Solitary idiopathic choroiditis generally displays OCT-A is a useful imaging technique to disclose CNV 11:00 AM–12:45 PM, None; 1854 To describe the imaging features of choroidal None, None; Psychology, Columbia University, New York, NY; 1854–1889/B0326–B0361 1856 R Joel Welch Ocular Oncology Service, None; The term solitary idiopathic choroiditis (SIC) was coined in Retrospective observational case series. Patients with CNV B0326 in white choroidal lesion found in the peripapillary region of the eye and Purpose: To describe the imaging features of choroidal neovascularization (CNV) associated with choroidal nevus using optical coherence tomography angiography (OCT-A) imaging. Methods: Retrospective observational case series. Patients with CNV secondary to choroidal nevus underwent full imaging examination including fundus photography, B-scan ultrasound, fluorescein angiography (FA), indocyanine green angiography (ICGA), spectral domain optical coherence tomography (SD-OCT), and OCT-A. The OCT-A features were analyzed and correlated with conventional angiography findings and SD-OCT. OCT-A was conducted using the split spectrum amplitude decorrelation angiography (SSADA) algorithm included in the Angiovue imaging system based on the commercially available Optovue RTVue XR Avanti (Optovue, Inc., Fremont, CA) in order to visualize blood flow and to allow a detailed evaluation of both retinal and choroidal circulations. We used a 6x6 protocol in order to have a comprehensive view of the affected area and a 3x3 to magnify and better characterize CNV details. Results: There were 11 eyes from 11 patients (6 male and 5 female, mean age of 65±20.4 years) included in the analysis. FA and ICGA documented the abnormal vascular network in 90% and 83%, respectively. OCT-A displayed CNV network in 11 eyes (100%). The pattern was classified as “sea-fan” in 8 eyes (73%) and “long filamentous linear vessels” in 3 (27%). Distinct from CNV, intrinsic vasculature within the nevus was observed in 6 eyes (55%), corresponding to those with retinal pigment epithelium chronic changes. Conclusions: OCT-A is a useful imaging technique to disclose CNV associated with choroidal nevus. Despite the presence of intraretinal or subretinal fluid and hemorrhage, OCT-A revealed the CNV in all cases. This imaging modality can be useful for analysis of long-standing nevi with related exudation. Commercial Relationships: Federico Corvi, None; Marco Pellegrini, Optovue (C); Emil Anthony T. Say, None; Carol L. Shields, None; Giovanni Staurenghi, Alcon (R), Alcon (C), Optovue (F), Zeiss (F), Ocular Instruments (P), Boehringer Ingelheim (C), Novartis (C), Optos (C), Roche (C), Novartis (R), Bayer (C), Heidelberg Engineering (C), Bayer (R), Novartis (F), Genentech (C), Heidelberg Engineering (R), Zeiss (C), Allergan (C)

Commercial Relationships: Federico Corvi, None; Marco Pellegrini, Optovue (C); Emil Anthony T. Say, None; Carol L. Shields, None; Giovanni Staurenghi, Alcon (R), Alcon (C), Optovue (F), Zeiss (F), Ocular Instruments (P), Boehringer Ingelheim (C), Novartis (C), Optos (C), Roche (C), Novartis (R), Bayer (C), Heidelberg Engineering (C), Bayer (R), Novartis (F), Genentech (C), Heidelberg Engineering (R), Zeiss (C), Allergan (C)

Optical Coherence Tomography Angiography Features of Choroidal Neovascularization Associated with Choroidal Nevis Federico Corvi2, Marco Pellegrini2, Emil Anthony T. Say2, Carol L. Shields1, Giovanni Staurenghi2, 1Ocular Oncology Service, Wills Eye Hospital, Thomas Jefferson University, Philadelphia, PA; 2Department of Biomedical and Clinical Science “Luigi Sacco”, Eye Clinic, Sacco Hospital, University of Milan, Milan, Italy.

Purpose: To describe the imaging features of choroidal neovascularization (CNV) associated with choroidal nevus using optical coherence tomography angiography (OCT-A) imaging.

Methods: Retrospective observational case series. Patients with CNV secondary to choroidal nevus underwent full imaging examination including fundus photography, B-scan ultrasound, fluorescein angiography (FA), indocyanine green angiography (ICGA), spectral domain optical coherence tomography (SD-OCT), and OCT-A. The OCT-A features were analyzed and correlated with conventional angiography findings and SD-OCT. OCT-A was conducted using the split spectrum amplitude decorrelation angiography (SSADA) algorithm included in the Angiovue imaging system based on the commercially available Optovue RTVue XR Avanti (Optovue, Inc., Fremont, CA) in order to visualize blood flow and to allow a detailed evaluation of both retinal and choroidal circulations. We used a 6x6 protocol in order to have a comprehensive view of the affected area and a 3x3 to magnify and better characterize CNV details.

Results: There were 11 eyes from 11 patients (6 male and 5 female, mean age of 65±20.4 years) included in the analysis. FA and ICGA documented the abnormal vascular network in 90% and 83%, respectively. OCT-A displayed CNV network in 11 eyes (100%). The pattern was classified as “sea-fan” in 8 eyes (73%) and “long filamentous linear vessels” in 3 (27%). Distinct from CNV, intrinsic vasculature within the nevus was observed in 6 eyes (55%), corresponding to those with retinal pigment epithelium chronic changes.

Conclusions: OCT-A is a useful imaging technique to disclose CNV associated with choroidal nevus. Despite the presence of intraretinal or subretinal fluid and hemorrhage, OCT-A revealed the CNV in all cases. This imaging modality can be useful for analysis of long-standing nevi with related exudation.

Commercial Relationships: Federico Corvi, None; Marco Pellegrini, Optovue (C); Emil Anthony T. Say, None; Carol L. Shields, None; Giovanni Staurenghi, Alcon (R), Alcon (C), Optovue (F), Zeiss (F), Ocular Instruments (P), Boehringer Ingelheim (C), Novartis (C), Optos (C), Roche (C), Novartis (R), Bayer (C), Heidelberg Engineering (C), Bayer (R), Novartis (F), Genentech (C), Heidelberg Engineering (R), Zeiss (C), Allergan (C)

Multimodal imaging characteristics of solitary idiopathic choroiditis in 26 cases

R Joel Welch, Thamован Surakiatchanukul, Carol L. Shields. Ocular Oncology Service, Wills Eye Hospital, Philadelphia, PA.

Purpose: The term solitary idiopathic choroiditis (SIC) was coined in 2002 to describe a small (approximately one disc diameter), yellow-white choroidal lesion found in the peripapillary region of the eye and of unknown etiology. In this retrospective, observational case series, we further characterize SIC by investigating multimodal imaging characteristics including enhanced depth imaging optical coherence tomography (EDI-OCT).

Methods: Review of chart, fundus photography, ultrasonography, fundus autofluorescence (FAF), infrared reflectance (IR) imaging, and EDI-OCT of SIC in 26 cases.

Results: The mean age at diagnosis was 50 years (range, 7–78 years). There were 13 male and 13 female patients. The mean best-corrected visual acuity was 20/25 (range, 20/20–20/150). Clinically, the SIC lesion appeared deep to the retina with overlying retinal pigment epithelial atrophy. The mass demonstrated yellow hue (n=25) with occasional surrounding orange halo (n=10). Mean basal diameter was 2.7 mm (range, 1.0–4.0 mm) and all 26 lesions were found posterior to the equator. Ultrasonography revealed acoustic solidity (n=17) with a mean thickness of 1.8 mm (range, 1.2–3.2 mm). FAF disclosed mild intrinsic hyperautofluorescence (n=17) from unmasking of the scleral autofluorescence and IR imaging displayed hyperreflectivity (n=21). On EDI-OCT, all 26 lesions demonstrated a focal nodular mass arising within the sclera with partial or complete compression of overlying choroidal vasculature to mean choroidal thickness of 39 µm (range, 0-122 µm). By EDI-OCT, mean lesion diameter was 2977 µm (range, 1864–4587 µm).

Conclusions: Solitary idiopathic choroiditis generally displays ultrasonographic solidity, hyperautofluorescence from scleral unmasking, and hyperreflectivity on IR imaging. By EDI OCT, this lesion localizes predominantly within the sclera and compresses the overlying choroidal vasculature. Based on these observations this condition shows features of a focal scleral nodule moreso than choroiditis and revision of nomenclature is advised.

Commercial Relationships: R Joel Welch, None; Thamован Surakiatchanukul, None; Carol L. Shields, None

Program Number: 1856 Poster Board Number: B0328

Presentation Time: 11:00 AM–12:45 PM

A comparison of morphological changes seen on en-face wide-field OCT imaging to short-wavelength fundus autofluorescence imaging in Stargardt disease

Vivienne C. Greenstein1, Jason Nunez2, Kasper Schurch1, Winston Lee, Juan Reynaud2, Brad Fortune1, Rando Allikston1, Donald Hood1, 1Ophthalmology, Columbia University Med Center, New York, NY; 2Psychology, Columbia University, New York, NY; 3Devers Eye Institute, Portland, OR; 4Pathology & Cell Biology, Columbia University, New York, NY.

Purpose: To compare morphological changes on en-face images derived from wide-field swept-source optical coherence tomography (ssOCT) scans to hypo- and hyper-autofluorescence (hyoAF, hyperAF) areas detected with short-wavelength autofluorescence (SW-AF) images in patients with recessive Stargardt disease (STGD1).

