UBC Department of Ophthalmology and Visual Sciences
34th Annual Research Day
VGH/UBC Eye Care Centre

Friday April 20, 2018

UBC Ophthalmology and Visual Sciences Speakers
“Clinically Relevant Basic Science and Clinical Research”

Special Guest Speaker
Mark Pennesi, M.D., Ph.D.
Division Chief, Ophthalmic Genetics
Associate Professor of Ophthalmology, Oregon Health and Science University
“What’s New in Retinal Gene Therapy?”

This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification program of the Royal College of Physicians and Surgeons of Canada. This program has been reviewed and approved by UBC Division of Continuing Professional Development.

Video conferencing will be available.

*This program lists the proposed presenters and discussants at the time of printing and is subject to change.*
April 15, 2018

Dear Colleagues:

It gives me great pleasure to welcome you to the 34th Annual UBC Department of Ophthalmology and Visual Sciences Research Day. The program promises to be a stimulating blend of clinical and basic science projects that will highlight the excellent work that has been conducted over the past year in our Department.

I am pleased to welcome Dr. Mark Pennesi as our invited guest. Dr. Pennesi comes to us from the Casey Eye Institute, of the Oregon Health and Sciences University in Portland, Oregon, where he is an Associate Professor and Chief of Ophthalmic Genetics. He is also co-director of Visual Function Services, and Director of the Ophthalmic Imaging Services.

Dr. Pennesi received his B.S. in bioengineering from the University of Pennsylvania, his Ph.D. and M.D. degrees from Baylor College of Medicine, undertook his residency at Scripps Mercy Hospital in San Diego, and completed his Ophthalmic Genetics fellowship at the Casey Eye Institute in 2009.

Dr. Pennesi’s research topics include the genetics of retinal dystrophies, methods for modulating retinal neurotrophic factors, retinal imaging techniques for patients and animal models, and gene therapy for retinal degeneration.

I would also like to welcome UBC president and our Department member Dr. Santa J. Ono, who will provide opening remarks this year.

I would like to thank this year’s organizing committee, Dr. Orson Moritz, Dr. Ipek Oruc, Dr. Simon Warner, Dr. Kevin Gregory-Evans, and Dr. Colten Wendel for their efforts in coordinating today’s meeting. This is a very significant contribution to the academic mandate of our Department.

A sincere thank you to this year’s meeting sponsors who have generously provided unrestricted educational grants. Platinum – Alcon Canada Inc., Gold – Bayer. Bronze – Allergan.

David Maberley, MD, FRSC
Professor and Head
Department of Ophthalmology and Visual Sciences, UBC
Head, Department of Ophthalmology Vancouver Acute
Regional Department Head, Department of Ophthalmology, VCH and PHC
Program

8:00 am  Introduction of Dr. Santa Ono – video conferencing starts........................................D. Maberley
8:01 am  Welcome and opening remarks from the President of UBC.............................................S. J. Ono

Session 1 – Retina 1
Moderator: O. Moritz

8:05 In vivo imaging of curcumin labeled amyloid beta deposits in retina using fluorescence scanning laser ophthalmoscopy in an Alzheimer mouse model ..........................................................A. Sidiqi
8:14 Multi-acquisition averaging OCT-A for diabetic retinopathy ................................................H. Akil
8:23 Visual and anatomic outcomes after vitrectomy with internal limiting membrane peeling for diabetic macular edema.................................................................E. Sedbazar
8:32 Canadian practice patterns for idiopathic epiretinal membranes.............................................M. Butler
8:41 Improving surgical technique for delivery of retinal precursor cells to subretinal space ....M. Wahid
8:50 Discussion................................................................................................................................S. Levasseur and A. Merkur

9:05 Introduction of Dr. Pennesi..........................................................K. Gregory-Evans
9:10 GUEST SPEAKER – What's new in retinal gene therapy?.........................................................M. Pennesi
9:55 Discussion................................................................................................................................TBA

10:10 Coffee Break

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Moderator: S. Warner

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10:44 Effect of visual exposure to other-race faces on face recognition efficiency.....................M. Mousavi
10:53 Eye movements as sensitive markers of small-vessel disease: a pilot study....................M-C. Liu
11:02 Fixation stability and motion perception deficits in amblyopia.........................................K. Meier
11:11 Dual-task smooth pursuit and working memory load improves diagnostic performance of pursuit in mild traumatic brain injury ..............................................................J. Stubbs
11:20 Discussion................................................................................................................................B. Sexton and J. Chuo

11:35 Lunch – Medical Student & Alumni Centre, 2750 Heather Street
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12:45 Urrets-Zavalia syndrome as a complication of neodymium-YAG laser posterior capsulotomy: A Case Series.................................................................L Robinson

12:54 Assessment of the impact of educational materials on patient satisfaction in an emergency ophthalmology clinic.................................................................G. Law

1:03 A resurgence of ocular syphilis in British Columbia: 2013-2017 A retrospective chart review.................................................................M. Eslami

1:12 Epidemiological survey of fungal and/or MRSA keratitis ..................................................G. Qiao

1:21 Prospective analysis of emergency ophthalmic referrals in a Canadian tertiary teaching hospital.................................................................M. Yang

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Session 4 – Methodology
Moderator: I. Oruc

1:45 Modeling environmentally-induced motor neuron degeneration in zebrafish.........................J. Morrice

1:54 Ex-vivo imaging of posterior human corneal layers after Big Bubble DALK procedure with Ultrahigh Resolution OCT (UHR-OCT) .................................................................M. Alobthani

2:03 Optical coherence tomography segmentation of conjunctival lymphatics with use of indocyanine green.................................................................G. Docherty

2:12 Role of prostaglandin use in recurrent HSV keratitis..........................................................K. Clapson

2:21 Association of post-operative topical prostaglandin analog and/or beta-blocker use and incidence of pseudophakic cystoid macular edema .................................................................C. Wendel

2:30 Discussion............................................................................................................A. Giligson and N. Nathoo

Session 5 – Retina 2
Moderator: K. Gregory-Evans

2:45 Dexamethasone implant for the treatment of persistent diabetic macular edema in eyes not responsive to long-term treatment with bevacizumab.................................................................A. Joe

2:54 Surgical success and functional outcomes of failed pneumatic retinopexy for primary rhegmatogenous retinal detachment.................................................................R. Martens

3:03 The effect of optical quality of posterior intraocular lens implants on vitrectomy..................T. Fang

3:12 Modeling cone-rod dystrophy in genetically modified African clawed frog: insights into photoreceptor disc membrane synthesis.................................................................B. Carr

3:21 Interplay between inflammation and cell death pathways in geographic atrophy of AMD....R. Chen

3:30 Discussion............................................................................................................D. Bhui and D. Hammoudi

3:45 Closing Remarks – video conferencing ends.....................................................................O. Moritz

3:55 Judging

4:00 Reception & Announcement of Awards
Abstracts

Session 1 – Retina 1

Moderator: O. Moritz

In vivo imaging of curcumin labeled amyloid beta deposits in retina using fluorescence scanning laser ophthalmoscopy in an Alzheimer mouse model

