population is of great significance. Here we propose a new design to achieve this goal.
Methods: The new design is based on tunable refractive index of the liquid crystals and the hybrid lens structure. The conventional liquid crystal lenses based on the refractive lens structure is thick and hence the response time is slow. The previous liquid crystal lenses based on grooved structures suffer from poor alignment of the liquid crystal molecules even if an alignment layer is coated on the grooved structure. To overcome these problems, we adopt structures such as diffractive lens, harmonic diffractive lens, and Fresnel lens to reduce the thickness of the liquid crystal lenses, and in order to obtain reliable alignment of liquid crystal, an innovative technique is proposed. In this technique, nanoparticles are doped into liquid crystals for uniform homeotropic alignment. Only one alignment layer is needed on the flat surface of the substrate and no alignment layer is needed on the micro-structured surface. New liquid crystal materials can be used in this lens structure to make polarization-independent lens, and this is a great advantage since the thickness of the whole lens assembly can be reduced by half.
Results: Adaptive liquid crystal lenses with large aperture (over 20 mm), large tunable range (over 3 diopters) and low driving voltage have been designed and fabricated. The lenses show high optical performance and are suitable for applications in adaptive spectacles and visual simulator.
Conclusions: The low-cost electro-active tunable lenses with large aperture and good tunable range provide a viable solution to vision correction and vision assessment.
Commercial Relationships: Guoqiang Li, None
Support: NIH/NEI R01 EY020641

Program Number: 5974
Presentation Time: 1:15 PM–1:30 PM
Longitudinal Chromatic Aberration of the human eye in the visible and near infrared from Hartmann-Shack wavefront sensing, double-pass and psychophysics
Maria Vinas, Carlos Dorronsoro, Lucie Sawides, Daniel Cortés, Daniel Pascual, Aiswaryah Radhakrishnan, Susana Marcos. Visual Optics & Biophotonics Lab, Instituto de Optica, CSIC, Madrid, Spain.
Purpose: Longitudinal Chromatic Aberration (LCA) plays an important role on polychromatic optical quality and retinal imaging at different wavelengths (λ). However, the reported LCA varies across studies, likely associated to the different measurement techniques. We present LCA obtained from Hartmann-Shack (HS) wavefront sensing, double-pass (DP), and psychophysical methods in the same subjects.
Methods: A supercontinuum laser (450-1020nm) was used as the light source in custom-develop Adaptive Optics (AO) system provided with a HS (HASO, Imagine Eyes) and a deformable mirror (MIRAO, Imagine Eyes) to measure and correct the aberrations of the system and/or eye. The system incorporates a motorized Badal system, a natural pupil monitoring system, a CCD camera capturing aerial retinal images, and a psychophysical channel with monochromatically back-illuminated stimuli. A total of 16 wavelengths were tested using 2 fiber-optic-channels: 450-650nm in the visible (VIS), and 700-1020nm in the near infrared (NIR). Measurements were performed on 5 subjects (35.60±3.3yrs; -2.75±1.9D) with dilated pupils (6-mm artificial pupil). LCA was estimated from measurements at all λ from: (1) the defocus Zernike terms from HS wave aberrations; (2) best focused images of through-focus (0.25D steps) DP aerial image series; (3) subjective Badal best focusing of monochromatic stimuli (VIS only). Measurements were corrected by the calibrated LCA of the optical system (0.05D in VIS/0.28D in NIR).
Results: The average VIS LCA (488-650nm) was 0.83±0.18D from HS, 0.84±0.08D from DP, and 1.16±0.03D (1.56 ± 0.03 D for 450-650nm) from subjective best focus. The average NIR LCA (650-950nm) was 0.39±0.18D from HS and 0.33±0.10D from DP. The average Total VIS-NIR LCA (488-950nm) was 1.30±0.23D from HS and 1.54±0.23D from DP.
Conclusions: A custom-made polychromatic AO system allowed objective and subjective measurements of LCA, in a wider range (HS and DP) than previously explored. Subjective LCA (best focus, large pupils) is significantly higher than LCA from reflectometric techniques (HS and DP, both in excellent agreement). LCA measurements under AO-corrected aberrations with this system will give insights on the origin of the systematic discrepancies of subjective/objective LCA: presence of aberrations or λ-dependency of the retinal reflective layer.
Commercial Relationships: Maria Vinas, None; **Carlos Dorronsoro**, None; **Lucie Sawides**, None; **Daniel Cortés**, None; **Daniel Pascual**, None; **Aiswaryah Radhakrishnan**, None; **Susana Marcos**, None
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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/ excentric fixation after macular surgery
Patricia Udaondo, Ana Hervas Ontiveros, Salvador García-Delpech, David Salom, Rafael Martínez-Costa, Ángel Cisneros-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 excentric 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 recolate the central one.
Methods: 10 patients with unstable or excentric 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.