purpose:** Proliferative vitreoretinopathy (PVR) is the most common cause of failure of surgery for rhegmatogenous retinal detachment (RRD). Removal of subretinal bands, especially bands that preclude surgical repair of detached retina and more specifically the "napkin ring" band around the optic disc, is considered an essential step in surgical management. This video features a unique outlandish technique of subretinal gliotic band removal through a subretinal approach.

**Methods:** A 57-year-old male presented with features of chronic RRD with extensive PVR changes and subretinal bands. During pars plana vitrectomy, the detached retina failed to get settled due to a cobweb-like network of subretinal bands. A 25-gauge valved port was furnished 10 mm from the limbus into the subretinal plane. All subretinal bands in the periphery and around the optic disc were removed meticulously, obviating the need for a retinotomy.

**Results:** A good anatomical and functional outcome was achieved. This innovative technique is a perfect blend of surgical skills and creativity.

**Conclusions:** This unorthodox technique of removing subretinal gliotic bands via subretinal approach is a long-lost art and we intend to resurface its application in the current vitreoretinal practice, in surgical scenarios with extensive subretinal bands. This technique may prove a boon to vitreoretinal surgeons in managing these tricky situations.

### Subretinal Hemorrhage Evacuation for Hemorrhagic Retinal Detachment Due to PCV

First Author: Nishant **RADKE**  
Co-Author(s): Snehal **RADKE**

**Purpose:** To demonstrate successful outcome in a case of massive hemorrhagic retinal detachment due to polypoidal choroidal vasculopathy (PCV).

**Methods:** A 68-year-old male, known hypertensive, on anticoagulants presented with sudden loss of vision of 34 days. Hemorrhagic retinal detachment was suspected on B scan and confirmed intraoperatively. The patient also had cataract. Both surgeries on the same patient were performed by the same surgeon: 25 G pars plana vitrectomy along with phacoemulsification and intraocular lens implantation (IOL) + subretinal hemorrhage evacuation + injection of perfluorocarbon liquid (PFCL) + endolaser followed by silicone oil injection and intravitreal anti-VEGF injection were carried out in a patient with PCV. The presenting vision was light perception (PL) which improved to 20/200 in the postoperative period. The patient needed 3 more anti-VEGF injections and subsequently underwent silicone oil removal (SOR) 4 months later. Retina stayed well attached with no more rebleeding. During SOR, 2 subretinal PFCL droplets within arcades but away from the fovea were aspirated using a 41 G cannula. This video is a composite of 2 videos which demonstrate the technique of inducing a GRT to clear subretinal hemorrhage and then retinopexy as well as subretinal PFCL aspiration.

**Results:** Retina stayed well attached with vision improving from PL to 20/150 3 months post SOR. IOP at presentation was 6 mm Hg and at last follow-up 3 months post-SOR had improved to 11 mm Hg.

**Conclusions:** Although the surgery was time consuming and duration of onset was more than 1 month, meaningful structural and functional improvements were noted.

### Surgical Approach to Bilateral Stage 4A Retinopathy of Prematurity

First Author: Katrina Beatriz **MANAS-LIM**  
Co-Author(s): Gregory Francis **GERMAR**

**Purpose:** To present a surgical video of bilateral stage 4A retinopathy of prematurity (ROP) with different extents of fibrous membranes and detachment.

**Methods:** A 930-g male infant was born at 26 weeks by normal spontaneous vaginal delivery at an outside hospital. There, he underwent an initial ROP screening, and underwent 1 injection of anti-VEGF. The patient was then transferred to our institution at a postmenstrual age (PMA) of 38 weeks for progression of ROP and vitrectomy. Both eyes were assessed to have stage 4A zone 2 ROP and tractional retinal detachment without foveal involvement; the left eye had less extensive disease. We performed pretreatment laser indirect ophthalmoscopy for both eyes 1 day prior to surgery. Lens-sparing 25-gauge pars plana vitrectomy was done in both eyes. Endolaser application was added to the posterior of the detachment border in the left eye.

**Results:** The eye with less extensive tractional retinal detachment, smaller total area of fibrous membranes, and smaller distance from the posterior border of detachment to fovea had a better outcome than the more severe eye despite the same staging and similar interventions.

**Conclusions:** In stage 4A ROP, the extent of fibrous membranes and detachment are predictors of outcome. Laser posterior to the detachment border may prevent progression of detachment. Further studies are needed for treatment of stage 4A ROP.



### Surgical Approach to a Combination of Tractional Retinal Detachment, Foveoschisis, and Lamellar Hole Secondary for Ocular Toxocariasis

First Author: Peter Vincent **CO**

**Purpose:** To present a case of chronic tractional retinal detachment, foveoschisis, and lamellar hole secondary to ocular toxocariasis.