Ahmad Sidiqi¹, Daniel Wahl², Sieun Lee¹,², Sijia Cao¹, Jing Cui¹, Eleanor To¹, Mirza Beg², Marinko Sarunic², Joanne Matsubara¹

2. School of Engineering Science, Simon Fraser University, Burnaby, BC, Canada.

Purpose: Alzheimer’s disease (AD) is a chronic progressive neurodegenerative illness that is the commonest cause of dementia. A hallmark of AD is amyloid beta (Aβ) plaques detected on neuropathology, or expensive clinical tests in patients who are in advanced stages of disease. A non-invasive method of screening for these plaques could allow for early detection and treatment of asymptomatic patients. While the eye is an extension of the brain, and an excellent organ to image in vivo, a fluoroprobe is required in order to visualize the ocular Aβ deposits. Aβ deposits in the eye can act as surrogate marker for early-stages of AD. In this longitudinal study, we use a mouse model of AD to detect ocular Aβ load in the mouse retina.

Methods: Transgenic (Tg) AD mouse models were followed between 5 months to 18 months of age. Curcumin (a fluorophore that binds to Ab) formulations were delivered to the target-in vivo site via tail-vein injections into each mouse (n=10) once every ~ 3 months. Retinal images of the right eye were acquired using a custom fluorescence Scanning Laser Ophthalmoscope (fSLO), before and 2 hours after curcumin injection. The Aβ load was quantified by fluorescence index, computed by segmenting and counting the number of pixels in fluorescent specks in each image. The specks were detected by intensity-based median-filtering and thresholding. At 18 months of age, the mice were sacrificed and Ab load was measured ex vivo on Tg brain and eye tissue using scanning confocal microscopy imaging and immunohistochemistry.

Results: While there was a trend towards higher fluorescence with increasing mouse age, the mean fluorescence index ratio was greater after curcumin injection compared to before (mean of 2.78 vs. 0.556 respectively, p = 0.004) at each time point. Funduscopic detection of Aβ deposits in the mouse eyes correlated with the scanning confocal microscopy imaging of the eye cups from the 18-month-old mice. Curcumin labeling of Tg mouse eye cross sections showed positive staining in the inner layers of the retina.

Conclusions: The retina and brain of the Tg mice readily express Aβ deposits, which are then detected using fSLO, confocal microscopy, and immunohistochemistry. These findings suggest that using in vivo fSLO live imaging of curcumin in the retina may be a novel and non-invasive method of detecting ocular amyloid beta, and potentially a novel method of predicting and diagnosing early AD.

Multi-acquisition averaging OCT-A for diabetic retinopathy

Handan Akil and Eduardo V. Navajas

Purpose: To study the impact of multi acquisition averaging on qualitative and quantitative evaluation of diabetic retinopathy with optical coherence tomography angiography (OCTA).

Methods: Ten eyes of 10 patients with diabetic retinopathy were included in this study. OCT-A images were acquired from an OCT clinical prototype with real-time speckle variance processing software. The OCT system used a 1060nm swept source (Axsun Inc) with 200 kHz A-scan rate and a 105 nm wavelength sweeping range. Ten serially acquired OCT-A volumes centered at the foveal avascular zone (FAZ) were obtained per eye. High performance computing was
introduced to accelerate the image processing to enable high quality visualization of the retinal microvasculature and more accurate quantitative analysis in a clinically useful time frame. Image discontinuities caused by rapid micro-saccadic movements and image warping due to smoother reflex movements were corrected by strip-wise affine registration and subsequent local similarity-based non-rigid registration.

Results: After the averaging of multiple enface images, the vessels of the deeper capillary plexus are more easily identified, making quantification more reliable and thereby facilitating investigation of its role in the pathophysiology of diabetic retinopathy.

Conclusion: High quality visualization of the retinal microvasculature may improve our understanding of the onset and development of retinal vascular diseases such as diabetic retinopathy, which is a major cause of visual morbidity.

Visual and anatomic outcomes after vitrectomy with internal limiting membrane peeling for diabetic macular edema

Enkhtuul Sedbazar and Hugh Parsons

Purpose: To investigate the effect of Pars Plana Vitrectomy (PPV) with Internal Limiting Membrane (ILM) peeling on the treatment of diabetic macular edema (DME) refractory to medical therapies of patients with or without vitreoretinal interface diseases.

Design: Retrospective, single-center, consecutive case series.

Participants: A total of 35 eyes in 31 patients undergoing pars-plana vitrectomy with ILM peeling for diabetic macular edema refractory to medical intervention between December 2009 and December 2016.

Methods: We reviewed the records of patients undergoing a standard 25-gauge pars-plana vitrectomy with ILM peeling for diabetic macular edema unresponsive to non-surgical treatments. Anatomic success and functional outcomes were evaluated for patients receiving PPV with ILM peeling.

Main Outcome Measures: The primary outcome measures were the change in the preoperative macular central subfield thickness (CST), in the best-corrected visual acuity (BCVA) score at postoperative month 1, 3 and 6 noted clinical appointment.

Statistic Analysis: Excel, SPSS.

Results: A total of 35 eyes in 31 patients had undergone PPV with ILM peeling for DME with or without vitreoretinal interface changes refractory to anti-VEGF and macular grid or focal photocoagulation on the mean of 3.9 years since the patients were first started on medical treatment for DME. The mean preoperative baseline logarithm of the minimum angle of resolution (LogMAR) (Snellen) best-corrected visual acuity (BCVA) was 0.50 ± 0.25 (20/63). At 1-month postoperative follow-up, the mean BCVA was 0.53±0.30 (20/63). At the 3-month post-operative, the mean BCVA was 0.48±0.28 (20/63), and at the 6-month postoperative follow up, the mean BCVA was 0.41±0.27 (20/50) (Table 1). The difference between preoperative and postoperative BVCA was not a statistically significant difference at 1, 3 and 6-month (P=0.098) (Table 2). The mean preoperative baseline macular central subfield thickness (CST) on time-domain optical coherence tomography (TD-OCT) was 374.29±98.60. At 1 and 3-month postoperative follow-up, the mean CST was 326.14±62.05 and 309.54±79.40 µm respectively. The mean CST at 6-month postoperative follow up was 308.25±61.76 µm. The difference between preoperative and postoperative 6-month CST was statistically significant (P=0.001) which smaller that our risk level of 0.05 (Table 3). 2 groups of DME those (20 out of 35) with intact IS/OS lines and with IS/OS defects were compared in visual acuity. People in group of DME those with intact IS/OS lines improved from preoperative average of 20/80 to postoperative 6-month average of 20/63 which shows statistically significant (P=0.01), whereas those (15 out of 35) with IS/OS defects improved from preoperative average of 20/60 to postoperative 6-month average of 20/50 (P=1.00)
Canadian practice patterns for idiopathic epiretinal membranes