Methods: Wide-field, ssOCT cube scans (9X12 mm, 256 B-scans, 512 A-scans, DRI-OCT, Topcon, Inc) were obtained from 16 patients (16 eyes) aged 11 to 70 yrs with genetically confirmed STGD1. OCT averaged B-scans and SW-AF images, were also obtained using Spectralis HRA+OCT (Heidelberg Eng). Following manual correction of the automated Topcon segmentation of the inner/outer segment (IS/OS) junction, the OS/retinal pigment epithelium (OS/RPE), and RPE/Bruch’s membrane boundaries, the average reflective intensity of en-face slabs of varying thickness were generated with these boundaries as references using special purpose software (ATL 3D-Suite). For each eye, the area of the central macular lesion/atrophy on a sub-RPE slab positioned below the RPE, and on an IS/OS band slab were compared to the central hypo- and

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hyperAF areas on the SW-AF image using ImageJ. The number and location of flecks observed on an OS/RPE slab positioned just above the RPE were compared to those on the SW-AF image.

**Results:** For all eyes, the sub-RPE slab showed a hyper-reflective area in the central macula (Fig. 1A), consistent with recent findings. [2,3] With the IS/OS slab (Fig. 1B), the corresponding area was hypo-reflective, and was significantly larger. For 14 eyes, there was a significant correlation between the abnormal hyper-reflective area on the sub-RPE en-face image and the hypoAF area (Fig. 1C) (r= 0.96), and between the abnormal area on the IS/OS slab (Fig. 1B) and the combined hypo- and hyperAF areas on the SW-AF image (Fig. 1C) (r=0.73). Two eyes were excluded based on absence of a distinct area of abnormal AF in one eye, and on diffuse AF abnormalities in the other. We also found good agreement between SW-AF and en-face OS/RPE slab images regarding fleck number and location (Fig. 2).

**Conclusions:** En-face imaging is of use in detecting morphological changes in STGD1, and indicates that in these cases IS/OS junction loss precedes RPE atrophy. 1. Fortune et al. IOVS 2014 2. Sodi et al. Graefe’s Arch. 2016 3. Melillo et al. IOVS 2016

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**Commercial Relationships:** Vivienne C. Greenstein, None; Jason Nunez, None; Kasper Schurch, None; Winston Lee, None; Juan Reynaud, None; Brad Fortune, None; Rando Allikmets, None; Donald Hood, Topcon, Inc (F), Heidelberg Engineering (F), Heidelberg Engineering (R), Topcon, Inc (R)

**Support:** R01 EY009076

**Program Number:** 1857 **Poster Board Number:** B0329

**Presentation Time:** 11:00 AM–12:45 PM

**Does fluorescein angiography add value in the management of suspected choroidal neovascularization?**

**Purpose:** Fluorescein angiography (FA) has long been the standard modality to diagnose and manage choroidal neovascularization (CNV). However, FA is costly, has a mortality of 1 in 220000, and considerable morbidity from allergic reactions. Since the advent of anti-VEGF therapy for CNV, optical coherence tomography (OCT), a non-invasive imaging method free of these disadvantages, is used extensively to manage CNV, while FA is primarily used to make the initial diagnosis. A recent study found the sensitivity and specificity of OCT compared to FFA in diagnosis of CNV to be 100 and 80.8%, respectively. We hypothesize that FA alters the management of patients initially suspected of having CNV in less than 10% of cases. If this hypothesis is confirmed, it would cast doubt on the clinical utility and cost-effectiveness of FA for diagnosing CNV.

**Methods:** We retrospectively reviewed the clinical histories, FA, and OCT of 99 patients (99 eyes) who had an initial presentation of later-confirmed CNV. After de-identification, four retinal specialists masked to each other reviewed, in randomized order, the standardized brief clinical history, the posterior pole color fundus image, and complete OCT of the initial visit. They then chose whether to manage each case by observation or anti-VEGF injection (FA- arm). After re-randomization, corresponding early, mid, and late phase FA images were added to each patient’s case data, and the experts again chose from these two management options (FA+). We determined for each expert, the case concordance (i.e., percentage of cases where the decision agreed between FA- and FA+) and inter-observer concordance (i.e., percentage of cases where all 4 experts agreed).

**Results:** Among our retina specialists, the average intra-observer concordance was 90.2% (82.2-98.2%, p<0.01). The average inter-observer concordance for the FA- arm was 84.2% (73.1-95.4%, p<0.05) and the average inter-observer concordance for the FA+ arm was 82.8% (70.8-94.8%, p<0.05).

**Conclusions:** There was a high degree of intra-observer agreement in management whether or not FA was utilized. A similar level of agreement was also seen among specialists in the FA- and FA+ groups, albeit at higher variability. We believe these findings are reflective of nationwide, if not worldwide, practice patterns and further support deferring the use of FA for management of CNV, except in treatment failures and non-standard cases.

**Commercial Relationships:** Prashant Parekh, None; James C. Folk, None; Stephen R. Russell, None; Elliott Sohn, None; Michael D. Abramoff

**Program Number:** 1858 **Poster Board Number:** B0330

**Presentation Time:** 11:00 AM–12:45 PM

An evaluation of central and peripheral features of diabetic retinopathy(DR) using optical coherence tomographyangiography(OCT A) and wide angle fluorescein angiography (FA)

Radha Das1, Ivana N. Despotovic2, Sabin Dang2, Carl B. Rebhun3, A. Yasin Alibhai3, Helen Mctamnney3, Usha Chakravarthy1, Nadia Waleed1. 1Center for Public health, Queens University, Belfast, Belfast, United Kingdom; 2New England Eye Centre, Tufts Medical center, Boston, MA; 3Belfast health and social care trust, Belfast, United Kingdom.

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Purpose: To examine relationships between DR features and severity in the retinal periphery and central macula.

Methods: Retrospective opportunistic cross-sectional analysis of fundus images acquired during routine clinical assessments of patients with DR in two tertiary care retina centers. Color (Zeiss), wide field FA (Heidelberg Spectralis) and OCTA (Zeiss angioptix or RTVue) were captured on the same visit in both eyes of all patients. Features of DR were graded and a severity score was computed. Areas of capillary non perfusion (CNP) were outlined on FA and a previously designed algorithm was used to calculate an OCT A ischemia index (OII). There was also feature based grading on FA for CNP areas, foveal avascular zone (FAZ) widening and neovascularization. Similar grading was done on OCTA for CNP areas, FAZ size and microvascular abnormalities (MVA). OII was calculated for 3x3mm and 6x6mm superficial plexus (SP), deep plexus(DP) and whole retina scans. OII has a theoretical range of 0-1, with 1 representing complete ischemia. Areas of CNP on the FA were estimated and stratified into two groups (CNP ≤ 50% and >50%).

Results: 22 eyes of 11 patients were included in the analysis. Significant spearman’s rank order correlations were noted between widening of FAZ on FA and SP and DP on OCT A (0.54,p=0.008; 0.50,p=0.01). Central CNP on FA showed significant relationships with MVA in SP (0.49,p=0.01), CNP and widening of FAZ in the DP of OCT A (0.49,p=0.01). Neovascularisation elsewhere and disc on FA correlated significantly with CNP in SP of OCTA (p=0.001,0.002). Significant positive relationships were seen with peripheral CNP on FA and widening of FAZ on the SP (0.54,p=0.008), as well as MVA in SP and DP of OCTA (0.63,p=0.001,0.54,p=0.009). The OII in the DP on the 6x6mm OCTA scan was seen to be significantly higher in the group with ≤50% ischemia on FA (p=0.03).

Conclusions: The presence of CNP and MVA on the OCT A is an indicator of widespread retinal vascular damage and potentially represents a non-invasive method of evaluating retinal ischemia.

Commercial Relationships: Radha Das, None; Ivana N. Despotovic, None; Sabin Dang, None; Carl B. Rehuhn, None; A. Yasin Alibhai, None; Helen Mctamney, None; Usha Chakravarthy, heidelberg (S), heidelberg (F), CARL ZEISS MEDITEC MEDITEC (F); Nadia Waheed, TOPCON (S), NIDEK INC (S), Genentech (C), OPTOVUE INC (S), CARL ZEISS MEDITEC (S), REGENERON PHARMACEUTICALS (C)

Program Number: 1859 Poster Board Number: B0331
Presentation Time: 11:00 AM–12:45 PM

Multimodal imaging of choroidal lesions in disseminated Mycobacterium chimaera infection
Sandrine A. Zweifel, Pascal W. Hasler, Peter Maloca, Daniel Barthelmes, Reinhard Rüesch, Christian Böni. 1Department of Ophthalmology, University Hospital Zurich, Zurich, Switzerland; 2Department of Ophthalmology, University of Basle, Basel, Switzerland; 3Department of Ophthalmology, Cantonal Hospital St. Gallen, St. Gallen, Switzerland.
Purpose: Recently, M. chimaera, a non-tuberculous mycobacterium, has attracted attention due to a health-care associated outbreak of invasive infections after cardiothoracic surgery. Ocular and histopathologic findings associated with this new disease entity have just been reported. The purpose of this study was to explore morphologic characteristics of choroidal lesions in disseminated M. chimaera infection using multimodal imaging and to propose a classification system into active and inactive forms.

Methods: Ophthalmologic imaging findings of nine patients (18 eyes) were confirmed and Mycobacterium chimaera infection were reviewed at baseline and follow-up visits and correlated with the status of the systemic disease control. Enhanced depth imaging optical coherence tomography (EDI OCT) scans over the choroidal lesions were evaluated regarding full/partial thickness, shape, reflectivity, internal pattern, margins and hypersignalization. In addition the lesions were evaluated as active/inactive by biomicroscopy, by fundus autofluorescence imaging, by fluorescein/indocyanine green angiography (ICG) and OCT angiography.

Results: The mean age of the 9 patients (18 eyes) was 54 years. All patients were male presenting with bilateral choroidal lesions of varying extent. The mean follow-up time was 14.9 months. Based on color photographs alone the degree of activity of the lesion could not always be assessed and some clinically silent choroidal lesions were missed, but were revealed using ICG and/or OCT. The lesions were hypofluorescent in ICG and appeared in the earlier phases. The subfoveal choroidal thickness (SFCT) was not increased (mean 255 um; standard deviation +/- 63 um). Active choroidal lesions were more likely to be full-thickness, round shaped, hyporeflective with well-defined borders.