**Methods:** Treatment was done via vitrectomy with fovea-sparing internal limiting membrane peeling.

**Results:** This is a case of a 19-year-old female who complained of progressive blurring of vision of the right eye. Ten years prior, the patient noted changes a few months after experiencing head trauma. At first consult, she presented with a visual acuity of 5/400 in the affected eye. Fundus exam showed a fibrous band over the optic nerve with a shallow tractional detachment of the surrounding retina and included the fovea. The band was also associated with vitreous membranes that extended into the far periphery and was densest in the infero-temporal quadrant. Macular OCT revealed a neurosensory detachment, foveoschisis, lamellar hole, and a dense vitreo-macular membrane. Due to the given history, the condition was initially attributed to the trauma. Treatment proceeded with a lensectomy, followed by a 25-gauge pars plana vitrectomy approach. To avoid any peripheral tractional forces, 360-degree truncation of the peripheral vitreous membranes was done. A small, white, dome-shaped granuloma was identified underneath the vitreous membranes in the infero-temporal quadrant. The fibrous band was shaved down to the base at the optic nerve but could not be completely removed. Finally, to relieve as much macular traction as possible and avoid iatrogenic foveal damage, a fovea-sparing internal limiting membrane peel was performed before C3F8 gas tamponade.

**Conclusions:** In conclusion, sequelae of ocular toxocariasis may create complex vitreo-retinal configurations that require careful surgical considerations.

### Surgical Nuances in Management of Intraocular Cysticercosis

First Author: Nawazish **SHAIKH**

Co-Author(s): Shorya **AZAD**, Akshaya **BALAJI**

**Purpose:** To evaluate the role of 25G MIVS in different scenarios associated with intraocular cysticercosis.

**Methods:** Three eyes of 2 patients who presented with intraocular cysticercosis underwent 25G MIVS at a tertiary eye care center in northern India. Each patient had a distinct clinical scenario. One eye had a live submacular cysticercosis cyst while his fellow eye had a dead fibrotic subretinal cyst along the inferotemporal arcade; and lastly, the third eye had a vitreous cyst associated with dense vitritis.

**Results:** All 3 eyes underwent a successful and uneventful 25G MIVS surgery with fluid-air exchange. All patients had a well attached retina at last follow-up with no adverse events reported in the postoperative period.

**Conclusions:** 25G MIVS is safe and effective in live as well as dead fibrotic cysticercosis cysts.

### Tale of a Stubborn Macular Hole

First Author: Aditya **KELKAR**

Co-Author(s): Mounika **BOLISETTY**, Subhasree **DUTTA**, Harsh **JAIN**

**Purpose:** Addressing challenging macular holes, especially in cases exceeding 400  $\mu\text{m}$ , extended duration, high myopia, and recurrence, lacks consensus. We introduce a novel technique involving epiretinal human amniotic membrane graft transplantation for managing persistent and recurrent macular holes.

**Methods:** A 64-year-old female with compromised vision and a persistent macular hole, along with epiretinal membrane and cataract, underwent a combined procedure comprising phacoemulsification with intraocular lens implantation, vitrectomy, epiretinal membrane peeling, internal limiting membrane (ILM) peeling, and SF6 gas tamponade. Despite initial attempts, the macular hole remained

open, leading to a re-surgery. As traditional techniques were ineffective, a human amniotic membrane graft was employed. A 3-mm cryopreserved epiretinal human amniotic membrane graft was positioned over the macular hole using intraoperative OCT guidance, followed by SF6 gas tamponade.

**Results:** The amniotic membrane graft induced gradual macular hole closure, confirmed by intraoperative OCT and postoperative assessments showing type I closure. This innovative technique demonstrated efficacy in treating previously unresponsive macular holes.

**Conclusions:** Managing challenging macular holes remains a clinical hurdle. Our novel epiretinal human amniotic membrane graft approach presents a promising solution, showcasing successful macular hole closure. While no universal gold standard exists, this technique expands the options available to retinal specialists when dealing with similar cases.

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### The Graft Craft for Macular Hole

*First Author: Gaurang SEHGAL*  
*Co-Author(s): Nagesha CHOKKAHALLI, Ayushi CHOUDHARY, Nikhil GOPALAKRISHNAN, Chaitra JAYADEV*

**Purpose:** To show a technique of retinal grafting in a young male with a large macular hole to prevent further vision loss by aiming at anatomical closure.

