

# Association between relative peripheral refraction and corresponding electro-retinal signals

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First published: 07 March 2023

<https://doi.org/10.1111/opo.13114>

## Abstract

### Purpose

Considering the potential role of the peripheral retina in refractive development and given that peripheral refraction varies significantly with increasing eccentricity from the fovea, we investigated the association between relative peripheral refraction (RPR) and corresponding relative peripheral multifocal electroretinogram (mfERG) responses (electro-retinal signals) from the central to the peripheral retina in young adults.

### Methods

Central and peripheral refraction using an open-field autorefractor and mfERG responses using an electrophysiology stimulator were recorded from the right eyes of 17 non-myopes and 24 myopes aged 20–27 years. The relative mfERG N1, P1 and N2 components (amplitude density and implicit time) of a mfERG waveform were compared with the corresponding RPR measurements at the best-matched eccentricities along the principal meridians, that is at the fovea (0°), horizontal ( $\pm 5^\circ$ ,  $\pm 10^\circ$  and  $\pm 25^\circ$ ) and vertical meridians ( $\pm 10^\circ$  and  $\pm 15^\circ$ ).

### Results

The mean absolute mfERG N1, P1 and N2 amplitude densities (nV/deg<sup>2</sup>) were maximum at the fovea in both non-myopes (N1:  $57.29 \pm 14.70$  nV/deg<sup>2</sup>, P1:  $106.29 \pm 24.46$  nV/deg<sup>2</sup>, N2:  $116.41 \pm 27.96$  nV/deg<sup>2</sup>) and myopes (N1:  $56.25 \pm 15.79$  nV/deg<sup>2</sup>, P1:  $100.79 \pm 30.81$  nV/deg<sup>2</sup>, N2:  $105.75 \pm 37.91$  nV/deg<sup>2</sup>), which significantly reduced with increasing retinal eccentricity ( $p < 0.01$ ). No significant association was reported between the RPR and corresponding relative mfERG amplitudes at each retinal eccentricity (overall Pearson's correlation,  $r = -0.25$  to  $0.26$ ,  $p \geq 0.09$ ). In addition, the presence of relative peripheral myopia or hyperopia at extreme peripheral retinal

eccentricities did not differentially influence the corresponding relative peripheral mfERG amplitudes ( $p \geq 0.24$ ).

## **Conclusions**

Relative peripheral mfERG signals are not associated with corresponding RPR in young adults. It is plausible that the electro-retinal signals may respond to the presence of absolute hyperopia (and not relative peripheral hyperopia), which requires further investigation.