A comparison of psychophysical and optical methods for determining the spatial profile of Macular Pigment
Tos TJM Berendschot, Rob LP van der Veen, Maria Makridaki, Dave Carden & Ian J Murray
1 University Eye Clinic Maastricht, The Netherlands; 2 Faculty of Life Sciences, University of Manchester, UK

INTRODUCTION

A straightforward comparison of absolute values of the Macular Pigment Optical Density (MPOD) obtained with optical and psychophysical methods is difficult. Because of its spatial peakedness, the size of the retinal field probed has a major effect. In the objective technique of spectral fundus reflectance, the MPOD is the average over the retinal field sampled, whereas in the psychophysical heterochromatic flickerphotometry minimizing flicker might be achieved at or near the edge of the test field.

PURPOSE

To investigate the origin of the discrepancies between optical and psychophysical methods of measuring MPOD by comparing MPOD at different eccentricities.

METHODS

Spatial MPOD profiles were compared in 19 healthy individuals (13 women, 6 men) aged 26 ± 8 years, using spectral fundus reflectance and heterochromatic flickerphotometry.

spectral fundus reflectance

MPOD reflectometry estimates were obtained at 0, 1, 2, 4, 6 and 8 degrees eccentricity with the Macular Pigment Reflectometer,1 that also allowed separate determination of lutein and zeaxanthin. Measurements were performed without pupil dilation.

heterochromatic flickerphotometry

The Macular Pigment Screener2 (called QuantEye in the USA) was used to assess MPOD psychophysically at 0, 0.5, 1, 2, 3, 4, 6 and 8 degrees eccentricity.

RESULTS

The Macula Pigment Screener. The difference between the two techniques at 0 and 0.5 degrees we assumed that on average, the difference at 0.5 degrees when the 1 degree target was presented at 0.5 degrees from the centre. After these corrections there was a high correlation between the values obtained with the two techniques (r = 0.87, p < 0.001).

CONCLUSION

The psychophysical measurement of MPOD can be corrected by assuming that flicker thresholds are based on observers focusing close to the edge of the flickering target at 0 and 0.5 degrees eccentricity. As other eccentricities, flicker thresholds are not based on this so called edge strategy and resulting MPOD measurements are virtually indistinguishable from those obtained with the optical technique.

For all eccentricities greater than 1 degree there was very good agreement between the actual MPOD values and the MPOD estimates obtained by the MPR, that employed a 1-degree test field (r = 0.94, p < 0.001). Note that we added the MPOD estimate from the MPR data at 8 degrees eccentricity to all MPS estimates, since in the latter the value at 8 degrees is taken as the reference point. For the 0 and 0.5 degrees measurements the agreement was poor.

Contact: tberendschot@och.azman.nl

References