Myra Butler, Lulu Yang and Carolyn Lee

An anonymous survey of 31 vitreoretinal surgeons was performed at the 2014 Canadian Retina Society. The majority of respondents were from BC and central Canada with a range of practice length. Although surgeons considered visual acuity, symptoms and OCT findings of differing levels of importance, they tended to agree that a symptomatic patient with an ERM on OCT and vision of 20/40 or worse are reasonable candidates for surgery. No surgeons reported partial or minimal vitrectomy. There were a variety of visualization techniques but ICG was the most common stain used. The "double peel" technique of ERM then ILM peeling separately was most common, though a minority usually peel only the ERM. Post-operative drop regimens varied widely; however, the most common combination was an antibiotic drop and cycloplegic for up to two weeks along with steroid drops for up to 4 weeks. Very few used NSAIDs for primary prevention of CME. Most surgeons do an OCT either at or beyond 6 weeks with another a month later if there are signs of CME. The majority treat CME immediately with NSAID and steroid drops possibly progressing to periocular or intraocular steroid if the CME persists. All but two respondents would offer repeat surgery for residual or recurrent membrane. More than half of respondents noted retinal thickening in the area of peeling.

Improving surgical technique for delivery of retinal precursor cells to subretinal space

Muizz Wahid, Anat Yanai, and Kevin Gregory-Evans

Purpose: Subretinal transplantation of retinal precursor cells (RPC) can be used to protect and rescue degenerative retina. Current techniques show low survival and functional integration of transplanted RPC. We propose to explore novel delivery systems in order to improve cell survival in subretinal injection of RPC. Specifically, we aim to improve the viability of RPC using a fibrin solution and present a technique to inject the suspension within the subretinal space.

Methods: We determined the concentration of fibrinogen and thrombin required to facilitate polymerization. Various concentrations were tested to determine the combination that would: 1) avoid polymerization within the syringe 2) polymerize relatively quickly once injected. Time to polymerize once both fibrinogen and thrombin were introduced into a single syringe was also tested, thereby determining the minimum and maximum time for injection. Cells were then placed into wells and fibrin solution was injected. Cell viability within the solution was determined via staining and microscopy at various time-points. Subretinal injections were then modeled using a novel artificial retina construct.

Results: Concentration of fibrinogen was determined to be 20 mg/mL and thrombin was 20 U/mL. Minimum time to inject once combined into one syringe was 180s. Injection prior to 180s prevents localization of hydrogel solution. Maximum time to inject to prevent polymerization within syringe was 230s.

Conclusions: Fibrinogen and thrombin can be combined to form an injectable hydrogel that may facilitate transplantation of RPC within subretinal space.
Session 2 – Perception and Neuroophthalmology
Moderator: S. Warner

An eye for detail: Is spatial frequency processing a source for enhanced cortical functioning in people with autism spectrum disorders?

Todd Kamensek1,3, Fakhri Shafai1,3, Grace Iarocci2, and Ipek Oruc3

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Autism Spectrum Disorder (ASD) is a developmental disorder characterized by deficits in social-communication and interaction in addition to restricted and repetitive behaviour and interests (APA, 2013). Despite these deficits, a few studies have shown superior performance in various visual tasks, such as visual search (O’Riordan et al. 2001) and embedded figures (Shah and Frith 1983). It has been suggested that these atypicalities can be attributed to enhanced functioning of low-level perceptual processes (Mottron et al., 2006). In the present study we examined basic visual processing of spatial frequency (SF) as a potential source for enhanced perceptual functioning (EPF). We employed three experiments to assess three distinct aspects of SF perception: sensitivity, precision, and accuracy. In Experiment 1, using a 2-interval forced choice (2-IFC) detection paradigm, contrast sensitivity was measured at eight SFs (1-24 cpd). In Experiment 2, we assessed precision as a function of spatial frequency via a 2-IFC discrimination paradigm. In Experiment 3, accuracy of SF perception (i.e., veridical perception) was assessed via a method-of-adjustment paradigm. Finally, in Experiment 4 we implemented a search experiment that has reliably demonstrated superior performance in people with ASD in previous studies (Hessels et al. 2014; Kemner et al. 2008; O’Riordan et al. 2001) to explore possible associations between performance in our first three experiments, and performance in visual search. No evidence for enhanced perceptual functioning was found in any of our three experiments examining sensitivity, precision, or accuracy of SF perception in ASD (N=10) compared to age-, gender-, IQ-matched controls (N=16). In addition, results from the search experiment failed to replicate previous findings of superior performance in ASD. These findings are consistent with our previous research on visual orientation perception (Shafai et al. 2015) and suggest that enhanced low-level visual processing is not a source of EPF in autism spectrum disorder.

Effect of visual exposure to other-race faces on face recognition efficiency

Seyed Morteza Mousavi1,2 and Ipek Oruc2

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2. Department of Ophthalmology and Visual Sciences, University of British Columbia

Perceptual development across several modalities is tuned towards a greater efficiency in processing more prominent environmental inputs (Pascalis et al., 2005; Lewkowicz & Ghazanfar, 2006). Face processing develops based on the specific types of faces available in the visual environment as well. One area that is impacted by this tuning pattern is recognizing own- versus other-race faces, as identification of other-race faces is more difficult than own-race faces, a phenomenon known as the other-race effect (Meissner & Brigham, 2001). However, it is not clear that how sustained high exposure to both own- and other-race faces would influence face recognition ability. Here we consider two hypotheses regarding the impact of multi-ethnic exposure on face recognition. A “resource bottleneck” account suggests that attainment of native-level expertise for face recognition requires significant neural resources and comes at the cost of ability to identify and discriminate other-race faces. Alternatively, a “use/disuse” account suggests that expertise for recognizing other-race faces does not develop due to lack of relevant input, rather than resources being needed elsewhere. If the former is true, then multi-ethnic exposure will prevent the brain from allocating all sufficient resources to develop face expertise for either ethnicity and will lead to less refined recognition of faces across all ethnicities. However, the “use/disuse” hypothesis
predicts that multi-ethnic exposure renders expert level performance in recognizing both own- and other-race faces. To discriminate between these two hypotheses, we examined the effect of exposure history on face recognition efficiency. We developed a 5-alternative forced choice task with three classes of stimuli: 1) Caucasian faces, 2) East Asian faces, and 3) Houses. Contrast recognition thresholds were measured among three subject groups: 1) high exposure to Caucasian faces (Caucasian), 2) high exposure to East Asian faces (East Asian), and 3) high exposure to both Caucasian and East Asian faces (Multiethnic). High-noise efficiency for the subjects across the three stimuli sets were computed relative to an ideal observer performing the same tasks. Efficiencies for faces were higher compared to houses across all three subject groups. The Multiethnic participants had high efficiencies for both face types. These results suggest that with high exposure to both own- and other-race faces the visual system has the capacity to attain native-level expert performance with faces from at least two distinct ethnicities.

