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1. Genetics and Gene Expression



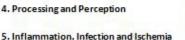
2. Development



3. Physiology and Pathology



4. Processing and Perception



7. Repair, Regeneration and Restoration



8. Imaging and Other Methods



9. Diagnosis and Treatment



Presentation Abstract

4370 Program#/Poster#:

Abstract Title: Peripheral Aberrations Measured With High Angular

Resolution In A Population Of Myopes And Emmetropes

Presentation Start/End

Time:

Wednesday, May 04, 2011, 1:45 PM - 2:00 PM

Session Number: 441

Peripheral Refractive Errors 2 / 2 Session Title:







Room 305 Location:

333 peripheral vision - VI Reviewing Code:

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Keywords: 623 aberrations; 604 myopia; 674 refractive error development

Abstract Body: **Purpose:** To use a newly developed high speed scanning peripheral

> wavefront sensor to study off-axis refraction and aberrations in a population of emmetropic and myopic eyes. Measurements will be taken with unprecedented high angular resolution allowing more accurate shape fits of the results over the peripheral retina.

Methods: A fast scanning peripheral Hartmann-Shack (HS)

wavefront sensor was used to measure off-axis aberrations along the horizontal meridian (±40°) with 1° angular resolution in a group of 75 normal subjects. Both eyes of all subjects were sampled in natural

condition, acquiring series of 324 HS-images in 7 s. Zernike polynomials were fitted using all data points and then rescaled to a 4mm pupil. The differences between the 51 emmetropes (EM) (foveal refraction \geq -0.75 D) and the 24 myopes (MY) were examined using shape parameters and mean individual angle measurements. Polynomials (1st-4th order) were fitted to the mean spherical equivalent (M) as a function of eccentricity. The quadratic coefficient (aQ) of 2nd order polynomials fitted to M, astigmatism (C0) and the RMS of the higher order aberrations (High-RMS: 3rd

and 4th order) were compared.

Results: For most emmetropic eyes (76.4%) the shape of M, as function of eccentricity, was best fitted with a quadratic function. For the myopic eyes this was only 58.3% while 27.8% needed higher

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order polynomials compared to 9.4% for EM. Examining coefficient aQ, significant difference between the groups was found (mn \pm std, EM / MY; -0.0012 ± 0.0006 / -0.0001 ± 0.0013). For the eyes best fitted with a quadratic function, 97.5% compared to 50.0% had a negative aQ-coefficient (myopic relative peripheral refraction) respectively for EM and MY. Statistic analysis of the normalized M data for each angle showed significant difference from 10° outwards for the temporal retina and from 25° outwards for the nasal retinal field. The shape of C0 varies significant between the refractive groups (aQ = $0.0021 \pm 0.0007 / 0.0018 \pm 0.0006$) causing a smaller relative difference between central and peripheral C0 for myopes. The myopic subjects had on average significantly more High-RMS $(0.05 \pm 0.03 \,\mu\text{m})$. The difference was asymmetric, with the largest differences at the nasal retina. This imbalance is due to the difference in shape of horizontal coma between the two groups. **Conclusions:** The use of a fast and high resolution peripheral wavefront sensor in a population study revealed significant differences in several optical properties of the peripheral eye comparing emmetropes and myopes.

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