Conclusions: Choroidal manifestations in patients with disseminated M. chimaera infection are good and easy accessible indicators of systemic disease control. Monitoring of disease activity in these patients cannot be based on color fundus photography only. SFCT does not seem to be a valuable monitoring criterion neither. EDI OCT in combination with ICG is suitable to visualize choroidal lesions, to classify them as active or inactive, to assess the response to antimicrobial treatment and to detect early subclinical recurrences.

Commercial Relationships: Sandrine A. Zweifel, None; Pascal W. Hasler, None; Peter Maloca, None; Daniel Barthelmes, None; Reinhard Rüesch, None; Christian Böni, None

Program Number: 1860 Poster Board Number: B0332
Presentation Time: 11:00 AM–12:45 PM

Features of Retinal Hyperreflective Foci by Spectral Domain Optical Coherence Tomography and Optical Coherence Tomography Angiography in Patients with Nonproliferative Diabetic Retinopathy With and Without Macular Edema
Stephanie J. Weiss, Ryan S. McGuire, Weive Li. Drexel University College of Medicine, Philadelphia, PA.
Purpose: The nature of hyperreflective foci (HRF) found on spectral domain optical coherence tomography (SD-OCT) remains uncertain. In a retrospective study, SD-OCT was utilized in conjunction with optical coherence tomography angiography (OCTA) to demonstrate the relationship between retinal vascular alterations and retinal HRF in patients with nonproliferative diabetic retinopathy (NPDR) with and without macular edema.

Methods: A retrospective review of 30 eyes diagnosed with NPDR from 15 patients was performed, evaluating SD-OCT and OCTA (AngioPlex, Zeiss Meditec, Inc., Dublin, California) for features of HRF.

Results: 30 eyes with NPDR were examined clinically and with SD-OCT as well as OCTA. Of the 30 eyes, 24 (81%) had best corrected visual acuity of 20/40 or better. When evaluating the degree of NPDR (n=30 eyes), 6(20%) had mild NPDR, 5(17%) had moderate NPDR and 19(63%) had severe NPDR. 8(27%) had macular edema. 24(83%) had HRF present on SD-OCT. All HRF were located within the inner retinal layers on SD-OCT. Of the 24 eyes with HRF on SD-OCT, 18(75%) were found to have HRF located in close proximity to retinal vasculature in an area of...
decreased capillary density on corresponding OCTA analysis. Areas of decreased capillary density were more prominent in the deep capillaryplexus than in the superficial capillaryplexus but were present in both regions. 7(88%) of the 8 eyes with macular edema had HRF present on SD-OCT. Of the 7 eyes with macular edema also found to have HRF, 2(29%) had HRF in close proximity to retinal vasculature in areas of decreased capillary density. In contrast, of the 17 eyes without macular edema found to have HRF, 16(94%) had HRF in close proximity to retinal vasculature in areas of decreased capillary density. 

**Conclusions:** HRF on SD-OCT are frequently found in close proximity to retinal vessels in areas of decreased capillary density detected by OCTA, especially at the level of the deep capillaryplexus. This finding suggests that the early vascular compromise in diabetic retina contributes to HRF formation. Therefore, it is conceivable to conclude that, in addition to the inflammatory pathogenesis previously proposed, local retinal ischemia is a contributing factor to the process of HRF development in diabetic retinopathy.

**Commercial Relationships:** Stephanie J. Weiss, None; Ryan S. McGuire, None; Weiye Li, None

**Program Number:** 1861 **Poster Board Number:** B0333

**Presentation Time:** 11:00 AM–12:45 PM

**Acute Macular Angiographic Changes with Intravitreal Injections**


**Purpose:** Intravitreal injections produce acute intraocular pressure (IOP) changes. We performed a prospective, observational clinical study to analyze changes in macular blood flow and macular thickness that occur post-injection using optical coherence tomography (OCT) angiography. We hypothesized that blood flow would acutely decrease with IOP elevations associated with intravitreal injections.

**Methods:** All patients over age 18 that received intravitreal injections with at least 20/80 vision were included. Patients were excluded only if they couldn’t fixate or media opacities led to poor signal. Ten patients receiving injections for diabetic retinopathy, macular degeneration, and radiation retinopathy were included. Injections of 0.05mL Avastin (1.25mg) were given to 8 patients, and 0.1mL Avastin (2.50mg) given to two radiation retinopathy patients. All patients had macular OCT angiography performed before and immediately after injections. IOP was checked immediately post-injection. Angiographic density maps were reviewed to measure blood flow changes related to intravitreal injections and associated acute IOP changes. The macula was subdivided into deep and superficial layers, with further subdivisions into macula, fovea, parafovea, superior hemifield, inferior hemifield, temporal, superior, nasal, and inferior. Changes in macular thickness were also measured. Paired t-testing in SPSS (v21) was used to analyze each patient’s pre—and post-injection angiographic density.

**Results:** Statistically significant changes in angiographic density (p<0.05) were observed only with superficial areas of the macula, and not in any deep macular measurements. Specifically, angiographic density in the overall macula, superior, superior hemifield, temporal, inferior, inferior hemifield, and nasal areas of the superficial macula were significantly decreased post-injection (Table 1). Deep layers were not significantly different pre- and post-injection. Overall macular thickness on OCT was not statistically different pre- and post-injection except in the nasal aspect, where it was increased.

**Conclusions:** Intravitreal injections produce acute changes in intraocular pressure (IOP) and changes in retinal blood flow. This preliminary study of 10 patients shows that superficial and not deep layers of the macula are affected by these changes, and that nasal OCT thickness increases while other areas are not significantly affected acutely after injections.
occlusion (1), acute central serous retinopathy (1) and pituitary tumor (1). Incidental findings included a peripheral atrophic retinal hole (1) and bilateral peripheral retinal hemorrhages (1). In all patients and eyes evaluated, non-myrdriatic UW-FP and OCT was sufficient to make the correct clinical diagnosis and form an appropriate treatment plan. No new or differing pathology was noted in any of the follow-up images nor in the 26 eyes that have subsequently undergone a complete dilated exam.

**Conclusions:** Although not a substitute for comprehensive dilated evaluation, undilated UW-FP and OCT may be a reasonable alternative in pregnant and nursing patients. In our series, non-myrdriatic imaging was able to adequately evaluate retinal pathology for reasonable clinical decision making in all eyes. During follow-up no new nor significantly different retinal pathology was uncovered that would have altered diagnosis or treatment recommendations. Larger, prospective series are undoubtedly needed to confirm our findings.

**Commercial Relationships:** Alexander Port, None; Ranjodh Singh, None; Daniel Kornberg, None; Anton Orlin, None; Donald J. D’Amico, None; Mrinali P. Gupta, None; Szilard Kiss, Optos PLC (C), Optos PLC (F)

**Support:** Unrestricted departmental support by Research to Prevent Blindness

**Program Number:** 1863 **Poster Board Number:** B0335 **Presentation Time:** 11:00 AM–12:45 PM

**Choroidal structural changes in tubercular multifocal serpiginoid choroiditis**

Madhuri Akella1, Aniruddha Agarwal1, Rupesh Agrawal1, 2, Neha Khandelwal1, 2, Alessandro Invernizzi1, Kanika Aggarwal1, Aman Sharma1, Ramandeep Singh1, Reema Bansal1, Nirbhai Singh1, Vishali Gupta1, 3

1Advanced Eye Centre, Chandigarh, India; 2National Healthcare Group Eye Institute, Tan Tock Seng Hospital, Singapore, Singapore; 3Singapore National Eye Institute, Singapore National Eye Centre, Singapore, Singapore; 4Eye clinic, Department of Biomedical and Clinical Science, Luigi Sacco Hospital, University of Milan, Milan, Italy; 5Department of Internal Medicine Division of Rheumatology, PGIMER, Chandigarh, India.

**Purpose:** Recently, choroidal vasculature index (CVI) has been proposed as a novel objective proxy measure of choroidal vascular perfusion in various vitreoretinal conditions. A prospective cohort study was performed to assess the changes in CVI among patients with tubercular multifocal serpiginoid choroiditis (TB MSC).

**Methods:** In this prospective case-control study, 18 patients with TB MSC (mean age: 26.92 ± 3.42 years) were recruited. 30 patients (age-matched) with no known ocular disease were also recruited as healthy controls. Patients of TB MSC and healthy controls underwent enhanced-depth imaging optical coherence tomography (EDI-OCT) scans were recruited. Patient demographics, clinical features, and fundus images were analyzed. Using previously validated semi-automated algorithm of image binarization, EDI-OCT scans were segmented to derive total choroidal area, luminal area, stromal area, and CVI. These values were correlated with controls using non-parametric Mann-Whitney U test and analyzed at follow-up using Wilcoxon signed-rank test.

**Results:** All the patients received anti-tubercular therapy with oral corticosteroids and followed up at regular intervals. There was a statistically significant difference in the CVI between controls (66.90 ± 1.77%) and TB MSC patients (65.46 ± 2.53%; p<0.001). There was statistically significant reduction in CVI at follow-up (3 months) (63.77 ± 3.91%; p=0.05). The subfoveal choroidal thickness (CT) was higher in TB MSC compared to controls (278.90 ± 57.84 µm versus 329.33 ± 27.69 µm; p=0.001). During the healed stage, CT decreased significantly (313.44 ± 21.41 µm; p=0.001).

**Conclusions:** CVI provides an objective assessment of choroidal vascularity in TB MSC. During the active disease, there is relative choroidal hypoperfusion. As the lesions heal, choriocapillaris atrophy occurs with further reduction in CVI.
VHRF scores may provide an objective and quantifiable measure in DR.

