Abstract – Synopsis

The complexity of spatial profiles of macular pigment

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It has been shown that peak macular pigment optical density (MPOD) is a poor predictor of the total amount of macular pigment present and it is more important to consider the overall distribution instead of a single central measurement of MPOD. There is general consensus that macular pigment peaks at the centre of the fovea and sharply declines exponentially with eccentricity. There have been reports of variations from this typical profile, whereby an annulus of higher MPOD is superimposed on the exponential distribution, giving rise to a ring-like structure between 0.5 and 1.2 degrees eccentricity. These ring-like structures are also known as secondary peak, bimodal or atypical profiles of the macular pigment. There have also been reports of a central dip or plateau whereby a central peak is absent. However, variation in measurement techniques makes comparison between studies difficult.

In order to achieve a systematic study framework, we propose a universal objective classification system to compare MPOD profiles between studies, which can then be applied to any MPOD measurement technique. We report excellent agreement between visits of this objective classification method using HFP techniques ($k = 0.88$, $P < 0.0005$) as well as FAF imaging ($k = 0.85$; $P < 0.0005$) compared to visual classification ($k = 0.44$, $P = 0.02$).

The presence of a secondary peak has been found three times less common in eyes with presence of AMD compared to healthy eyes. In addition, non-exponential profiles of MPOD may be present more frequently in some ethnicities. This may contribute to ethnic variations seen in AMD prevalence, with lower prevalence of early AMD reported in individuals of black or Asian Indian compared to white ethnicity. Although these results suggest that non-exponential MPOD spatial profiles may play a role in the protection of the eye against AMD, no relationships have been found between MPOD profile type and the established risk factors for AMD such as age, smoking, and family history.

Using our objective classification system, we explored the effect of ethnicity on the macular pigment profile as well as the association with foveal anatomy measured with optical coherence tomography. Our data showed that ethnicity plays an important part in variations observed between spatial profiles while foveal architecture does not. While accounting for ethnic variations in retinal anatomy, foveal architecture provided no predictive values for the MP spatial profile.

Disclosures: None

Online video: https://www.youtube.com/watch?v=ANFZsI4pTps