Eye movements as sensitive markers of small-vessel disease: a pilot study

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Background: Cerebral small vessel disease is a neurodegenerative condition affecting the smallest blood vessels in the brain. It may present with strokes, cognitive impairment, dementia, or functional decline. The disease often progresses insidiously, and is not diagnosed until symptoms are severe. Our study aims at identifying pre-symptomatic high-risk patients by using eye movements.

Method: We developed an eye-movement test battery that includes the following tests: visually-guided and predictive smooth pursuit tracking of small spots moving at different speeds and in different directions, saccades and antisaccades to visual targets, and self-paced saccades to investigate the ability to initiate movements without external trigger.

Results: Preliminary findings reveal no differences between patients (n=23) and healthy controls (n=21) in standard assessments of visual (ETDRS), cognitive (MoCA) or motor function (gait; timed up-and-go). However, eye movement markers discriminate patients from controls even at the earliest stage of the disease.

Discussion: These findings indicate that eye movements might be useful indicators of the disease. Our test may enable earlier diagnosis, thus facilitating early, aggressive treatment of vascular risk factors to prevent progression to stroke or dementia.

Fixation stability and motion perception deficits in amblyopia

Kimberly Meier¹, Simon Warner², Deborah Giaschi², and Miriam Spering²

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Introduction: Beyond the characteristic deficit in visual acuity in one eye, people with unilateral amblyopia show deficits on a range of visual functions including motion perception at slow speeds. These are usually attributed to the abnormal development of low-level visual motion processing mechanisms. However, unstable fixation has been reported in amblyopia, and may impact motion perception by degrading the input received by direction-selective neurons. Here we ask whether poor performance on slow motion tasks can be accounted for by poor fixation stability. We assessed fixation stability in adults with healthy vision and adults with amblyopia during a motion perception task.
Methods: Participants performed a global motion direction discrimination task with stimuli moving at a slow or fast speed. Dot coherence was controlled with a staircase procedure to obtain coherence thresholds. In a control condition, participants viewed stationary dot patterns. Participants were asked to fixate a central cross throughout the task. Bivariate contour ellipse area and the number of microsaccades on each trial were calculated as indices of stability.

Results: Fixation was more stable for the motion discrimination task at either speed, compared to stationary viewing. Participants’ overall stability did not predict their coherence thresholds on the motion discrimination task for either speed.

Conclusions: Adults show no clear relationship between eye movement stability and global motion coherence thresholds. This suggests fixation instability may not solely account for the motion perception deficits observed in amblyopia.

Dual-task smooth pursuit and working memory load improves diagnostic performance of pursuit in mild traumatic brain injury

Jacob L. Stubbs, Sherryse L. Corrow, Benjamin Kiang, Jeffrey Corrow, Hadley L. Pearce, William J. Panenka, Jason J. S. Barton

Background: It is estimated that there are up to 42 million mild traumatic brain injuries (mTBI) worldwide every year, however no standardized tool or biomarker exists to diagnose mTBI. Recent work has attempted to quantify and use eye movement variability as an objective biomarker of mTBI, yet the sensitivity and specificity of such paradigms are still insufficient for diagnostic use. We hypothesized that combining a challenging working memory task and smooth pursuit would increase the diagnostic performance of smooth pursuit in mTBI.

Methods: We integrated an n-back task with two levels of working memory load (1-back and 2-back) into a smooth pursuit target, and tested single- and dual-task pursuit in 16 mTBI patients and 15 healthy controls. We quantified pursuit using traditional measures of velocity accuracy, as well as measures of spatial accuracy and variability.

Results: A two-way mixed ANOVA showed that the mTBI group had higher pursuit variability than the control group at baseline and across each level of additional working memory load (p < 0.05). Post hoc tests using Tukey’s HSD showed that performing a concurrent 1-back task during pursuit decreased pursuit variability for the mTBI group (p < 0.05), but not significantly for the control group. Performing a concurrent 2-back task decreased pursuit variability for the control group (p < 0.05), but not the mTBI group. Empiric receiver operator characteristics showed the greatest area under the curve for overall pursuit variability when pursuit was performed with the 2-back (AUC = 0.90), as opposed to baseline pursuit (AUC = 0.80) and with the concurrent 1-back (AUC = 0.72).

Conclusions: Dual-task pursuit with a working memory task may provide better diagnostic performance than smooth pursuit alone.

Session 3 – Epidemiology
Moderator: C. Wendel

Urrets-Zavalia syndrome as a complication of neodymium-YAG laser posterior capsulotomy: A case series

Louise Robinson, F S Mikelberg, D Manning, and G Outteridge

Background: To describe the clinical features and management of Urrets-Zavalia syndrome following Neodymium-YAG laser posterior capsulotomy.

Design: A retrospective, observational case series from two private Ophthalmology practices.
Participants: Three eyes (two patients) with diagnosed glaucoma, who following YAG posterior capsulotomy, developed a Urrets-Zavalia syndrome.

Methods: Patients were identified through a retrospective medical chart review. A review of the published literature surrounding Urrets-Zavalia syndrome and YAG capsulotomy was conducted.

Main Outcome Measures: Intra-ocular pressure.

Results: Urrets-Zavalia syndrome, defined as, a fixed dilated pupil, iris atrophy and an associated increase in intra-ocular pressure, is a rare post-operative complication, which has been reported following various common ocular procedures. This is the first reported case series of this syndrome occurring following YAG posterior capsulotomy. This case series of three eyes, with previously diagnosed and controlled glaucoma, developed Urrets-Zavalia syndrome after undergoing an uncomplicated YAG posterior capsulotomy, all of which required emergency surgical trabeculectomy in order to adequately control their intra-ocular pressure.

Conclusions: YAG posterior capsulotomy is a very common, generally uncomplicated procedure, however, users should be aware that it has the potential to precipitate Urrets-Zavalia syndrome, with associated sight threatening intra-ocular pressures, particularly in glaucoma patients. This case series indicates that eyes which have glaucoma, despite adequate IOP control, are prone to developing this syndrome. Identification of these eyes should be made prior to any intra-ocular procedure, with consideration of prophylactic glaucoma medication pre and post procedure, with associated close intra-ocular pressure monitoring, in order to identify Urrets-Zavalia syndrome.

Assessment of the impact of educational materials on patient satisfaction in an emergency ophthalmology clinic

Geoffrey Law, Amanda Schlenker, Gavin Docherty, Nawaaz Nathoo, and Simon Warner

Purpose: Studies in various areas of medicine have demonstrated that educational materials can increase patient satisfaction with their provider and with the overall quality of their care. Specifically, in ophthalmology, patients have indicated a preference for educational materials (printed and electronic) recommended by their care provider. To date however, there have been few studies examining the impact of educational materials on patient satisfaction in ophthalmology. Further contributions to this area could potentially have a great impact in the quality of care delivered to patients. This study aims to assess patient satisfaction before and after the introduction of patient educational materials. We aim to demonstrate that the provision of educational pamphlets will improve or maintain patient satisfaction during the clinical encounter.