**Methods:** An 18-year-old male presented to us with a large macular hole with base diameter 1802 µm. A 3-port pars plana vitrectomy was planned. Post vitreous detachment (PVD) was induced with help of IVTA. A fourth port was made and with the help of inferior chandelier illumination system bimanual surgery was done. The retinal graft site was marked by 3 layers of endolaser in the supero-temporal quadrant, and the graft was harvested with horizontal and vertical intraocular scissors. Under PFCL, the graft was transferred to the macula with the help of ILM and Pick forceps. The graft was trimmed to approximately 10% more than the actual size of macular hole. After securing the

graft, the harvest site and grafting site were re-checked and the eye was filled with long standing gas tamponade in the form of C3F8 gas.

**Results:** On postoperative day 1, there was closure of the macular hole on fundus examination with 20 D lens. On week 3 follow up of the patient, OCT showed complete closure of the macular hole with graft. The patient's vision maintained at 6/60 parts. Anatomical closure of the macular hole was achieved. Visual outcomes are awaited as RPE undergoes remodeling.

**Conclusions:** Retinal grafting can be attempted using our technique with minimal instrumentation to achieve anatomical outcomes and prevent further loss of visual acuity.

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### The Rescue Needle

*First Author: Harshal SAHARE*  
*Co-Author(s): Dr Ravi Shankar H N*

**Purpose:** To fill silicone oil in an underfilled eye with a 26G needle.

**Methods:** Attaching a 26-gauge needle to a silicone oil infusion syringe and inserting the needle directly into the globe without creating additional ports in cases of underfilled silicone oil constitutes easy insertion of silicone oil.

**Results:** All underfilled eyes were refilled with silicone oil again without making any extra ports, which helps in avoiding intraoperative hypotonous globe-related complications.

**Conclusions:** This method allows for the refill of intraoperative underfilled silicone oil without the need for an additional port, avoiding hypotonous globe-related complications.

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### Tractional Retinal Detachment: The Unveiling

*First Author: Harsh JAIN*  
*Co-Author(s): Subhasree DUTTA, Aditya KELKAR*

**Purpose:** This video sheds light on the challenges faced while managing tractional retinal detachment (TRD), unveiling techniques

to handle both TRD and its intraoperative complications.

**Methods:** The video comprehensively showcases various TRD management approaches, discussing the importance of biometric assessment for precise preoperative planning and insights to manage complications during surgery.

**Results:** The video offers a comprehensive guide for managing TRD, providing an approach adaptable to different scenarios.

**Conclusions:** Effectively managing TRD demands diverse techniques, meticulous preoperative planning, and adept intraoperative problem-solving. This video contributes to improve patient care and surgical outcomes in TRD cases.

### Unraveling the Funnel: Tips on Managing Closed Funnel Retinal Detachment

*First Author: Ayushi CHOUDHARY  
Co-Author(s): Poornachandra B, Nikhil GOPALAKRISHNAN, Aishwarya JOSHI, Priyanka GANDHI*

**Purpose:** To showcase a case-based surgical video of a re-surgery done for closed funnel retinal detachment due to extensive proliferative vitreoretinopathy (PVR) changes in a young male. This short video aims to show certain tips and tricks that might prove useful when handling daunting cases of closed funnel retinal detachments.

**Methods:** A young male was operated on initially for a traumatic scleral tear, vitreous hemorrhage, and retinal detachment 1 month previously. Scleral tear repair with a meticulous vitrectomy followed by fluid-air exchange and SF6 gas injection had been done. He then developed significant PVR and closed funnel RD with a VA of counting fingers close to face. A crumpled retina with rolled-over margins was seen 1 month post-surgery. Intraoperatively, densely adherent PVR membranes were seen with multiple star folds. All of these membranes were patiently dissected, and the funnel was opened using PFCL. Retinal margins were manually unrolled and a relaxing

retinotomy was done to manage intrinsic retinal contraction. A fluid-air exchange was then done, followed by silicone oil injection.

**Results:** After meticulous dissection and relaxing retinotomy, the funnel was slowly opened. Our patient achieved a vision of 3/60 post-surgery.

**Conclusions:** The case demonstrates tips for handling retinal detachments with extensive PVR changes. It also brings forth the possibility of managing cases which are often considered inoperable, and the chances of having visual recovery in the same.

### Visualizing the Obscure: Chromophore-assisted Retinal Break Detection

*First Author: Shishir VERGHESE*

**Purpose:** Finding a retinal break which is responsible for retinal detachment (RD) is a critical step in the surgical treatment of this condition. In spite of improvement in visualization systems in pars plana vitrectomy, identifying the break which is the source of subretinal fluid (SRF) could pose a challenge especially in complex RDs, re-detachments with extensive laser scars, or where there is lack of contrast from the choroid.

