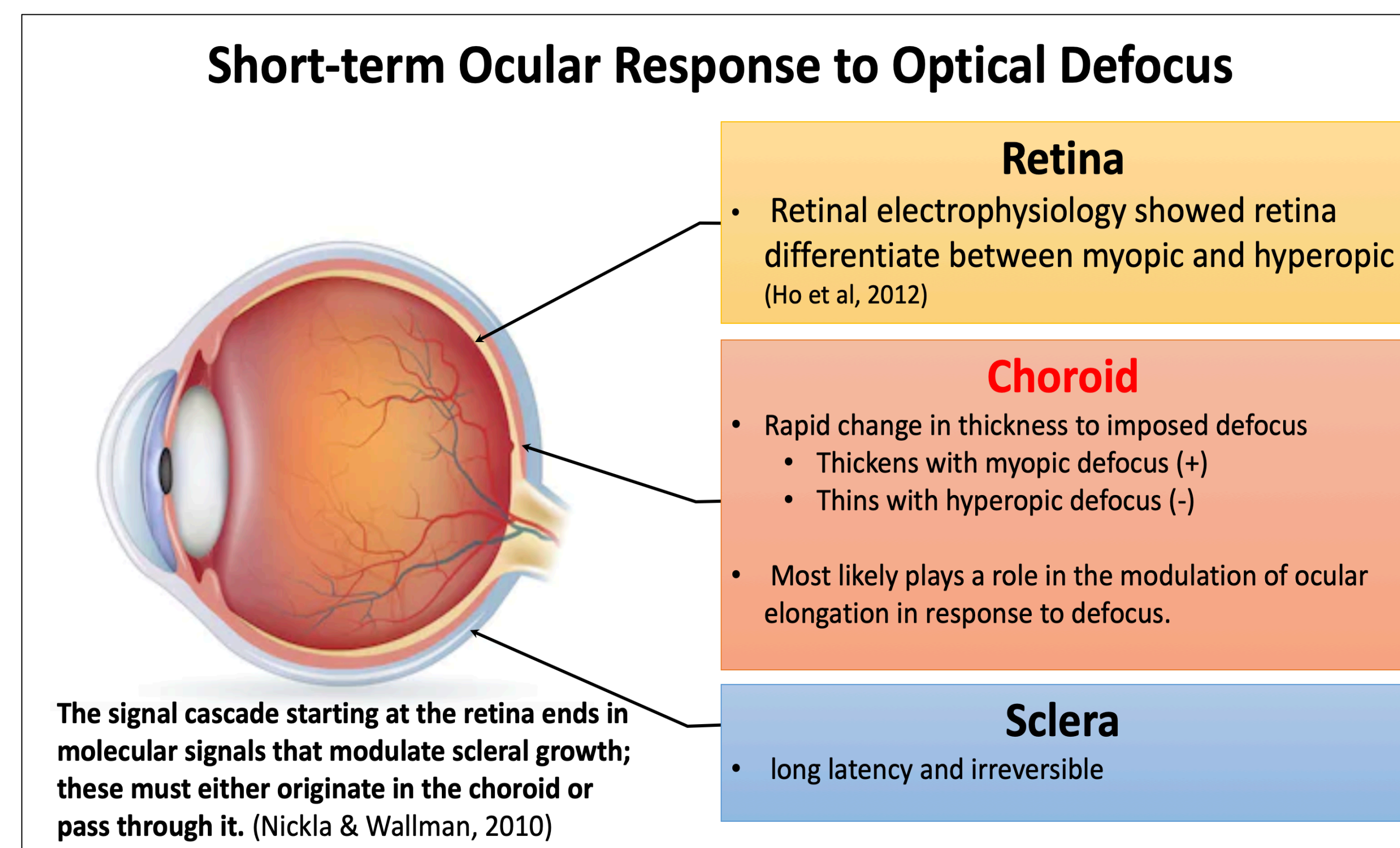


BACKGROUND

- There is growing evidence of rapid choroid response to optical defocus,
- Changing in choroidal thickness may provide quick feedback on retinal response to defocus.



PURPOSE

- To examine the short-term changes in choroidal thickness associated with daily wear of multifocal gas permeable (GP) contact lens.