Methods: The study will occur in two phases. The initial phase will consist of having all patients who attend the clinic fill out a patient satisfaction survey. The patient survey will be marked after clinic as to whether they had blepharitis, posterior vitreous detachment or other. The second phase of the study will consist of all patients with blepharitis or posterior vitreous detachment being given an educational brochure at the end of the encounter and asked to fill out the satisfaction survey. All other patients will also be asked to fill out a patient satisfaction survey even if they do not receive an educational pamphlet. The survey used in this study is based on a validated questionnaire, the Patient Satisfaction Questionnaire Short Form (PSQ-18). It is a concise, validated tool that may be applied to various settings (12,13). Given that the current scope of patient satisfaction studies in a Canadian outpatient ophthalmology setting are limited, we have adapted the PSQ-18 for our specific study.

Results: Results are pending as collection of data is still ongoing. Two-tailed unpaired t-test comparison will be used to compare the survey satisfaction scores between patients who did not receive a survey at the end of their visit, and those who did. These findings are subject to change as subsequent data is collected and analyzed.
A resurgence of ocular syphilis in British Columbia: 2013-2017 A retrospective chart review

Maryam Eslami MD Cand, Gelareh Noureddin MD, Simon Warner MD, and Jonathan Troy Grennan MD

Background: Syphilis infection caused by the bacterium Treponema pallidum, has had a resurgence globally since its initial decline in the late 1980s. The United Kingdom, The United States and Australia have all reported increased syphilis cases from 1990s to 2000s1,2,3. Ocular syphilis, defined as the presence of signs and symptoms of ocular disease in a patient with laboratory-confirmed syphilis infection, has also been on the rise. In 2015, CDC issued a clinical advisory which prompted a subsequent review of syphilis surveillance and case investigation data in eight US jurisdictions4,5.

Methods: All patients with syphilis infection from 2013-2016 reported to BC-CDC, who were assessed by an ophthalmologist for ocular concerns were captured in a retrospective database. The details of their Ophthalmologic presentation and outcome were extracted from ophthalmologists’ patient charts.

Results: There were a total of 39 ocular syphilis cases from Jan 2013 to Dec 2016; 6 in 2013, 5 in 2014, 12 in 2015, and 16 in 2016. The median age for all patients was 61, 82% were male and 54% had HIV co-infection. Of these cases, 23 charts were available at the time of this analysis. 11 patients (48%) presented with bilateral ocular complaints resulting in a total of 34 affected eyes with available data. Of these 34 eyes assessed, 53% had anterior uveitis, 71% had vitritis, 75% had retinitis, 66% had vasculitis and 59% had optic nerve involvement. The BCVA of the affected eye at the time of presentation ranged from 20/20 to LP. 44% of the eyes had two or more lines of improvement post syphilis treatment.

Conclusion: Ocular syphilis, although rare, is on the rise globally with serious ocular sequelae. A high index of suspicion is required for proper diagnosis and treatment.

Epidemiological survey of fungal and/or MRSA keratitis

Grace Qiao, Alfonso Iovieno, and Sonia Yeung

The aim of this undertaking is to better understand the causative agents, risk factors, treatment practices, and clinical outcomes of cases of infectious keratitis in Canada. We hope to identify trends in the incidence of various pathogenic organisms, and assess how underlying risk factors (particularly contact lens use) affect the risk of infection, management strategies, and treatment outcomes. Specifically, we are interested in examining whether the incidence of fungal keratitis may be increasing in Canada due to changing patterns in climate and migrate. We hypothesize that molds may be emerging as a causative pathogen and contact lens use is becoming a more significant risk factor for this disease. We are also examining whether strains of bacterial pathogens causing infectious keratitis may be demonstrating shifting patterns of antimicrobial susceptibility due to emerging resistance.

Prospective analysis of emergency ophthalmic referrals in a Canadian tertiary teaching hospital

Michelle Yang, Gavin Docherty, Jiyoung Hwang, Brennan Eadie, Kathryn Clapson, Jodi Siever, Simon Warner

Objective: This study was conducted to analyze data from emergency ophthalmology referrals after hours from different hospitals in order to identify the most common pathologies and compare accuracy of diagnoses. Additionally, examination findings including visual acuity (VA), intraocular pressure (IOP), and pupils from referring service and ophthalmic exam were compared to assess agreement.

Design: This was a prospective study that reviewed information collected from referring services to the emergency on call ophthalmology service and compared it to the ophthalmic examination between February 2017 and July 2017.
Methods: The number of referrals from each hospital was reviewed. Referring physician provisional diagnosis, VA, IOP, and pupil assessment were collected to analyze the agreement between ophthalmic examination and diagnosis.

Results: The observed agreement rate was 67.0% between referring source and ophthalmic diagnosis. Posterior vitreous detachment (12.2%) was the most common diagnosis followed by corneal abrasion (7.4%), and retinal detachment (5.3%). Referring services measured VA to be worse than on-call ophthalmology service (right eye Z=-5.47, p<0.001; left eye Z=-5.44, p<0.001) and IOP measurement was measured significantly higher by referring services (p<0.05). The observed agreement rate of pupillary assessment was 91% between referring services and ophthalmology services.

Conclusion: Data suggests that there is good diagnostic agreement between referring service and ophthalmology examination in regard to provisional diagnosis and pupillary assessment. Both visual acuity and IOP were measured to be higher by referring services. This study highlights common emergency ophthalmic referrals and suggests potential areas for teaching initiatives for primary care physicians assessing ophthalmic emergency patients.

Session 4 – Methodology

Modeling environmentally-induced motor neuron degeneration in zebrafish

Jessica R Morrice, Cheryl Y Gregory-Evans and Christopher A Shaw

Amyotrophic lateral sclerosis (ALS) is characterized by the progressive degeneration of upper and lower motor neurons. The majority of ALS patients are considered of unknown origin, termed sporadic, and are largely assumed to arise from environmental insults. Despite this, research to date has been heavily focused on genetic models of the disease, which represent 10% of all ALS cases. Research has made disappointing progress with elucidating disease initiating mechanisms and therapeutic translation to patients. Sporadic ALS (sALS) models may provide substantially more applicable insight into disease pathogenesis, however there is currently a lack of reliable and effective models. Zebrafish offer promising advantages to investigating neurodegenerative diseases such as ALS, with highly conserved biological processes to humans, including genes implicated in human neurodegenerative diseases. Further, they can be used for high throughput toxicity screening and are optically transparent as embryos to allow for high resolution imaging in vivo. We hypothesize that exposure to particular environmental toxins can be used to induce ALS-like hallmarks in zebrafish. We find that zebrafish are an efficient and effective model for screening motor neuron degeneration induced by neurotoxins. Our findings show that exposure to bisphenol A (BPA) results in motor neuron degeneration with affected motor function, reduced motor axon length and branching, reduced neuromuscular junction integrity, motor neuron cell death and the presence of activated microglia. Further, our preliminary timeline studies suggest that axonopathy precedes motor cell death, suggestive of retrograde degeneration. Together, these results show that the zebrafish model is advantageous for screening toxin-induced motor neuron degeneration and can be used as a valid model of sALS. This research can be extended to confirm ALS-associated neurotoxins and may have implications for early phase treatments of motor neuron degeneration.

