540 Visual Field Testing
Thursday, May 08, 2014 12:00 PM–1:45 PM
Exhibit/Poster Hall SA  Poster Session
Program #/Board # Range: 6109–6117/A0247–A0255
Organizing Section: Visual Psychophysics / Physiological Optics
Contributing Section(s): Retina

Program Number: 6109 Poster Board Number: A0247
Presentation Time: 12:00 PM–1:45 PM

Visual training with microperimetry for patients with unstable/ eccentric fixation after macular surgery
Patricia Udaondo, Ana Hervas Ontiveros, Salvador García-Delpech, David Salom, Rafael Martínez-Costa, Ángel Csínes-Lanuza. Ophthalmology, La Fe University Hospital, Valencia, Spain.

Purpose: The maia microperimeter identifies, in a fast and easy way, retinal threshold sensitivity and patient characteristics. In a previous study we conclude that microperimetry can provide useful information of retinal function and analyze the progression of the functional loss or improvement after macular surgical treatments and that functional (central visual acuity and visual field) and morphologic parameters (retinal thickness) are significantly related. In those patients with limited visual gained was usually associated to either an eccentric or unstable fixation point.

In this study our objective was to evaluate if with a vision training module patients could develop a new, more functional retinal locus or recollect the central one.

Methods: 10 patients with unstable or eccentric fixation point after macular surgery underwent a visual training with the microperimeter application twice a week for a month. A complete ophthalmic examination including best corrected visual acuity (BCVA), macular integrity measured with the device named MAIA (Topcon Medical Systems, Inc.) was used to determine visual sensitivity and fixation stability and the Optical Coherence Tomography 3D OCT-1000 (Topcon Medical Systems, Inc.) to study the anatomical profile and central macular thickness (CMT) in all cases before, a month and three months after surgery and the visual training.

Results: All patients referred an improvement in visual acuity. No changes where observed in the anatomical profile but 7 of 10 patients improved the fixation point and the best corrected visual acuity that are clearly observed in the tests provided by the microperimeter and correlated with the OCT to easily compared the changes of the fixation on a posterior pole image and OCT scan.

Conclusions: Although further studies are necessary to determine the role and effectiveness of this visual training module we conclude that the preliminary results are good and the application should be consider to improve retinal sensitivity and visual acuity in patients after macular surgery. We also think that the study of macular integrity should be included in routine in patients with macular pathology to better understand the effect of treatments and time in the visual function and not only base the follow up in the macular anatomy.

Commercial Relationships: Patricia Udaondo, Allergan (C), Bausch lomb (R), Bayer (C), Gene signal (C), Thea (R); Ana Hervas Ontiveros, None; Salvador García-Delpech, None; David Salom, None; Rafael Martínez-Costa, None; Angel Csínes-Lanuza, None

Program Number: 6110 Poster Board Number: A0248
Presentation Time: 12:00 PM–1:45 PM

Comparison of Kinetic Visual Fields (Goldmann and Octopus) and Threshold Visual Fields (Octopus macular static and Full-Field Stimulus Threshold) in Patients with Inherited Retinal Diseases
Ronald A. Schuchard1, 5, David G. Birch1, Gislin Dagnelie1, Robert K. Koenekeop1, Ava K. Bittner1, Leah M. Wood1, Claire S. Barnes2.
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Purpose: The main objective was to compare Goldmann (GVF; manual) and Octopus (OVF; semi-automated) kinetic visual fields. The study also assessed the test-retest GVF and OVF solid angle measures. Finally the study determined whether Octopus static macular thresholds provided equivalent results to Full-Field Stimulus Threshold (FST; Diagnosys) measures.

Methods: Twenty-six participants with inherited retinal diseases (IRD; RP or LCA), age range 7 to 52 years, with reduced visual fields (10 deg to 120 deg diameters measured by V4e and one smaller size target, IV4e to 14e) underwent GVF and OVF tests repeated after one week. Octopus macular thresholds with five static points within 5 degrees of fixation and FST measures were obtained and also repeated after one week. Perimetrist ratings assessed fixation, cooperation, fatigue, and reported photopsias.

