Vancouver, Canada – In their own words, First Authors at the 2019 Annual Meeting of the Association for Research in Vision and Ophthalmology explain their findings. Their abstracts were designated as some of the newest and most innovative research being conducted in various specialties and are being presented on Sunday, April 28. To view abstracts, enter the program number or title in the “Search” field of the Online Planner or mobile app.

Anatomy and Pathology/Oncology

A0367. Interaction of Immune Checkpoints in Tumor-Stromal Microenvironment of Primary and Chemoreduced Retinoblastoma. 4:00 - 5:45pm

The presented topic is highly relevant during the progress to our current research for immunotherapy in Retinoblastoma. Currently, there are no successful therapies for metastatic retinoblastoma, in spite of several studies going on. Immunotherapy has established a new standard for the treatment of cancer with prospects for clinical benefit in patients with retinoblastoma. There is a critical need for a biomarker for clinical benefit; however, a reliable predictive marker for response to immune markers has so far elusive. This approach will elicit long tumour effects, which not only enhance the likelihood of tumour being eradicated, but also decrease the risk of tumour recurrence.

Immunology/Microbiology

1352. Novel alterations to the corneal neuroimmune phenotype in mice with central nervous system tauopathy. 9:45 – 10:00am

The effects of age-related neurodegenerative diseases, such as Alzheimer’s disease, have on the health of the ocular surface is unclear. We have novel data that suggest corneal nerves and resident immune cells are altered in a mouse model of Alzheimer’s disease. This study aims to thoroughly characterise the nature and timing of the corneal changes in mice to determine if they could serve as a potential biomarker of disease severity in patients. Understanding how corneal neuroimmunology is affected during Alzheimer’s disease will provide important insights into peripheral nervous system pathology that occurs in diseases of the central nervous system.

1724. Inflammatory cell type-specific bioluminescence for quantitative scoring of uveitis in vivo. 11:45am - 12:00pm
This project explores a novel method for determining what types of cells are present in the eye when it is inflamed or impacted by a disease known as uveitis.

**Retina**

A0169. Automated volumetric choroidal neovascularization segmentation and quantification in swept-source OCT angiography using machine learning. 8:15 - 10:00am

Age-related macular degeneration (AMD) is a leading cause of vision loss among people aged 50 and older. Advanced stages of this disease often display the growth of abnormal blood vessels below and in the deep layers of the retina, a pathology known as choroidal neovascularization (CNV), causing noticeable visual changes. The appearance, presence and characteristics of CNV are very important indications to track over time in order to start and manage treatment regime in AMD patients. Swept-source OCT angiography (SS-OCTA) is a non-invasive imaging technology that allows the visualization of retinal vessels with impressive detail in three dimensions. However, volumetric characteristics of CNV are very difficult to quantify in SS-OCTA images mainly due to difficulties making volumetric manual annotations. We have developed a method to automatically detect the presence of CNV within these images, isolate the volumetric region corresponding to CNV and generate quantifiable characteristics describing the CNV volume, area, density, and invasiveness (a measurement of abnormal vessel intrusion within the retina). The resulting images and quantifications are generated automatically and seem very promising to monitor CNV activity in patients over time.

A0222. Deep learning predicts OCT measures of diabetic macular thickening from color fundus photographs. 8:15am - 10:00am

We conducted a proof-of-concept study to evaluate whether deep learning (DL) can predict optical coherence tomography (OCT) measures of diabetic macular thickening (MT) from color fundus photographs (CFPs). We utilized data from the phase 3 RIDE/RISE diabetic macular edema (DME) studies. Analysis of 17,997 CFPs and their associated OCT measurements showed that DL is capable of predicting key quantitative OCT measurements related to MT from CFPs. In predicting central subfield thickness (CST) of ≥ 400 µm, the best DL model had an area under the curve of 0.94, while the best deep convolutional neural network regression model to quantify actual CST values had an $R^2$ of 0.74. Thus, while our DL models still need to be validated in the real-world setting, our study showed that DL models could potentially benefit diabetic retinopathy screening programs by quantifying the severity of DME and enhancing referral patterns.

B0159. Usefulness of liquid biopsy of aqueous humor biomarkers in predicting anti-VEGF response in Diabetic Macular Edema. Results of a pilot study. 4:00 - 5:45pm

Diabetic retinopathy is becoming a pandemic and both the incidence and prevalence of diabetic macular edema is increasing over the years. After the introduction of intravitreal therapies, the prognosis of these patients has improved dramatically, but we still have patients with variable response to different therapies. It is important to determine the patient response profile to either antiVEGF or steroids in order to improve the chances and visual prognostic when we start therapy in any patient with diabetic macular edema. we have done the first step for identifying these profiles of response.

B0165. Understanding the relationship between ellipsoid zone inner border variation and its effect on visual acuity in Diabetic Retinopathy patients.
The retina is the back part of the eye that contains the cells that respond to light. These specialized cells are called photoreceptors. There are 2 types of photoreceptors in the retina: rods and cones. Currently, there is no study that evaluates the relationship between the irregularity of this rod/cone layer and diabetic patient’s visual acuity. Therefore, we devised a new mathematical-based algorithm which will not only visually capture how irregular photoreceptor layers are, but also quantify such irregularity by computing the variance. For diabetic patients included in our study, this variance was calculated over multiple visits. Change in variance was then compared with patient’s change in Visual Acuity. Analysis was then performed to see if there is a correlation between worsening irregularity variation and worsening visual acuity. We collected 115 data sets between 2016 and 2018, and our study shows that there is statistically and clinically significant correlation between increase in irregularity of the photoreceptor layer and worsening visual acuity.