To quantify vitreous hyperreflective foci (VHRF) from optical coherence tomography (OCT) in patients with uveitis by using an algorithm we previously validated on patients with diabetic retinopathy.

**Methods:** Retrospective analysis of 97-slice OCT scans from 55 eyes (52 patients) with established uveitis compared to healthy controls. We used an algorithm which enhanced the vitreous imaging from OCT, performed automated quantification of VHRF, and calculated a VHRF score representing foci per vitreous volume analyzed for each scan (Figure 1). This score was compared between control eyes, and eyes with uveitis.

**Results:** VHRF scores were significantly greater in the 12 eyes with uveitis (p<.0001), suggesting VHRF is associated with inflammatory disease. Additionally, LogMAR visual acuity correlated positively with VHRF (p=.0031).

Artifacts were present in OCT scans of 6 eyes with uveitis and 1 control, which were excluded from analysis. Grubbs’ test of outliers was performed, and 2 control eyes had VHRF scores that were significant outliers which were also excluded from analysis.

**Conclusions:** VHRF scores may provide an objective and noninvasive measure of intraocular inflammation. Additional large-scale studies will further define the relationship of VHRF to uveitis and subgroup uveitis grade, as well as help determine the value of VHRF score in initiating therapeutic intervention and monitoring of treatment response.

**Commercial Relationships:** Alexandre R. Tumlinson, Carl Zeiss Meditec (E); Fasi Rahman, Carl Zeiss Meditec (E); Stephanie Magazzeni, Carl Zeiss Meditec (E); Paolo Pochendorfer, Carl Zeiss Meditec (E); Nathan Shemonski, Carl Zeiss Meditec (E)

**Program Number:** B0337
**Presentation Time:** 11:00 AM–12:45 PM

**Quantifying Microvascular Abnormalities with Increasing Disease Severity in Diabetes Mellitus**

**Purpose:** To quantify retinal and choriocapillaris microvascular changes in healthy control eyes and different stages of diabetic retinopathy (DR) using optical coherence tomography angiography (OCTA).

**Methods:** This was a retrospective cross-sectional study including 44 eyes of 26 healthy age-matched controls and 137 eyes of 86 patients with different stages of DR. All participants were imaged with a commercial OCTA device (RTVue-XR Avanti, OptoVue Inc.). We analyzed the superficial (SCP) and deep retinal capillary plexus (DCP), the full retina as well as the choriocapillaris for the following OCTA parameters: foveal avascular zone, vessel density, percentage area of non-perfusion (PAN) and adjusted flow index (AFI). We included demographic and disease-related covariates into our statistical models.

**Results:** All OCTA parameters correlated significantly with DR severity (p<0.05) in the univariate models, however, when we corrected for covariates, only vessel density and PAN (all layers) and the AFI in the DCP remained significantly correlated with DR severity. There was no significant difference between healthy controls and eyes with DM without DR, although we found a borderline significant increase for AFI in the SCP (p= 0.0534).

**Conclusions:** Retinal and choriocapillaris vascular non-perfusion in OCTA is significantly correlated with disease severity in eyes with DR. Demographic and disease-related covariates as well as OCTA signal quality have a significant influence on the OCTA parameters and should be taken into account when using OCTA as an outcome measure in DR.

**Commercial Relationships:** Philipp K. Roberts; Peter L. Nesper, None; Alex Onishi, None; Haitao Chai, None; Lei Liu, None; Amani A. Fawzi, None

**Program Number:** B0338
**Presentation Time:** 11:00 AM–12:45 PM

**Algorithmic Analysis of Vitreous Hyperreflective Foci in OCT Scans of Patients with Uveitis as a Correlate of Inflammation and Visual Acuity**

**Purpose:** To quantify vitreous hyperreflective foci (VHRF) from OCT scans of patients with uveitis by using an algorithm we previously validated on patients with diabetic retinopathy.

**Methods:** Retrospective analysis of 97-slice OCT scans from 55 eyes (52 patients) with established uveitis compared to healthy controls. We used an algorithm which enhanced the vitreous imaging from OCT, performed automated quantification of VHRF, and calculated a VHRF score representing foci per vitreous volume analyzed for each scan (Figure 1). This score was compared between control eyes, and eyes with uveitis.

**Results:** VHRF scores were significantly greater in the 12 eyes with uveitis (p<.0001), suggesting VHRF is associated with inflammatory disease. Additionally, LogMAR visual acuity correlated positively with VHRF (p=.0031).

Artifacts were present in OCT scans of 6 eyes with uveitis and 1 control, which were excluded from analysis. Grubbs’ test of outliers was performed, and 2 control eyes had VHRF scores that were significant outliers which were also excluded from analysis.

**Conclusions:** VHRF scores may provide an objective and noninvasive measure of intraocular inflammation. Additional large-scale studies will further define the relationship of VHRF to uveitis and subgroup uveitis grade, as well as help determine the value of VHRF score in initiating therapeutic intervention and monitoring of treatment response.

**Commercial Relationships:** Philipp K. Roberts; Peter L. Nesper, None; Alex Onishi, None; Haitao Chai, None; Lei Liu, None; Amani A. Fawzi, None

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Comparison Of Non-Mydriatic Fundus Imaging Methods For Screening Of Retinal Pathology In An Internal Medicine Practice

Mehreen Adhi, Fabiana Q. Silva, Richard Lang, Raul Seballos, Roxanne Sukol, Steven Feinleib, Rishi P. Singh. 1Ophthalmology, University of Louisville School of Medicine, Louisville, KY; 2Ophthalmology, Cleveland Clinic Foundation, Cleveland, OH; 3Cleveland Clinic Foundation, Cleveland, OH.

**Purpose:** Single-field photography covering 20-50° fundus field is traditionally used to evaluate retinal diseases. Of late, the advent of non-mydriatic ultra-wide field (NM-UWF) imaging has improved visualization of the peripheral retina. This study aims to characterize the prevalence of peripheral retinal pathology in healthy subjects using NM-UWF imaging in comparison to standard single-field imaging in an internal medicine practice.

**Methods:** Six-hundred and thirty-two healthy subjects (1260 eyes) that underwent NM-UWF fundus imaging on Optos Daytona device as part of their annual health screening at Cleveland Clinic, Ohio, from October 2016 through March 2016 were retrospectively identified. An automated algorithm processed the raw images into: (1) NM-UWF image with mask/grid outline that delineates a center 45° field simulating the standard single-field photograph and (2) single-field image comprising 45° of the posterior pole extracted from the corresponding NM-UWF image. To be gradable, the NM-UWF images needed to have at least 55° peripheral retinal field visible beyond the mask/grid outline (total 100° field of view or more including the 45° posterior pole). Images were analyzed to characterize the peripheral retinal findings.

**Results:** Mean age of patients was 59.6 ± 7.5 years. Of the 1260 eyes, 1 eye failed processing and 21 eyes were considered non-gradeable. Of the remaining 1238 eyes, NM-UWF images detected peripheral retinal pathology in 228 eyes (18.4%) that were not visible on the corresponding single-field images. These included dot-blot hemorrhages in 44/1238 (3.5%), lattice degeneration in 28/1238 (2.2%), choroidal nevi in 23/1238 (1.9%), paving stone degeneration in 20/1238 (1.6%), drusen in 16/1238 (1.3%), retinal tear in 9/1238 (0.7%), choroidal atrophy in 9/1238 (0.7%), choroidal lesion suspicious of melanoma in 1/1238 (0.1%) and retinoschisis in 1/1238 (0.1%) eyes (Figure).

**Conclusions:** NM-UWF imaging enables non-contact photography of a wider field than traditional fundus imaging without need for mydriasis allowing improved visualization of peripheral retinal pathology. This capability may be useful for emerging tele-health screening and disease management programs.

A1-D1: Single-field fundus images of 4 healthy subjects. A2-D2: Corresponding NM-UWF images with mask/grid outline showing peripheral retinal pathologies that are not visible on single-field images.

**Commercial Relationships:** Mehreen Adhi, None; Fabiana Q. Silva, None; Richard Lang, None; Raul Seballos, None; Roxanne Sukol, None; Steven Feinleib, None; Rishi P. Singh, Alcon (R), Optos (C), Genentech (R), Alcon (C), Genentech (C), Thrombogenics (C), Zeiss (C), Regeneron (C), Regeneron (R), Shire (C)
Purpose: In the city of Bologna, we performed a pediatric screening of 10,500 in pre-school children, performing the fundus oculi with Fundus Camera Next (Next Sight s.r.l.). We found 2 children with Best’s syndrome and 2 children with Stargart’s syndrome.

Methods: The screening was aimed at children aged between 5 and 6 years. The characteristics of the Fundus Camera Nexy are: the field of view 45 ° extendable to 90 ° with the side fixations, resolution 14 μ, white LED lighting and infrared, 7 internal fixations, running time 15-20 seconds.

The machine is in experimental studies so at the moment it is not yet validated, so screening was performed prior consent from parents. The instrument has an eye tracking system and is able to perform auto-focus to any refractive defect.

Results: We noticed the rapidity and easiness of execution of the examination and therefore the capability to have a very clear image with the possibility to perform a screening even by paramedics as orthoptists and opticians. This is possible because the examination is performed in miosis.

Conclusions: In view of the rapid diagnosis permitted, we consider that the instrument is extremely fast and useful, especially in mass depistage, and very economical because is not necessary to use hyper specialized staff.

In the past we made other pediatric screenings, very useful because they have detected the presence of refraction defects and amblyopia; in this case we wanted to evaluate the incidence of retinal or optic nerve disease in children in order to be able to intervene immediately.