Results: All 26 participants maintained fixation with few losses during the perimetry tests. The testing times to determine the two GVF and OVF isopters (V4e and one smaller size) were not significantly different (GVF/OVF median = 22/23 minutes, range = 10-40/6-49 minutes). Solid angle measures (0.2 to 3.2 steradians) from GVF and OVF isopters were not significantly different (paired t-test; p<0.05). Test-retest values (solid angle percent change) were also not significantly different between GVF and OVF with the V4e isopters producing smaller test-retest values (GVF/OVF median = 9.4%/12.8%, range = 0.6%-76.2%/0.2%-62.1%) than the smaller size target isopters (GVF/OVF median = 8.6%/18.1%, range = 0.3%-110.7%/0%-184.5%). Threshold values from FST and Octopus static macular (average or most sensitive) were not correlated. The relationship of participant cooperation, fatigue, and photopsias to results will be discussed.

Conclusions: Our results provide evidence that OVF semi-automated kinetic perimetry with reaction time compensation can provide similar solid angle measures and similar test-retest variability to GVF performed by a qualified operator in the same testing time. Octopus static macular thresholds are not related to FST values. These findings suggest that OVF can provide reliable and accurate visual field measures in IRD clinical trials and that Octopus static thresholds from the macula do not provide equivalent threshold information to the FST.

Commercial Relationships: Ronald A. Schuchard, QLT Inc. (C); David G. Birch, QLT Inc. (C); Gislin Dagnelie, QLT Inc. (C); Robert K. Koenekeop, QLT Inc. (C); Ava K. Bittner, QLT Inc. (C); Leah M. Wood, None; Claire S. Barnes, QLT Inc. (C)
Support: Support provided by QLT Inc.
Progression in Patients with Advanced Retinal Degenerative diseases (RDD) followed with Full-field Stimulus Threshold (FST) Testing

**Purpose:** The FST has been established as a useful method for assessing visual function in patients with advanced retinal degeneration when other methods like visual fields and electroretinograms cannot be performed or have reached the limit of their sensitivity (Messias et al., Doc. Ophthalmol, 2013; Klein, Birch, Doc. Ophthalmol, 2009). Here we present prospective data from patients who had FST testing on two or more visits at least 12 months apart in order to determine whether progression can be detected as a difference in thresholds.

**Methods:** Included were 13 eyes from 13 patients. Each patient had advanced RDD, no detectable rod ERG and very small (<4.0 μV) to non-detectable (<0.1 μV) cone ERG responses and had performed the FST on two visits at least 12 months apart. FST was performed dilated and dark-adapted as described by Klein, Birch 2009 with 0 dB level set at 0.1 cd.s/m². The difference in thresholds (in log cd.s/m²) between the two visits was calculated. Based on repeat variability (Klein, Birch, Doc. Ophthalmol, 2009), differences of ≥ 0.3 log unit were considered significant.

**Results:** The average threshold on the initial visit was -2.6 ± 0.9 log cd.s/m², which is an elevation of 3.9 log units above mean normal (-6.5 log cd.s/m²). The average duration between visits was 29 months. Over this time, the average increase in threshold was 0.46 log units, or roughly 0.14 log unit per year. Of the 13 eyes, 7 eyes showed a significant (> 0.3 log unit) rise in threshold between visits with a mean duration between visits of 31.9 ± 12.5 months. Most patients with an elevation over 4.5 log units at the initial visit showed little change.

**Conclusions:** Progression can be followed by FST threshold in patients with minimally-detectable ERGs and visual fields. The average annual rate of change of 0.14 log unit is roughly consistent with the 10-20 % decline in visual field sensitivity reported in less advanced patients. Eyes with the greatest elevation in threshold at the initial visit showed no progression, suggesting a possible floor effect.