**Methods:** Video report of cases with recurrent RD where subretinal brilliant blue green (BBG) dye was injected to detect retinal breaks.

**Results:** Case 1: A 62-year-old male with hand movements vision presented with recurrent RD in the right eye. No break was detected intraoperatively and BBG dye was loaded in the subretinal injector, infusion pressure was reduced, and the dye was injected into the subretinal space using a 41-gauge cannula and displaced with PFCL. The plume of the dye was noticed emanating from the retinal break thereby leading to its identification. Case 2: A 70-year-old female with recurrent RD in the right eye with no identifiable break underwent the same technique leading to its identification.

**Conclusions:** Subretinal BBG dye is least toxic and useful for occult break detection as it provides a color contrast. A posterior draining

retinotomy can be avoided if a retinal break is localized. It is useful in recurrent RD and where there is lack of contrast from the choroid. Its use for this innovative technique has not been reported previously.

### Vitreotomy in Retinopathy of Prematurity

First Author: Rajiv **GANDHI**

**Purpose:** To demonstrate the difficulties when operating in retinopathy of prematurity (ROP) patients and both the surgical and general challenges faced.

**Methods:** A series of patients (babies) who underwent vitrectomy for retinopathy of prematurity were recorded for presentation after obtaining consent from the parents.

**Results:** Vitrectomy in cases of ROP is performed in stage 4 or stage 5. With advances in technology, outcomes have improved drastically in stage 4 cases and in certain cases of stage 5. Timely intervention with proper surgical technique yields a better outcome.

**Conclusions:** Retinopathy of prematurity is one of the leading causes of blindness in children. Although operating on ROP has a lot of challenges and difficulties, with newer technologies and smaller gauges, performing surgeries in such cases has become easier than before. This video demonstrates the surgical difficulties a surgeon faces in operating on ROP cases and overcoming them, plus general challenges ranging from parent counseling to acceptance.

### When the Cornea Goes Brittle, Our Resolve Goes Hard

First Author: Obuli **N**

Co-Author(s): Soumya **JENA**, Mahipal **SACHDEV**, Pranita **SAHAY**, Gauri **KHARE**

**Purpose:** To share our experiences when operating on a case of bilateral brittle cornea syndrome with multiple failed penetrating keratoplasties and showing retinal detachment on B-scan.

**Methods:** A 12-year-old child with bilateral brittle cornea syndrome had a history of

multiple penetrating keratoplasty in both eyes. At presentation RE had perception of light and LE had no perception of light. Total graft scarring with retinal detachment on B-scan was noted. Patient was taken up for RE temporary keratoprosthesis followed by vitreoretinal surgery with 5000CS SO endotamponade and finally a penetrating keratoplasty was performed in the same sitting.

**Results:** Postoperatively the child had uncorrected visual acuity of FC at 6 m.

**Conclusions:** In this video we wish to elucidate the different challenges we encountered during the surgery and also the techniques we implemented to overcome the challenges.

### “When you cannot eat it, bury it”: An Unorthodox Surgical Approach for Fibrotic Subfoveal Choroidal Neovascular Membrane

First Author: Naresh **KANNAN**

Co-Author(s): Avik **DEY SARKAR**, Muthukrishnan **VALLINAYAGAM**

**Purpose:** Scarred CNVM is not amenable to conventional treatment modalities and submacular surgery offers an exciting option albeit the modest functional outcome.

**Methods:** Surgical video. An 80-year-old patient presented with defective vision in the left eye for 3 months. B scan showed vitreous hemorrhage with subretinal hemorrhage. 23G ports were made and core vitrectomy was done. Choroidal neovascular membrane (CNVM) with subretinal plaque was noted. An iatrogenic detachment was induced with 41 G needle. Fluid-air exchange was done followed by diathermy to temporal periphery to create 180-degree retinal flap. The retinal flap was everted nasally using Tano’s scraper to expose the subretinal plaque. The plaque was removed using forceps and noted to be leathery. Diathermy was done to harvest temporal RPE graft. It was carefully positioned over the macula and the retinal flap was repositioned. The fibrotic plaque was buried temporally in the donor area of graft. PFCL and silicone oil topped up and advised supine positioning for 3 days. In a second stage surgery, silicone oil



and PFCL were removed and fluid-air exchange done. Endolaser was done at the temporal aspect of the flap along with silicone oil tamponade.

**Results:** The postoperative imaging demonstrates complete removal of CNVM and no recurrence was observed over 6-month follow-up period.

**Conclusions:** Submacular surgery for fibrotic CNVM can stabilize or improve visual acuity in selected cases. Surgical excision provides a gratifying outcome in large fibrotic CNVM.