Ex-vivo imaging of posterior human corneal layers after Big Bubble DALK procedure with Ultrahigh Resolution OCT (UHR-OCT)

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¹ Department of Ophthalmology and Vision Sciences, University of British Columbia
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Purpose: To Visualize ex-vivo the morphology of the posterior corneal layers after big-bubble deep anterior lamellar keratoplasty (BB-DALK) procedure by using Ultrahigh resolution optical coherence tomography (UHR-OCT) system. To understand the role of endothelial cells in contribution to the double-contour line imaged by the commercially available OCT.

Study Design: Laboratory Controlled Experiment.

Methods: A sub-micrometer axial resolution OCT system was used to image ex-vivo the morphology of the posterior human corneal layers. 29 human cadaver cornea were obtained from the Eye Bank of British Columbia. A BB-DALK was formed after intrastromal injection of air into the donor corneoscleral button of 24 of the corneas, while the remaining 5 served as controls. After the procedure, the endothelial layer was covered with Dispase at 4°C for (16-20 hours) then rinsed with buffer solution to remove the endothelial layer. Volumetric OCT images (512 A-scans x 512 B-scans) were acquired from 10x10 mm area of the central cornea with 0.95 µm axial and ~5 µm lateral resolution before and immediately after the BB-DALK procedure and after 18h treatment with Dispase. Custom, Matlab-based image processing algorithms were used to numerically dispersion compensate the OCT images and segment and measure the thickness of the posterior corneal layers.

Results: Out of 24 corneas injected with air, 10 corneas had Type-1 BB (Dua's Layer (DL) with Descemets membrane (DM)), 3 corneas had Type-2 BB (DM alone) and 3 corneas had Type-3 BB (Mixed form), the remaining 8 cornea had Viscoat to create or maintain ruptured BB. UHR-OCT of the posterior corneal layers of both Type-1 BB and Type-2 BB showed double contour line. In Type-1 BB, the anterior line was thicker and more hyper-reflective. Re-imaging the posterior corneal surface after chemical removal of the endothelium with Dispase continued to show the double contour line but the posterior line was less hyper-reflective.

Conclusions: Imaging posterior corneal layers with UHR-OCT present distinct features which help understanding the structure BB-DALK and eventually may enhance surgical techniques and develop intraoperative UHR-OCT in the future for Lamellar corneal surgery.

Optical coherence tomography segmentation of conjunctival lymphatics with use of indocyanine green.

Gavin Docherty, Rosanna Martens, Morgan Heisler, Marinko Sarunic, and Eduardo Navajas

Objective: To segment conjunctival lymphatic vessels using optical coherence tomography and indocyanine green dye.

Design: Pilot study with a single healthy volunteer will be assessed.

Methods: Following ethics approval 0.5mg of ICG will be injected into the subconjunctival space of a healthy volunteer after application of topical anesthesia (tetracaine 0.5%). Injection sites will be approximately 3mm from the limbus in the nasal and temporal quadrants. Imaging will be performed with a commercially available device (Spectralis® OCT; Heidelberg Engineering Inc., Heidelberg, Germany).

Results and Conclusion: Pending.
Role of prostaglandin use in recurrent HSV keratitis: Comparison of topical pressure lowering agents in recurrent HSV keratitis

Kathryn Clapson, Sonia Yeung, Alfonso Iovieno, Mahyar Etminan

Abstract: Topical prostaglandin medications are one of the most effective topical pressure lowering agents available for the treatment of elevated intraocular pressures. However, their use in the setting of Herpes Simplex Virus (HSV) keratitis has been discouraged due to case reports of reactivation of the virus in a quiescent eye. Despite this highly recommended avoidance of prostaglandin use in HSV keratitis patients, there has not been any research conducted on humans to confirm this hypothesis. This study functions to compare the incidence of recurrence HSV keratitis with the use of topical prostaglandins in comparison to the three other major classes of pressure lowering agents: alpha-agonists, beta-blockers, and carbonic-anhydrase inhibitors.

Methods: The data available from 2006-2016 in the North American database was utilized, using the following searches: ICD-9 diagnostic code for HSV keratitis through MD visit and hospitalization, and drug name (topical prostaglandins, beta blockers, alpha-agonists, and carbonic-anhydrase inhibitors). Anonymized demographic information collected included age, and gender. The total number of events (HSV keratitis coded by eye-care professionals) were gathered pre and post exposure to each of the topical pressure lowering agent.

Results: Pending

Conclusion: Pending

Association of post-operative topical prostaglandin analog and/or beta-blocker use and incidence of pseudophakic cystoid macular edema

Colten Wendel, Helena Zakrzewski, Bruce Carlton, Mahyar Etminan, and Frederick Mikelberg

Purpose: To determine the association of post-operative topical prostaglandin analog and/or topical beta-blocker use and the incidence of pseudophakic cystoid macular edema (CME).

Methods: This was a nested case control study. All adult (age > 18) patients who underwent cataract surgery between January 1st, 2006 and December 31st, 2016 and who were enrolled in the PharMetrics Plus database were eligible for inclusion. Patients with a previous diagnosis of diabetes mellitus were excluded. The association between post-operative topical prostaglandin analog (bimatoprost, latanoprost and travoprost/travoprost-z) and/or beta-blocker (betaxolol, levobunolol and timolol) use and the incidence of pseudophakic CME was assessed by conditional logistic regression.

Results: Incidence of pseudophakic CME was found to be statistically significantly associated with the current post-operative use of both topical prostaglandin analogs (relative risk (RR) 1.86, 95% CI 1.04 to 3.32) and topical beta-blockers (RR 2.64, 95% CI 1.08 to 6.49). Post-operative use of each of bimatoprost (RR 2.73, 95% CI 1.35 to 5.53%) and travoprost/travoprost-z (RR 3.16, 95% CI 1.42 to 7.03) in the year prior to diagnosis was demonstrated to be statistically significantly associated with the incidence of pseudophakic CME. This association was not observed to be statistically significant with the post-operative use of latanoprost (RR 1.55, 95% CI 0.84 to 2.88).

Discussion: The hypothesis for the development of pseudophakic CME following cataract surgery is longstanding and laboratory and clinical studies have demonstrated that benzalkonium chloride may play an integral role in the exacerbation of the aforementioned mechanism. These findings suggest that other risk factors such as complicated cataract surgery must also undoubtedly be considered in the development of pseudophakic CME. It may thus be prudent to exercise caution in the use of topical prostaglandin analogs and topical beta-blockers following cataract surgery, most notably in high-risk eyes.
Conclusion: To the best of our knowledge this is the largest study to date that has investigated the association between post-operative topical prostaglandin analog and/or beta-blocker use and the incidence of pseudophakic CME. Post-operative use of both topical prostaglandin analogs and topical beta-blockers was found to be associated with the incidence of pseudophakic CME. Further investigation is required.