Commercial Relationships: Sergio Zaccaria Scalinci; Meleleo Arianna; None; Magnifico Mariangela; None; Marano Noemi; None; Lucia Scordol, None

Program Number: 1870 Presentation Time: 11:00 AM–12:45 PM

Downgaze-Induced Vitreous Chamber Elongation in Highly Myopic Eyes with Staphyломa as Gauged by Magnetic Resonance Imaging

Dan Chun\textsuperscript{1}, Jack Grinband\textsuperscript{2}, Stanley Chang\textsuperscript{1}, Lawrence A. Yannuzzi\textsuperscript{1,3}, K Bailey Freund\textsuperscript{4}, Quan V. Hoang\textsuperscript{4}.

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Purpose: Both genetic and environmental factors are thought to contribute to axial elongation in myopia. The elucidation of modifiable environmental factors is critical to slowing myopia progression. Here, we determine if the stress and strain of normal eye movements result in vitreous chamber axial length change in highly myopic eyes.

Methods: A prospective imaging study was performed on 82 eyes of 43 highly myopic patients (> 27 mm of axial length on IOLMaster) with a clinical diagnosis of staphyloma. 3D MRI scans were acquired while subjects gazed in 5 directions (primary, nasal, temporal, superior and inferior). Volume renderings were manually segmented to isolate the fluid-filled vitreous and aqueous chambers and a novel processing pipeline was created to automate alignment of the eye and to measure the vitreous chamber axial length for each eye in every gaze. Vitreous chamber length (defined as the distance along the visual axis from the limbal plane to the anterior surface of the retina) at each eccentric gaze was compared to the vitreous chamber length in primary gaze using a fixed effects regression allowing for person-specific and eye-specific effects. To account for the repeated measurements of vitreous chamber length for each subject, we report standard errors that are clustered at the patient-gaze level.

Results: Subjects exhibited a range of ethnic backgrounds, including Caucasian (n = 29), East Asian (n = 9) and African American (n = 5). Axial lengths ranged from 27.0 to 39.3 mm on IOLMaster and vitreous chamber lengths ranged from 20.4 to 33.1 mm (median 24.2) on MRI volumetric renderings. In examining vitreous chamber axial length in the different gazes, we found that the mean change in vitreous chamber length was not statistically significant when comparing primary gaze to nasal (p = 0.35) or temporal gaze (p = 0.52). The mean change in vitreous chamber length was near-zero and not statistically significant when changing from primary gaze to upgaze (p = 0.79, 95% CI -0.03 to 0.04). There was vitreous chamber elongation when changing from primary gaze to downgaze by +0.04 mm (p = 0.026, 95% CI 0.005 to 0.08).

Conclusions: A reversible, instantaneous vitreous chamber axial elongation appears to occur only in downgaze, which is consistent with past clinical studies suggesting an association between excessive near work and myopia development and progression.

Commercial Relationships: Dan Chun; None; Jack Grinband; Stanley Chang; None; Lawrence A. Yannuzzi; None; K Bailey Freund; None; Quan V. Hoang; None

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Program Number: 1871 Poster Board Number: B0342

Presentation Time: 11:00 AM–12:45 PM

Quantitative analysis of choriocapillaris in uveitic and normal subjects with SS-OCT Angiography

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Purpose: To investigate the difference of choriocapillaris (CC) flow in uveitic and normal subjects with 3mm x 3mm SS-OCT angiography.

Methods: Retrospective, cross-sectional study of uveitic and normal subjects. A SS-OCT research prototype Plex-Elite (Carl Zeiss Meditec, Dublin, CA) and OMAG algorithm was used to acquire OCT angiograms of CC. Global average flux index (averaged and normalized OCTA signal intensity of entire CC en face image), global fluctuation flux index (standard deviation of normalized OCTA signal intensity of entire CC en face image) and CC flow void density (percentage of nonflow area in CC against the whole 3mm x 3mm imaging area) were quantified for each cohort. Divergence index (averaged divergence of whole image) was calculated for each uveitic cases against averaged normal OCT angiograms. Two sample t-test were used for statistical analysis.

Results: Global average flux index for normal subjects are (0.455, 0.021), with 95% CI of (0.441, 0.469) (n=11); (0.409, 0.039) with 95% CI of (0.386, 0.432) for uveitic cohort (n=14). Global fluctuation flux index for normal subjects are (0.075, 0.007), with 95% CI of (0.070, 0.080); (0.099, 0.027) and 95% CI of (0.084, 0.115) for uveitic cohort. Significant difference were found in both the global average flux index (p=0.0028) and global fluctuation flux index (p=0.0110). The CC flow void density for normal cohort is (0.066, 0.003), with a 95% CI of (0.064, 0.069) while it is (0.149, 0.020) with 95% CI of (0.138, 0.160). Significant difference were found in CC flow void density too with p=2.937e-12. The averaged divergence of uveitic subjects is 6.174 and it is found negatively correlated with global average flux index.

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in global RNFL thickness was 2.92 microns. In 7 of 12 eyes (58.3%) the central macular thickness (CMT) was increased in the lower-quality image, with a mean increase of 11.85 microns. In 3 eyes the CMT was decreased in the lower-quality image, with a mean decrease of 3.67 microns. 2 eyes exhibited no change in CMT.

**Conclusions:** Measured RNFL and CMT were altered with intentional degradation of OCT image quality. A majority of eyes studied exhibited an increase in measured RNFL or CMT when OCT image quality was degraded. Clinicians should consider the possibility of erroneous measurements when evaluating poor quality OCT images.

**Commercial Relationships:** Benjamin Chaon, None; Luai Eldweik, None; Michael S. Lee, None

**Support:** VitreoRetinal Surgery Foundation, Minneapolis, MN

**Program Number:** 1875 **Poster Board Number:** B0347

**Presentation Time:** 11:00 AM–12:45 PM

**Polarization sensitive optical coherence tomographic documentation of choroidal melanin loss in chronic Vogt-Koyanagi-Harada disease**

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**Purpose:** We hypothesized that depolarization in polarimetry imaging can reveal levels and distribution of choroidal melanin in normal and pathologic changes affecting the choroid. In this study, we evaluated the sunset glow fundus appearance in chronic Vogt-Koyanagi-Harada (VKH) disease with polarization sensitive optical coherence tomography (PS-OCT).

**Methods:** We evaluated 26 eyes of 13 patients with chronic VKH disease, 21 eyes of 21 age-matched control subjects and 20 eyes of 20 high myopic subjects with tessellated fundus appearance. Two observers using color fundus images (CF) grouped the eyes with VKH disease either belonging group A (presence of sunset glow fundus) or group B (absence of sunset glow fundus). The presence of melanin in choroid was determined by degree of polarization uniformity (DOPU) obtained by Jones-matrix OCT with 1-µm probing wavelength. Area rate of low DOPU (<0.8) at choroid was calculated with three sets of B-scan images for each case. Sunset grow index [Red/(Red + Green + Blue)] was calculated using mean intensity of each color channel in CF. Classification results with CF by two observers were compared with area rate of low DOPU, sunset grow index, foveal choroidal thickness, standard OCT images, near-infrared images at 780 nm (NIR), and autofluorescence images at 500 nm (SW-AF) and at 780 nm (NIR-AF).

**Results:** There were 14 eyes in group A and 12 eyes in group B. For all eyes in group A disappearances of choroidal melanin were clearly detected with PS-OCT. Area rates of low DOPU in choroid [mean ± SD (range)] were 0.004 ± 0.003 (0.0003 - 0.009), 0.26 ± 0.12 (0.09 - 0.48), 0.31 ± 0.12 (0.11 - 0.51) and 0.19 ± 0.09 (0.10 - 0.42) for group A, B, control group and tessellated fundus group, respectively. Mean area rates of low DOPU in group A was significantly lower than other groups (P < 0.0001), and showed no overlaps with other groups. Distribution of choroidal thicknesses and sunset grow index in group A were substantially overlapped with other groups. Subjective approach of VKH group for group A and B with standard OCT, NIR, SW-AF or NIR-AF showed substantial inconsistencies with CF or PS-OCT.

**Conclusions:** The PS-OCT provides in-vivo objective evaluation of choroidal melanin loss in sunset grow fundus seen in chronic VKH disease.
Commercial Relationships: Masahiro Miura, Novartis (S), Santen (F), Santen (S), Alcon (F), Allergan (F), Bayer (F), Novartis (F); Shuichi Makita, Tomey (F), Topcon (F), Nidek (F); Yoshiaki Yasuno, Tomey (F), Topcon (F), Nidek (F); Rintaro Tsukahara, None; Yoshihiko Usui, None; Nursing A. Rao, None; Yasushi Ikuno, Senju (F), Santen (F), Tomey (F), Alcon (F), Bayer (F), Novartis (F); Sato Uematsu, None; Tetsuya Agawa, None; Takuya Iwasaki, None; Hiroshi Goto, Santen (F), AbbVie (F), Tanabe-Mitsubishi (F), Pfizer (F), Abbott (F), Hoya (F), Novartis (F), Senju (F), Otsuka (F), Alcon (F)

Support: KAKENHI (15K10905)

Program Number: 1876 Poster Board Number: B0348
Presentation Time: 11:00 AM–12:45 PM
Photoreceptor cell injury detected with SD-OCT and fundus autofluorescence in the initial stage of Vogt-Koyanagi-Harada disease

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Purpose: Photoreceptor injury was reported in experimental Vogt-Koyanagi-Harada (VKH) animal model as well as in patients. In this study, we aimed to demonstrate photoreceptor cell injury using spectral domain optical coherence tomography (SD-OCT) and fundus autofluorescence (FAF) in VKH disease.

Methods: Thirty-four eyes of 17 patients diagnosed with VKH disease that was followed up from the initial stage to the convalescent stage were reviewed. All the patients underwent SD-OCT and FAF tests, along with ophthalmological examination at the follow-ups.