METHODS

- Two subjects (age 27 and 29 years) wore multifocal corneal GP lenses on both eyes for one week. The GP lenses were center-distance and contained add of +3 D (Figure 1).
- Both subjects underwent optical coherence tomography (OCT) choroidal imaging using Optovue SD-OCT (Optovue Inc., Fremont, CA).
- Several 12-mm wide scans were taken across the horizontal and the vertical meridian were taken at baseline (bare eye), day 1 and day 7 of lens wear. All scans were centered on the fovea and taken between 12 pm and 1 pm, controlling for the diurnal variation.
- Choroidal thickness (ChT) was measured over the macular area (fovea, parafovea, and perifovea) and peripheral regions (near-periphery and periphery) in all four quadrants (superior, inferior, temporal and nasal) (Figure 2).

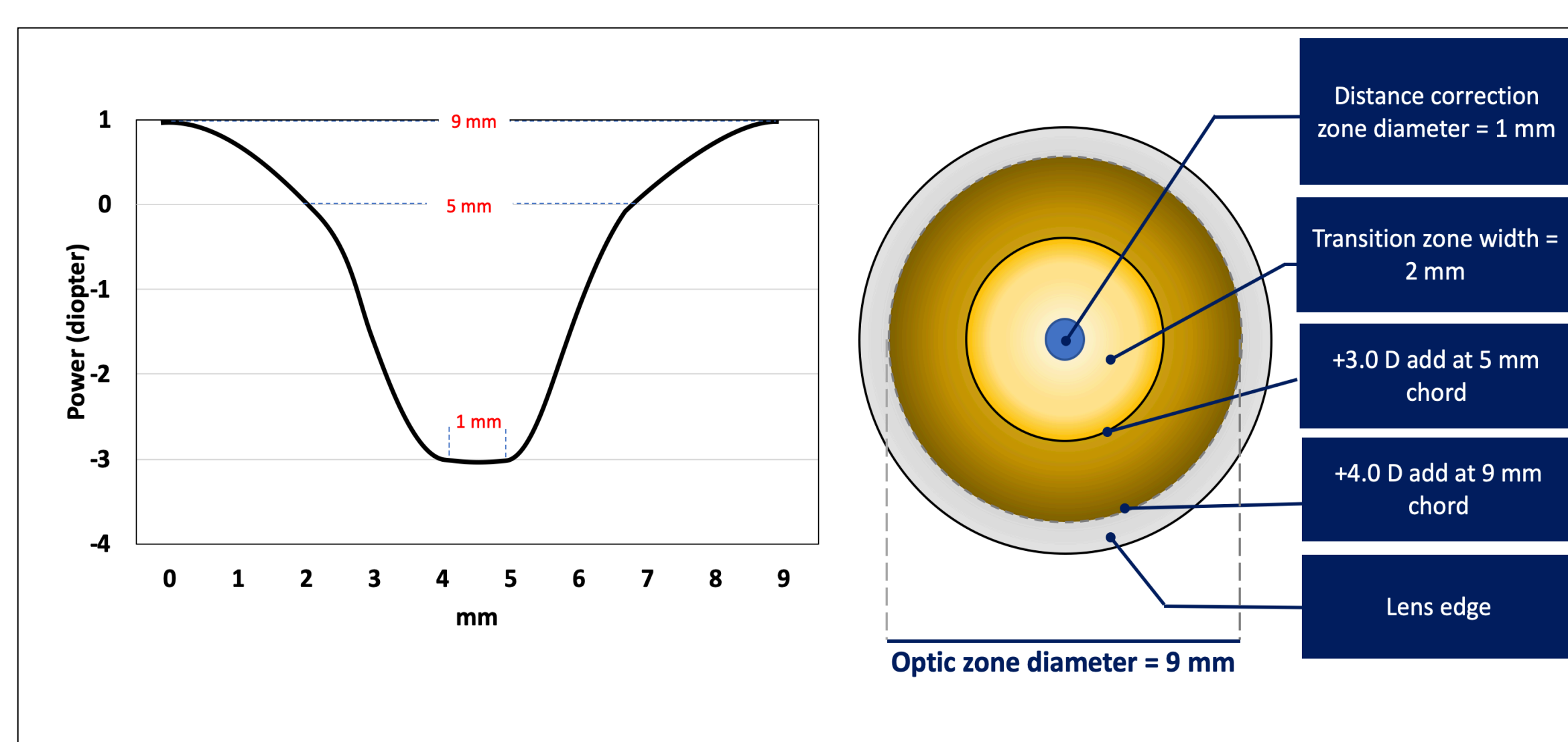


Figure 1. power profile of the multifocal GP lens design used in the study

