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Presentation Abstract

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| Program#/Poster#: | 4370 |
| 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 |
| Session Title: | Peripheral Refractive Errors / |
| Location: | Room 305 |
| Reviewing Code: | 333 peripheral vision - VI |
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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.<br>**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 ≥ -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.<br>**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 |

order polynomials compared to 9.4% for EM. Examining coefficient aQ, significant difference between the groups was found (mn ± 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 ± 0.0007 / 0.0018 ± 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 ± 0.03 µm). 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.

CommercialRelationships: **Bart Jaeken**, None; **Linda Lundstrom**, None; **Pablo Artal**, None

Support: Ministerio de Educación y Ciencia", Spain (grant nº FIS2007-64765) and "Fundación Séneca, Murcia, Spain (grant 04524/GERM/06)