Results: In the initial stage of VKH disease, seventeen (50%) eyes of the patients had hyperautofluorescence around the macular and retinal pigment epithelium undulation. In the convalescent stage of VKH disease, the SD-OCT scans revealed the outer nuclear layer attenuation, interruption of myoid zone, ellipsoid zone and outer segments of photoreceptors in convalescent phase, along with suspect interdigitation zone and RPE/Bruch’s complex injury. FAF showed the peri-macular hyperfluorescence area persistent existed in the convalescent stage of the disease. The microstructure abnormality of outer retina observed in SD-OCT scans was corresponded to the peri-macular hyperfluorescence in FAF in the initial stage.

Conclusions: The photoreceptor injuries in VKH disease started at the first beginning of the disease and persisted until the convalescent phase of VKH. SD-OCT scan and FAF are effective and noninvasive tools for evaluating photoreceptor cell damage in an early phase in VKH disease. The comprehensive analysis of SD-OCT and FAF could provide us more useful information of VKH disease.
Comparison of pre-operative and intraoperative imaging of epiretinal membranes

Jennifer MARIE-LOUISE1, Raphaël THOUVENIN1, Elise PHILIPPAKIS2, Sarra Gatoussi1, Aude COUTURIER3, Ramin Tadayoni1.
1Ophthalmology, Hôpital Lariboisière, Université Paris Diderot-Sorbonne Paris Cité, Paris, France; 2Ophthalmology, Hôpital Pellegrin, Bordeaux, France.

Purpose: To compare different types of pre-operative imaging and intraoperative visualization after staining in the analysis of primary epiretinal membrane (ERM) morphology.

Methods: Consecutive patients operated on for ERM with pre-operative multimodal imaging over a 9-month period were retrospectively reviewed. Secondary ERM and cataract combined procedures were excluded. Pre-operative imaging consisted in color retinophotography, a 55° Infrared reflectance (IR) and blue reflectance (BR) and a macular cube spectral domain optical coherence tomography (OCT) with En Face analysis. Intraoperative visualization of the ERM after 1-min staining with a mix of trypan blue and brilliant blue was captured. For each patient, the 5 images obtained were sorted by 2 independent specialists from A to E by order of contribution in the analysis of ERM morphology and limits (A being the most contributive image, E the less). The most contributive image was the one gathering the higher rate of A+B.

Results: On the 34 patients operated on for ERM, 13 were excluded because of combined surgery or secondary ERM. Eventually, 21 patients operated on for primary ERM were analyzed. Mean patient age was 70.4 years (±9.2, range 53-87) and 48% of patients were phakic. The most contributive images were in that order: BR (A+B=85%), En face OCT analysis (A+B=66.7%) and intraoperative visualization capture (A+B=61.9%). Color retinophotography (A+B=2%) and IR (A+B=0%) were the less contributive. Among phakic patients, BR offered the best analysis of the ERM morphology (A+B=85%), whereas in pseudophakic patients, the most contributive image was En face OCT (A+B=81.8%).

Conclusions: Morphological analysis of ERM may benefit from a multi-modal pre-operative imaging, especially BR image and En Face OCT analysis. Their quality may depend on the lens status. Both images may be used as overlays in future digital visualization operating systems.

Commercial Relationships: Jennifer MARIE-LOUISE, None; Raphaël THOUVENIN, None; Elise PHILIPPAKIS, None; Sarra Gatoussi, None; Aude COUTURIER, None; Ramin Tadayoni, None

Biomarkers of diabetic retinopathy based on dynamic fluorescein angiography

Jennifer J. Kang-Mieler1, Shaoxian Hu1, Carol Y. Cheung2, Leanne Horvath1, Miranda Poklar1, Danny S. Ng1, Fangyao Tang2, Wong Ying YIP2, William F. Mieler1, Kenneth Tichauer1.
1Biomedical Engineering, Illinois Institute of Technology, Chicago, IL; 2Ophthalmology and Visual Sciences, The Chinese University of Hong Kong, Hong Kong, Hong Kong; 3Ophthalmology and Visual Sciences, University of Illinois at Chicago, Chicago, IL.

Purpose: The purpose was to demonstrate that the retinal vascular permeability and volumetric blood flow mapping from dynamic fluorescein enhanced fluorescent imaging can detect changes of diabetic retinopathy (DR).

Methods: A routine fluorescein angiogram (FA) was performed in three normal control subjects and three diabetic patients. A bolus of
fluorescein dye (500mg/5ml) was injected to obtain videoangiograms (30°, 90 sec movie) using Heidelberg Spectralis. The images were obtained immediately after the injection to capture the initial filling of the blood vessels. Additional images were obtained at mid-phase and late-phase. The fluorescein images were loaded into MATLAB. Either plug-flow or AATH tracer kinetic model was applied to obtain retinal vascular permeability and blood flow maps from control and diabetic patients.

**Results:** Control subjects had no ocular abnormality. Based on the kinetic model analysis, the control subjects had an average volumetric blood flow of 26.2 ± 4.2 ml/min/100g. The average vascular permeability (extraction fraction) for the control subjects was 6.2x10^-5 ± 5.1x10^-5. The diabetic patients had no DR to mild non-proliferative DR. Two patients also had signs of diabetic macular edema. For the diabetic patients, the average volumetric blood flow was 14.5 ± 5.9 ml/min/100g. The average vascular permeability from the diabetic patients increased to 0.078 ± 0.037. There were significant differences in vascular permeability and volumetric blood flow between the control subjects and diabetic patients based on the kinetic model analysis.

**Conclusions:** The current data demonstrated that dynamic fluorescein enhanced fluorescent imaging can detect changes of volumetric blood flow and vascular permeability in diabetic patients. Specifically, an increase in the vascular permeability, in absence of proliferation, may be a sensitive parameter to detect vascular abnormality. This study demonstrated that the vascular permeability and blood flow may be powerful biomarkers for early detection of DR.

**Commercial Relationships:** Jennifer J. Kang-Mieler; Shaoxian Hu, None; Carol Y. Cheung, None; Leanne Horvath, None; Miranda Pokiar, None; Danny S. Ng, None; Fangyao Tang, None; Wong Ying VIP, None; William F. Mieler, None; Kenneth Tichauer, None

**Program Number:** 1880 Poster Board Number: B0352
**Presentation Time:** 11:00 AM–12:45 PM

**Challenges in Grading of Diabetic Retinopathy using Non-myridiatic Wide-field Imaging**

Daniel Rock¹, Lydia Marahrens¹, Tjalf Ziemssen², Martin Leitritz¹, Clin Lucien¹, Foncke Ziemssen¹. ¹Eberhard Karls University, Centre for Ophthalmology, Tübingen, Germany; ²University Hospital Carl Gustav Carus Dresden, Department of Neurology, Dresden, Germany; ³Reutlingen University, School of Informatics, Reutlingen, Germany.

**Purpose:** Large-scale epidemiologic studies described a considerable frequency of retinal microvascular abnormalities, even in the absence of diabetes or hypertension.¹ Therefore, we wanted to analyze potential influence factors on grading diabetic retinopathy severity, when analyzing wide-field imaging data of a cross-sectional cohort.

**Methods:** The recruitment of the DiabCheck³ was placed in in 3 secondary diabetes care centers during a period of 4 months. The inclusion criterion was a proven diagnosis of diabetes. The medical history was assessed for all participants. The wide-field photograph was taken using the non-myrdiatic OPTOS P200 imaging device (Optos GmbH, Düsseldorf). The patients underwent also spectral-domain optical coherence tomography (OCT, Heidelberg Spectralis). All images were graded using a reading center platform and the ETDRS standard photographs in order to derive the ETDRS severity scale.² ³ The images were analyzed for possible interaction by potential ocular comorbidities. The statistical analyses were performed with SPSS 22 (IBM) (NCT02311504).

**Results:** 1622 images were analyzed for 820 patients with diabetes. Following ocular comorbidities were detected: 12 eyes showed marked vitreous opacity due to asteroid hyalosis or vitreous hemorrhage. 3 eyes had branch vein occlusions, 3 eyes central arterial occlusion, 9 eyes arterial branch occlusion. Scares due to age-related macular degeneration were seen in 37 eyes, choriotenral scars outside of the macular region in 25 eyes and naevi in 28 eyes. Subretinal fibrosis (3 eyes) or staphyloma (3 eyes). Information of additional OCT and infrared images were used to clarify the concomitant disease.

Peripheral lesions, outside of the standard ETDRS fields were seen only in a small fraction of images (1.5%).¹ Most changes were bleedings, pigmentary changes or potential vascular variations.

**Conclusions:** In a typical cohort of patients attending a secondary diabetes centers in Germany, ocular comorbidities – independent of diabetic retinopathy – are not so rare and complicate the clinical grading. Potentially wrong assignments were more frequently seen in the range of 10 to 35 of the ETDRS severity score. While considering more than one imaging modalities might increase the specificity, coexisting ocular and general diseases still cause a frequent need of additional examinations after an image-based screening.

**Commercial Relationships:** Daniel Rock; Lydia Marahrens, None; Tjalf Ziemssen, Almirall (R), Robert Ernst Foundation (F), Bayer-Schering (R), Hertie Foundation (F), Deuteich Diabetessstiftung (F), MSD (R), GSK (R), Biogen Idec (R), Novartis (C), Bayer-Schering (C), Sanofi-Aventis (R), Teva (C), Novartis (R), Robert Perlger Foundation (F), Biogen Idec (C), Genzyme (R), Merck Serono (R), Teva (R); Martin Leitritz, None; Clin Lucien, None; Foncke Ziemssen, Alcon (R), Novartis (C), Bayer (C), Novartis (R), Bayer (R), Biogen (C), Novartis (F), Allergan (R), Alimera (C), Biogen (R), Allergan (C)

**Program Number:** 1881 Poster Board Number: B0353
**Presentation Time:** 11:00 AM–12:45 PM

**Presumed cytoid bodies and retinal ganglion cell apoptosis imaged in vivo by AOSLO in cotton wool spots (CWS)**

Thomas Gast, Christopher A. Clark, Ting Luo, Stephen A. Burns. Optometry, Indiana University, Bloomington, IN.