**Commercial Relationships:** Martin Klein, None; David G. Birch, None

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Results: The average (N=11, ±SD) absolute horizontal offsets were 4.4±3.3, 2.5±2.6 and 4.2±4.2 arc min, respectively for the low, medium, and high IR settings. The corresponding values for vertical offsets were 3.7±2.4, 3.3±2.3 and 3.9±2.9 arc min. The average offsets across illuminance levels were not significantly different for the younger and older subjects.

Conclusions: The NIDEK MP-1 registers the IR images during follow-up testing with an accuracy close to one pixel (1 pixel = ~4 arc min). Registration is equally good for both younger and older subjects and does not differ significantly across IR illuminance settings. The MP-1 can be used to assess essentially identical retinal locations repeatedly with a dense sampling grid.
and functional visual field using Visual Field with Inhibitory Tasks (VFIT). VFIT is a computer software developed in 2004 to detect functional visual field for healthy subjects and cerebral injury patients. This test measures a person’s ability to recognize one object in the peripheral visual field while watching a point of regard at the center of the screen. The percentage of correct answers in VFIT is already known to have a significant correlation with the rating of driving skills using an actual vehicle (Fujita.Y et. al. Sagyoryohou [in Japanese], 2012). Spearman’s rank correlation coefficient was used to investigate the relationship between the percentage of correct answer of VFIT, CDV A and FVA.

Results: The mean age of the subjects was 66.8±4.4 years (range: 60 to 77 years). Mean CDVA and FVA in log MAR were -0.11±0.12 and -0.03±0.14, respectively. The mean percentage of correct answers in VFIT was 86.6±11.3. The mean score of Schirmer test was 8.0±6.3. The mean BUT was 3.4±2.8 seconds. The percentage of correct answers in VFIT significantly correlated with FVA (r = -0.470 and P = 0.009), but not with CDVA.

Conclusions: FVA has the potential to effectively evaluate the elderly driving skills.

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Presentation Time: 12:00 PM–1:45 PM
Retinal sensitivity by means of microperimetry in patients with different drusen type
Giovanni Staurenghi, Andrea Giani, Mario V. Cigada. Department of Biomedical and Clinical Sci (Luigi Sacco), University of Milan, Milano, Italy.

Purpose: To investigate retinal sensitivity in patients with soft and pseudoreticular drusen without any sign of advanced age-related macular degeneration.

Methods: Multicolor picture, infrared reflective imaging, fundus autofluorescence, fluorescein and indocyanine green angiography using Heidelberg Spectralis (Heidelberg Engineering) were used to identify and classify drusen. Microperimetry were performed in 63 consecutive patients by means Maia microperimetry (Centerveu, Padova Italy), using the standard pattern. Retinal sensitivity were tested at 1° and 3° centered in the fovea. Six measurement points in the upper and lower macula area were analyzed. Two indipendent observer classified the different drusen type. Agreement was assessed with Kappa statistic. Retinal sensitivity of soft and pseudoreticular drusen were compared with ANOVA and MANOVA

Results: 40 patients with soft drusen and 23 with reticular pseudodrusen were identified. Microperimetry test has a mean duration of 6 minutes. Retinal sensitivity decreased in pseudoreticular drusen only at 3°. This difference is more evident in the superior field. MANOVA do not shows significantly differences in this pattern between nasal, center and temporal area.

Conclusions: This study shows the significantly different sensitivity between reticular pseudodrusen and soft drusen in the area where rods are more present. This could confirm that reticular pseudodrusen are photoreceptor disease sign. This small study already suggest that it is possible to limit to only six points test which reduce the time to only 3 minutes.

<table>
<thead>
<tr>
<th>ANOVA (P values)</th>
<th>Nasal</th>
<th>Center</th>
<th>Temporal</th>
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<tr>
<td>Superior 3°</td>
<td>0.00501</td>
<td>0.0198</td>
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</table>

Table 1 ANOVA p value results

Commercial Relationships: Giovanni Staurenghi, Alcon (C), Allergan (C), Bayer (C), Boehringer (C), Genentech (C), Heidelberg Engineering (C), Novartis (C), OD-OS (C), Quentel (C), Riche (C), Zeiss (C); Andrea Giani, None; Mario V. Cigada, None