Session 5 – Retina2
Moderator: K. Gregory-Evans

Dexamethasone implant for the treatment of persistent diabetic macular edema in eyes not responsive to long-term treatment with bevacizumab

Aaron W. Joe, PhD, FRCSC,1,4 Sanj S. Wickremasinghe, DMEdSc, FRANZCO,2 Mark C. Gillies, PhD, FRANZCO,2 Vuong Nguyen, PhD,1 Lyndell L. Lim,2 Hemal Mehta, MA, FRCOphth1,3, Samantha Fraser-Bell, PhD, FRANZCO2

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Purpose: To report the results of a prospective interventional study on the effect of intravitreal dexamethasone 0.7 mg implants in eyes with persistent diabetic macular edema (DME) after long-term treatment with bevacizumab.

Design: Non-randomized clinical trial

Participants: Sixteen eyes from 16 patients who completed the 6 month study period

Methods: Patients were enrolled if they had persistent DME (with central macular thickness [CMT] greater than 300 μm) despite regular anti-VEGF treatment for 6 months or longer. They were switched to the dexamethasone implant which was given up to every 16 weeks on a pro re nata (PRN) basis. The primary outcome was proportion of eyes with CMT less than 300 μm at 6 months and secondary outcomes included mean change in best-corrected visual acuity (BCVA) at 6 months.

Results: There were fifteen eyes (94%) that completed the study. The mean number of bevacizumab treatments prior to enrollment was 14.3 (95% confidence interval 9.6 – 19.1). Using intent-to-treat analysis, seven eyes (44%) achieved CMT <300 μm at 6 months. Mean decrease in CMT was 220 μm (95% confidence interval 118 – 332 μm). Improvement in best corrected visual acuity BCVA equal to or greater than 5 logMAR letters was found in 9 of 16 eyes (56%). Mean vision change was +3.9 logMAR letters (95% confidence interval -1.0 – 8.9 logMAR letters) at 6 months but this difference was not statistically significant (p=0.10).

Conclusion: Switching to dexamethasone 0.7 mg implant can lead to anatomical improvement of DME in eyes refractory to long-term bevacizumab treatment. However, not all eyes will gain vision.

Surgical success and functional outcomes of failed pneumatic retinopexy for primary rhegmatogenous retinal detachment

Rosanna Martens2, Zaid Mammo1, Andrew Merkur2, Andrew Kirker2, David Albiani2, C Gustavo De Moraes1, Stanley Chang1 and David Maberley2

1: Ophthalmology, Columbia University, New York, NY, United States.

Purpose: Previous studies have shown that the final visual acuity outcomes of PR, SB, PPV, and PPV+SB are similar despite a higher anatomical success rate with SB, PPV and PPV+SB. This
retrospective chart review will have a larger sample size than previous studies and will include the procedures PPV, PPV+SB and SB as well as the risk factors associated with failure and anatomic and visual outcomes.

**Methods:** Retrospective consecutive case series of failed primary PRs at a tertiary referral centre. Six-month anatomical and functional outcomes of secondary interventions were compared: Scleral buckle (SB), pars-plana vitrectomy (PPV) and combined PPV and SB (PPV+SB).

**Results:** Seventy-three failed cases with six-month follow-up were included. Within failed cases, 60% required a secondary intervention within 1-3 days of the original procedure. Percentage of failures attributed to proliferative vitreoretinopathy was 4%, 20% and 44% in the PPV, SB and PPV+SB group, respectively (p<0.01, Fisher’s exact test). The combined single secondary intervention anatomical success rate post-failed PR was 93% (SB 87%, n=15), PPV 96% (n=49), and PPV+SB (89%, n=9) (p=0.33, Fisher’s exact test). VA (logMAR [Snellen acuity equivalent]) at initial presentation and final follow up were similar for the PPV (1.07 [20/237] and 0.28 [20/38] and SB (1.005 [20/202] and 0.183 [20/30] groups, respectively (p=0.71 and p=0.91, respectively, ANOVA Tukey’s HSD method). Both the PPV and SB groups had better VA at initial presentation and at final follow up compared to the combined SB+PPV group (1.36 [20/459] (p<0.01) and 0.92 [20/166] (p<0.01), respectively (ANOVA Tukey’s HSD method).

**Conclusion:** At final follow-up, equivalent anatomical outcomes were observed for PPV, SB and SB+PP for failed PRs. Functional outcomes were similar across the PPV and SB groups but superior to those in the PPV+SB group. This could be related to more severe cases of RRD given worse initial visual acuity and unequal representation of PVR as a cause of PR failure within the PPV+SB group.

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**The effect of optical quality of posterior intraocular lens implants on vitrectomy**

*T. Fang, R. Spouge, T. Wiens, P. Ma*

**Introduction:** During vitrectomy, the optics of the intraocular lens (IOL) in pseudophakic patients affects the view of the back of the eye for the retina surgeon. As IOL design technology moves forward, the use of premium lenses (including multifocal and accommodative IOLs) often decreases the view of the retina during surgery. This study is designed to categorize the relationship between the view of the retina (represented by IOL grading) and the type of IOL.

**Purpose:** The purpose of this study is to categorize the optical quality of IOLs by grading the view of the back of the eye through the IOL during surgery. This study is a retrospective chart review. The data collected includes: the type of IOL and the grading of the IOL view recorded during retina surgery. The objective of this study is to come up with a ranked view correlating IOL grading with type of IOL.

**Methods:** A database search of patients from Dr Patrick Ma’s practice is being conducted for patients who have previously undergone vitrectomy, and are pseudophakic. IOL grading on a scale of 0 through 4 is being captured, where 0 represents the highest quality view of the retina and 4 the poorest quality view of the retina. Results from IOL grading during vitrectomy surgery will be collected until 100 patients have been characterized. All procedures are standard of care. No extra procedures are required to collect information for this study. Data parameters collected during this retrospective chart review will include, but not be limited, to the following: 1. Medical History: diagnosis of patient resulting in need for vitrectomy, month and year of cataract surgery and type of PC IOL. 2. Surgical Parameters: view grading of PCIOL during vitrectomy, ranked view through IOL, comments by surgeon.

Data for all specified assessments will be collected from the patient’s medical charts available at Dr Patrick Ma’s office. No additional medical procedures or tests will be performed for the purposes of this study.

**Results:** Pending.

**Conclusions:** Pending.

Brittany J. Carr, Paloma Stanar, Beatrice M. Tam and Orson L. Moritz

Purpose: Mutations in the prCAD and PROM1 genes result in common retinal degenerative disorders such as retinitis pigmentosa, Stargardt disease, and macular dystrophy. PROM1 and prCAD proteins localize to areas where new outer segment discs are made, and are proposed to participate together in disc membrane biosynthesis, although their exact roles are unknown. To characterize further the roles of these proteins, we knocked out the corresponding genes in X. laevis (African clawed frog) tadpoles using CRISPR/Cas9 gene editing technology, and then documented the resulting effects on photoreceptor outer segment biosynthesis and health.