**Purpose:** To image by AOSLO and OCT the acute and chronic retinal changes associated with CWS

**Methods:** Subjects with HTN, DM and interferon related CWS were imaged with OCT and AOSLO including a patient imaged within 24 hours of occurrence who was also imaged 9 additional times over his 3 month clinical course. The acute and chronic changes of CWS on the individual retinal layers were quantified by OCT. Qualitative descriptions of the retinal changes seen by AOSLO and interpretation based on histology are made.

**Results:** Prominent findings on AOSLO include the imaging of apparent cytoid bodies within CWS. The axons in continuity with the CWS on the disk or retrograde side showed multiple linearly arranged enlargements developing over several days which then fade. These may represent the accumulation of organelles in retrograde transport to the cell bodies of ganglion cells whose axons were involved in the CWS. The temporal, or anterograde side of the acute lesion, showed scattered bodies within the distribution of the axons transgressing the CWS. These developed over several days post the occurrence of the acute CWS and occurred at greater distances from the CWS over time. These were interpreted as likely representing ganglion cells in the process of apoptosis. These observed changes in the retrograde and anterograde axonal pathways fade with time. Acutely, on OCT, there is remarkable thickening of the nerve fiber layer displacing the inner retinal layers. This resolves over time but contra-intuitively results in a thickened ONL in the area of the prior CWS, a thickened more reflective local NFL in the area of the CWS - presumably from astrocytic scarring, and thinning of the NFL in the areas of axons which passed through the CWS.
Conclusions: AOSLO imaging of CWS shows apparent cytoid bodies and imaging over the full temporal course of an acute CWS showed many of the changes observed histologically including cytoid bodies, and retinal ganglion cells in the process of apoptosis as well as changes in the anterograde and retrograde axon fibers. OCT showed distinct changes in retinal layer thicknesses that can serve as long term markers of the CWS even after it is not clinically visible.

Conclusions: SS-OCT is useful in imaging most choroidal nevi. We were able to identify characteristics of choroidal lesions that affects optimal image quality with SS-OCT. Our results revealed that image quality decreases with increasing distance of the edge of the choroidal lesion from the fovea, increasing lesion thickness as measured with ultrasound and darker lesion pigmentation.

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Presentation Time: 11:00 AM–12:45 PM

Prevalence of Outer Retinal Atrophy in Idiopathic Multifocal Choroiditis Associated with Persistent Fundus Hyperautofluorescence
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Purpose: To describe the prevalence and anatomic correlates for an uncommon variant of idiopathic multifocal choroiditis (MFC) characterized by regions of hyperautofluorescence showing minimal change over an extended follow-up.

Methods: Retrospective review of MFC patients from a single retina practice. Fluorescein angiography, indocyanine green angiography, optical coherence tomography, fundus autofluorescence and ultra-widefield imaging data were reviewed. The spatial and temporal characteristics of outer retinal and chorioretinal lesions were evaluated.

Results: Fifty-five eyes from 34 patients with a mean follow-up period of 4.6 years were analyzed. All eyes demonstrated pigmented, punched-out chorioretinal scars, with additional findings including peripheral curvilinear scars, vitritis and choroidal neovascularization. In addition, 5 eyes (9.1%) demonstrated a persistent fundus autofluorescence pattern characterized by regions of fundus hyperautofluorescence occurring in the posterior pole.
and/or periphery. In these 5 eyes, both visual acuity and the intensity and size of these hyperautofluorescent showed minimal change over an extended follow-up. Correlation of multimodal imaging data showed that the regions of hyperautofluorescence correlated with structural changes in the outer retina, without observable alterations at the level of the choroid or retinal pigment epithelium.

Conclusions: This study reports the prevalence and multimodal imaging characteristics of a rare variant of idiopathic MFC. These findings expand our understanding of the range clinical features occurring in this disorder.

Multifocal choroiditis with persistent regions of fundus hyperautofluorescence. In 5 eyes of 3 patients, the hyperautofluorescence persisted for the duration of follow-up.

A
B

Multimodal imaging findings of the left eye of one 3 cases with persistent hyperautofluorescence. Clinical features typically seen in multifocal choroiditis are evident including curvilinear Schlaegel lines (white arrows) and punched-out pigmented lesions (A). An area of peripapillary zonal atrophy is best seen on fundus autofluorescence imaging (B and C), as is the macular scar at the site of prior choroidal neovascularization and surgery. A hyperautofluorescent rim surrounds the region of zonal atrophy and the macular scar. En-face, swept source optical coherence tomography (OCT;D) reveals absence of large choroidal vessels at these sites but demonstrates the relative preservation of these vessels in other parts of the posterior pole. Spectral domain OCT (I) reveals the anatomic correlates for the 3 hyperautofluorescent patterns. The hyperautofluorescent rim correlates to the boundary between normal retina and the site where the external limiting membrane and ellipsoid zone are lost. Hypoautofluorescence correlates to the region of outer retinal and retinal pigment epithelium loss.

Commercial Relationships: Talia R. Kaden, None; Rosa Dolz-Marco, None; Chandra Bala, None; K Bailey Freund, Bayer HealthCare (R), Optos (R), Heidelberg Engineering (R), Optovue (R), Genentech (R); Lawrence A. Yannuzzi, Genentech (R)

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Investigating correspondence between markers of glycemic control and retinal ganglion cell layer thickness in an African population

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**Purpose:** The increasing prevalence of diabetes in Africa highlights the importance of early detection of diabetic eye changes. Recent work has identified thinner (RGC) layer on Spectral Domain Optical Coherence Tomography (SD-OCT) in patients with diabetes as compared to normal controls. The purpose of this pilot work is to determine if glucose tolerance test values in an African cohort correspond with RGC thickness, potentially identifying early evidence of diabetic changes in the eye that could precede retinopathy.

**Methods:** First and second generation African volunteers above the age of 18 who self-identified as healthy were recruited through newspaper advertisements, flyers and the NIH website and seen jointly at the NIDDK and the NEI. Patients with SD-OCT or exam evidence of comorbid retinal or optic nerve pathology, previous a diagnosis of diabetes, women who are breastfeeding or have an infant less than four months of age, or women with irregular menses in the year prior to enrollment were excluded. All participants had OGTT to identify who had normal glucose tolerance, prediabetes and diabetes. Then, minimum value RGC layer thickness was calculated using the Zeiss Cirrus SD-OCT segmentation algorithm and values for both eyes were averaged for each participant.

**Results:** Of 93 eligible self-identified healthy African immigrants ([61.2% male, age 41.53 ± 8.95 (mean ± SD)], 11 patients were classified as diabetic, 23 patients were classified as having impaired glucose tolerance, and 59 were classified as having normal glucose tolerance. Patients with diabetic (>200 mg/dL) glucose tolerance tests were older than those who had normal (<140 mg/dL) or impaired (140-200 mg/dL) glucose tolerance tests (p=0.008). Average minimum RGC layer thickness was greatest in the normal group (84.86 μm), less in the impaired glucose tolerance group (81.15 μm) and least in the diabetic group (78.50μm), and this difference was significant (p=0.001).

**Conclusions:** This pilot study suggests that average minimum RGC layer thickness corresponds with glucose tolerance in African immigrants. However, age may be a confounding factor. The next step is a longer study with longitudinal follow up.

**Commercial Relationships:** Robert P. Finger, Novartis (C), QLT Inc. (C), Santen (C); Maximilian Wintergerst, None; Frank G. Holz, Genentech/Roche, Zeiss (R), NightstarX (F), Boehringer-Ingelheim (C), Allergan (F), Thea (C), Allergan (R), Bioeq (C), Optos (F), Zeiss (F), Acucela (F), Novartis (C), Heidelberg Engineering (F), Novartis (R), Bayer (C), Bayer (R), Heidelberg Engineering (C), Novartis (F), Pixon (F), Merz (C), Heidelberg Engineering (R), Acucela (C), Genentech/Roche (C), Genentech/Roche (F), Bioeq (F), Bayer (F)

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Nerve Fiber Thickness in Emmetropic and High Myopic Eyes

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**Purpose:** We hypothesized that retinal nerve fibre layer (RNFL) thickness affects parapapillary autofluorescence (PAF). To test this idea, we compared the relationship between RNFL thickness and PAF in emmetropic and high myopic eyes.

**Methods:** Seventy-two healthy subjects (aged 29.5±12.0 years) were recruited. Thirty-two were emmetropes (±<0.75D) and 40 were high myopes (≥-6.00D). Thirty-degree PAF images were captured using Spectralis HRA+OCT. PAF intensities were sampled around the optic disc. RNFL segment measurements were obtained from optic disc cube scans using Cirrus OCT (Carl Zeiss). Correlation coefficient was calculated between PAF intensity and RNFL thickness (Fig. 1). Statistical significance was set at P<0.05.

**Results:** RNFL was thickest inferior-temporally and thinnest nasally (n=72). In myopic eyes, RNFL was thicker temporally and thinner superiorly and inferiorly compared to emmetropic eyes (P>0.04). PAF intensities were highest nasally and lowest inferior-temporally (n=72). PAF intensity was negatively correlated with RNFL thickness in 59.4% (n=19) of emmetropic and 55.0% (n=22) of myopic eyes (r=-0.914 to -0.588, P<0.05). The 13 emmetropic eyes that showed no PAF-RNFL correlation were older (36.3±12.6 vs 25.0±7.4 years, P=0.007) and had more negative refraction (-0.27±0.69D vs 0.23±0.45D, P=0.018) than those emmetropes with PAF-RNFL correlation. In the myopic eyes, there was no significant difference in age, refraction or axial length (AL) between those with or without correlation in PAF intensity and RNFL thickness.

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Conclusions: PAF is negatively correlated with RNFL thickness in most young emmetropic eyes, showing that RNFL may attenuate PAF. Lack of PAF-RNFL correlation in older emmetropic eyes and longer eyes suggests changes in the parapapillary retinal pigment epithelium and/or RNFL. Age and AL are not major factors in PAF-RNFL correlation in high myopic eyes.

Figure 1. The infra-red image from disc OCT scan (left) was aligned with the PAF image of the optic disc (middle). PAF intensities were sampled from 5x5 pixel squares at the same location where RNFL thickness was measured. PAF intensities of 4 sampling squares were averaged at each of the 12 segments. The RNFL thickness of the 12 segments of the optic disc is shown at the right.

Commercial Relationships: Teresa Tee, None; Lekha Gopal, None; Ian J. Murray, None; Ivan Y. Leung, None

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Normative Assessment of Outer Retinal Metrics Utilizing Ellipsoid Zone Mapping

Neely A. Dukles, sruthi arepalli, Peter M. Kaiser, Allison Watts, Jamie Reese, Sunil K. Srivastava, Justis Ehlers. Cole Eye Institute, Cleveland Clinic, Cleveland, OH.

Purpose: Ellipsoid zone (EZ) integrity has been linked to visual prognosis and function in various vitreoretinal disorders, but normative data is lacking for macular EZ metrics. The purpose of this study is to evaluate EZ and outer retinal metrics in eyes without macular disease across a wide age spectrum.

Methods: An IRB-approved retrospective image analysis study of 204 eyes of 204 subjects without macular pathology was performed. Line-by-line reviewed as performed by an expert reader to verify the absence of macular pathology. SD-OCT scans were analyzed using a novel automated EZ mapping tool with line-by-line manual verification of optimal segmentation. The output of the EZ mapping assessment including multiple quantitative metrics of macular EZ-retinal pigment epithelium (RPE) volume, central foveal EZ-RPE thickness, central foveal EZ-RPE area, en face percentage of EZ loss (EZ thickness = 0μm), and en face EZ attenuation (EZ thickness < 20 μm). Outer retinal parameters were also measured from the outer nuclear layer (ONL) to the RPE. Inclusion criteria included a Cirrus macular cube with signal strength of 7 of 10 or greater, sufficient for analysis. Exclusion criteria included a history of optic neuropathy, intraocular surgery besides for uncomplicated phacoemulsification, myopia greater than 6 diopters, macular pathology, and previous intraretinal or subretinal fluid. EZ parameters were assessed for correlation with age, and spherical equivalent.

Results: Eyes ranging 10 to 84 years (mean 52.2) were analyzed. Clinical parameters were assessed for the overall group (n=202) and compared between 4 age quartiles; 1: 10-29 years (n=41), 2: 30-49 years (n=37), 3: 50-69 years (n=82), 4: 70-89 years (n=41). The mean central foveal EZ-RPE thickness was 49±6.13 microns in the overall group. The mean EZ-RPE volume was 1.19±0.11 mm³. Average map area of EZ attenuation was 0.47±1.23 mm², and the average map area of EZ loss was 0.04±0.05 mm². The mean central foveal ONL-RPE thickness was 126.13±10.45 microns in the overall group. The mean ONL-RPE volume was 4.04±0.30 mm³. Overall, the parameters between quartiles were similar.

Conclusions: This study provides important information on normative metrics for outer retinal parameters. Future research and clinical trials that focus on quantitative EZ integrity will be able to utilize this information for comparative assessment to normal. Minimal changes were noted with age.

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Program Number: 1888 Poster Board Number: B0360

Presentation Time: 11:00 AM–12:45 PM

Comparative Evaluation of Review Strategies for Detection of Vascular Abnormalities on Optical Coherence Tomography Angiography in the AVATAR Study

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Purpose: The purpose of this study is to compare review strategies for optical coherence tomography angiography (OCTA) for multiple pathologic features found in common diseases of the choroid and retina.

Methods: AVATAR is an IRB-approved prospective observational study of OCTA in eyes undergoing routine spectral-domain optical coherence tomography (SD-OCT) for macular disease. Patients were imaged with the Avanti RTVue XR HD (Optovue, Fremont, CA) and the SSADA algorithm software was utilized for OCTA performance. All scans of sufficient quality were reviewed by 2 masked independent expert reviewers. A third masked reviewer was utilized for any reviewer disagreement. A single report using automated segmentation within the Avanti software to represent the superficial retina, inner retina, and choroid was generated. A line-by-line video export was also reviewed for each OCTA scan. Each report was reviewed for the presence of three pathologic features: choroidal neovascularization, microaneurysms, and macular ischemia.

Results: Four hundred twenty-one eyes were included in the study. Of those, 350 scans were deemed sufficient for interpretation and analysis. Detection rates of choroidal neovascularization, microaneurysms, and macular ischemia on the report were 90.5%, 84.5%, and 95.4% respectively. Likewise, detection rates on the line-by-line review video were 88.1%, 96.4%, and 95.4% for choroidal neovascularization, microaneurysms, and macular ischemia respectively. Cohen’s kappa values ranged from 0.79 to 0.96, corresponding to good and very good agreement between the report and line-by-line review for each variable.

Conclusions: Defining an optimal reporting strategy for OCTA is important for diagnostic accuracy and optimizing workflow in retina clinics. In this study, an OCTA report using automated segmentation was comparable to line-by-line review for detecting microvascular abnormalities of the retina and choroid.
Commercial Relationships: Amy S. Babiuch, Allergan (R); Mehnaz Khan, None; Ming Hu, None; Peter K. Kaiser; Sunil K. Srivastava, Synergetics (P), Leica (P), Bausch and Lomb (C), Allergan (F), Alcon (C), Santen (C), Bioptigen (P), Bausch and Lomb (P), Zeiss (C); Rishi P. Singh, Optos (C), Regeneron (F), Genentech (C), Alcon (F), Zeiss (C), Regeneron (C), Genentech (F), Apellis (F), Shire (C); Allison Watts, None; Jamie Reese, None; Justis Ehlers, Regeneron (F), Santen (C), Alcon (C), Bausch and Lomb (P), Genentech (F), Leica (P), Synergetics (P), Bioptigen (P), Genentech (C), Leica (C), Thrombogenics (C), Alimera (C), Alcon (F), Bioptigen (C), Zeiss (C), Allergan (C), Thrombogenics (F)

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Program Number: 1889 Poster Board Number: B0361
Presentation Time: 11:00 AM–12:45 PM
En Face OCT Analysis to Assess the Spectrum of Perivenular Ischemia and PAMM in Retinal Vascular Occlusion

Ananda Kalevar1, 8, Khalil G. Falavarjani2, 3, Nopasak Phasukkijwatana2, 4, Emmett Cunningham1, 4, Richard McDonald1, Rosa Dolz-Marco5, Phillip Roberts6, Irena Tsui1, Richard B. Rosen1, K Bailey Freund9, Lee M. Jampol7, David Sarraf2, 10, 1West Coast Retina Medical Group, San Francisco, CA; 2David Geffen School of Medicine, University of California Los Angeles, Los Angeles, CA; 3Eye Research Center, Rassoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran (the Islamic Republic of); 4Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand; 5Medical University of Vienna, Vienna, Austria; 6New York Eye and Ear Infirmary of Mount Sinai, New York, NY; 7Feinberg School of Medicine, Northwestern University, Chicago, IL; 8California Pacific Medical Center, San Francisco, CA; 9Vitreous Retina Macula Consultants of New York, New York, NY; 10Greater Los Angeles VA Healthcare Center, Los Angeles, CA.

Purpose: To assess the spectrum of perivenular ischemia in eyes with retinal vein occlusion using en face optical coherence tomography (OCT).

Methods: Eyes with recent retinal vascular occlusion illustrating paracentral acute middle maculopathy (PAMM) in a perivenular pattern with en face OCT were evaluated in this study. Multimodal retinal imaging including en face OCT segmentation of the inner nuclear layer was performed in all patients. Color fundus photography and fluorescein angiography (FA) images were used to create a vascular overlay of the retinal veins versus the retinal arteries to map the distribution of PAMM with en face OCT analysis.

Results: Multimodal retinal imaging was performed in 11 eyes with acute retinal vascular obstruction. While 7 eyes demonstrated obvious findings of retinal vein obstruction (5 with central and 2 with hemiretinal retinal vein occlusion), 4 eyes were unremarkable at baseline. One of these 4 eyes progressed to CRVO. En face OCT analysis demonstrated a spectrum of perivenular PAMM illustrating progressive wider perivenular lesions with sparing of the periarteriolar area in all cases.

Conclusions: En face OCT may illustrate a remarkable perivenular pattern of PAMM in eyes with retinal vascular obstruction even in the absence of significant funduspic findings. Perivenular PAMM with en face OCT demonstrates a wide spectrum of variation that may develop due to anflow obstruction causing perfusion pressure reduction in the affected eye resulting from different severities of retinal vein occlusion.

Commercial Relationships: Ananda Kalevar, None; Khalil G. Falavarjani, None; Nopasak Phasukkijwatana, None; Emmett Cunningham, None; Richard McDonald, None; Rosa Dolz-Marco, None; Phillip Roberts, None; Irena Tsui, None; Richard B. Rosen, None; K Bailey Freund, None; Srinivas R. Sadda, None; Lee M. Jampol, None; David Sarraf, None

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