Methods: We injected Cas9 mRNA as well as guide RNAs that target the PROM1 and prCAD genes into single-cell X. laevis embryos; Cas9 will cut the genomic DNA sequence targeted by the guide, resulting in a non-functional gene and/or protein. After 14 days of retinal development, eyes were examined for changes in rod and cone outer segment morphology using confocal, super-resolution, and electron microscopy. PROM1 is present in some ciliated cells other than photoreceptors, so we also looked for phenotypes caused by PROM1 knockout in cell types such as multiciliated skin cells, olfactory neurons, and inner ear hair cells.

Results: prCAD knockout (prCAD-/-) did not perceptibly alter photoreceptor health or structure when examined using confocal microscopy. Under electron microscopy, prCAD-/- mutants had outer segment disc defects in which some discs were oriented vertically instead of horizontally. PROM1 knockout (PROM1-/-) resulted in rod and cone outer segment defects that were readily apparent by confocal microscopy; rods appeared convoluted and bulbous in shape and degeneration of some cone photoreceptors was obvious. Proteins involved in outer segment biosynthesis and photoreceptor morphology, such as peripherin-2 and α-acetylated tubulin, remained present in PROM1-/- retinas. PROM1 protein was present on embryonic multiciliated skin cells (2-3 dpf), but was absent from olfactory neurons at later developmental time points (> 14 dpf); PROM1-/- mutation did not appear affect these cells significantly, when examined under confocal microscopy.

Conclusions: PROM1 knockout results in a more severe phenotype than prCAD knockout, suggesting that these proteins may be involved in different processes in outer segment disc membrane biosynthesis. Neither protein appears to be absolutely required for disc membrane biosynthesis; rather, they are essential for proper outer segment morphology. The presence of peripherin-2 and α-acetylated tubulin in PROM1-/- outer segments indicates that other processes involved in photoreceptor disc synthesis, including the formation of the highly curved disc rim region and elongation of the connecting cilium and axoneme, remain functional. PROM1 appears to be much less critical in other ciliated cell types; the morphology of multiciliated cells is unaffected in putative PROM1-/- mutants, although some cells (<10%) may have reduced numbers of cilia relative to control embryos.

Interplay between inflammation and cell death pathways in geographic atrophy of AMD

Rachel Chen, Wade Gao, and Joanne Matsubara

Background: Age-related macular degeneration (AMD) is a disease of progressive photoreceptor loss in the macula leading to diminished vision. It can be further classified into the wet and dry forms. Dry AMD results in significant geographic atrophy of pigment epithelium (PRE) cells. Inflammasomes, which contribute to the activation and release of inflammatory cytokines, are implicated in the pathogenesis of dry AMD. Specifically, NLRP3 is the most extensively studied inflammasome subtype. The activity of other inflammasome subtypes is an under-researched area and thus remains unclear.

Objectives: Identify common and relevant inflammasome subtypes in human adult retinal pigment epithelium-19 cells and quantify their expression levels at the RNA level.
**Methods:** We identified six inflammasome subtypes that are most relevant to epithelium function in diseases via primary literature database search. To determine inflammasome subtype expressions, RNA was extracted and reverse-transcribed into cDNA from ARPE-19 cells treated with 0 nM or 2.5nM XIAP-siRNA. Quantitative real-time PCR was then conducted using SYBR green method. Inflammasome expression measurements were assessed by two-tail T test. p-values less than 0.05 were considered significant.

**Results:** With XIAP-siRNA treatment, we observed significant reduction in RNA levels of, respectively, 29.8% in NLRP 6, 35.1% in caspase 4, 40.4% in NLRP 1, and 50.7% in NLRC 4. No significant change was observed in AIM 2 or NLRP 3 RNA expression levels between XIAP-siRNA treated and non-treated groups.

**Conclusion:** In XIAP-siRNA treated ARPE-19 cells, inflammasome subtypes exhibited differentiated expression levels. Four inflammasome subtypes showed significant reduction in RNA levels and two inflammasome RNA expression remained unchanged.
Program Objectives

The program brings together UBC Ophthalmology experts in comprehensive ophthalmology, paediatrics, neuroscience, glaucoma, oculoplastics, and retina. Clinically relevant research will be emphasized in this update of the latest research in these areas. Topics to be covered include:

RETINA:

- Review the use of OCT angiography in its role in diabetic retinopathy
- Describe a novel delivery system for retinal precursor cells
- Review the outcomes following vitrectomy for diabetic macular edema
- Discuss practice patterns in regards to treatment of epiretinal membranes
- Examine the use of a dexamethasone implant for treatment of persistent diabetic macular edema
- Assess surgical success of failed pneumatic retinopexy for retinal detachment
- Examine the interplay between inflammation and cell death in geographic atrophy
- Discuss modeling cone-rod dystrophy in a genetically modified African clawed frog
- Categorize the relationship between intraoperative retinal view and type of intraocular lens implant
- Discuss potential uses of curcumin in retinal imaging

PERCEPTION AND NEUROOPHTHALMOLOGY:

- Discuss enhanced low-level visual processing as a source of enhanced visual function in ASD
- Better understand the exposure to other-race faces on facial recognition efficacy
- Evaluate the relationship between eye movement stability and motion perception deficits in amblyopia
- Discuss how dual-task pursuit with a working memory task improves performance in TBI
- Examine the potential for eye movements to serve as markers of small-vessel disease.

EPIDEMIOLOGY:

- Address ocular syphilis in British Columbia as a resurgent cause of ocular disease and sequelae
- Assess impact of educational materials on patient satisfaction in the emergency ophthalmology clinic
- Examine the relationship between ER ophthalmic examination and referral examination
- Explore the clinical outcomes of infectious keratitis cases in Canada
- Discuss Urrets-Zavalia syndrome as a complication of neodymium-YAG laser posterior capsulotomy.

METHODOLOGY:

- Discuss the use motor neuron degeneration in zebrafish as a model for ALS research
- Discuss imaging of the posterior corneal layers following Big Bubble DALK
- Assess the role of prostaglandin use in recurrent HSV keratitis
- Examine the relationship between topical glaucoma agents and pseudophakic cystoid macular edema
- Better understand the anatomy of the conjunctival lymphatic vessels using OCT

Twenty-five percent of the time will be devoted to discussions of the clinical relevance of the presentations led by designated authorities, allowing the audience to decide how this research could impact their practice. By merging basic science and clinical research, the program will be of interest to ophthalmologists, ophthalmologists-in-training, basic scientists and allied health professionals.

Course Planning Committee

Orson Moritz, PhD - Associate Professor
Simon Warner, MD, FRCSC - Clinical Professor
Ipek Oruc, PhD – Assistant Professor
C. Wendel, MD – Resident
Kevin Gregory-Evans, MD – Professor

Judges

Dr. Claire Sheldon, Dr. Robert Douglas and Dr. M. Pennesi

We gratefully acknowledge and thank our sponsors for their support of this educational conference:

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