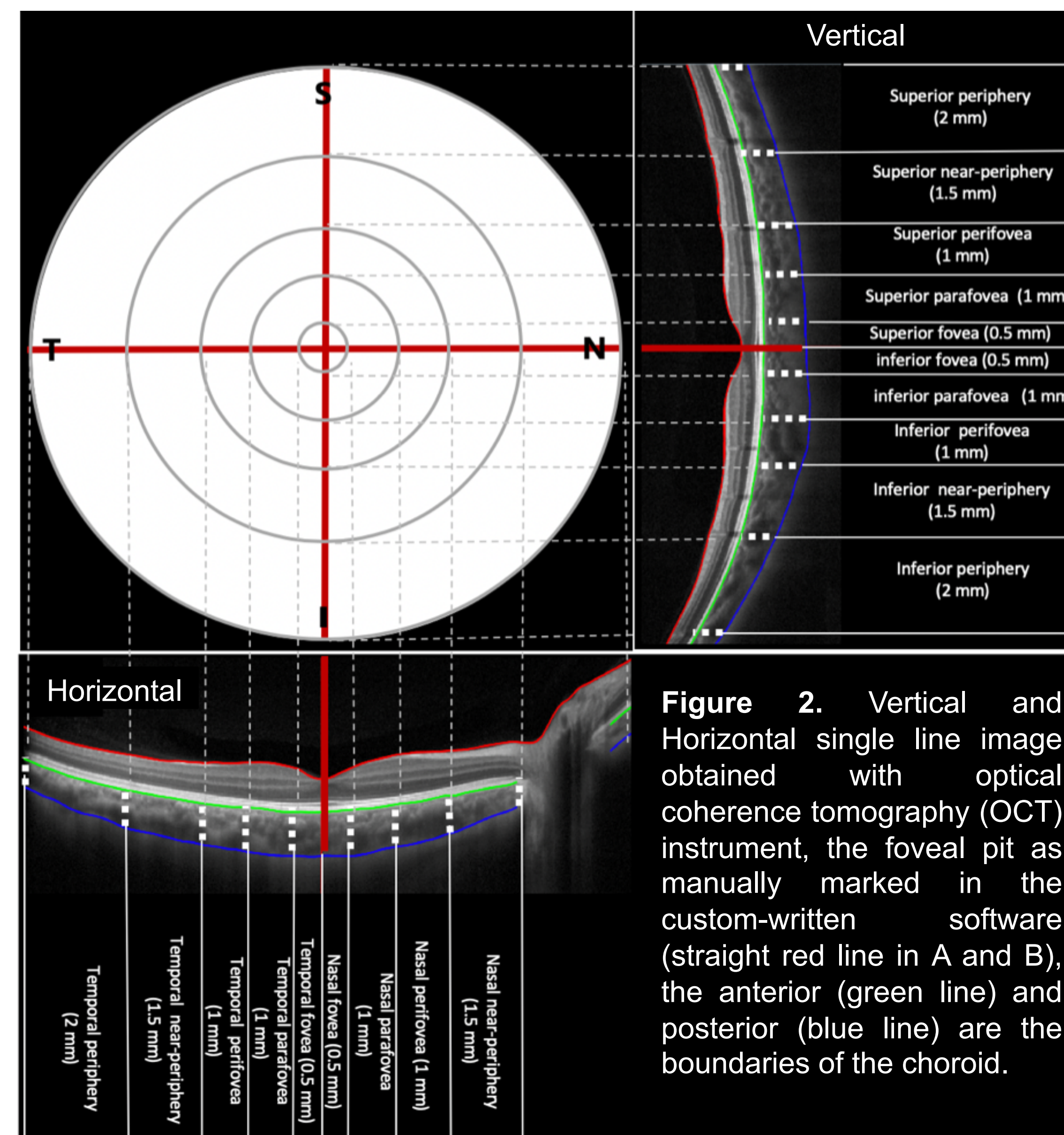


Figure 2. Vertical and Horizontal single line image obtained with optical coherence tomography (OCT) instrument, the foveal pit as manually marked in the custom-written software (straight red line in A and B), the anterior (green line) and posterior (blue line) are the boundaries of the choroid.

RESULTS

- On the first day and after 5 hour of GP lens wear, there was an overall choroidal thickening ($17.7 \pm 5.3 \mu\text{m}$) in both eyes. At day 1, inferior choroid showed the most thickening of an average of $18.5 \mu\text{m}$ followed by superior ($16.9 \mu\text{m}$), nasal ($12.6 \mu\text{m}$), and temporal ($9.5 \mu\text{m}$). See Figure 3.
- The choroidal thickening seemed to remain at a constant level or slightly decrease after one week of GP lens daily wear with overall thickening of $10.9 \pm 4.5 \mu\text{m}$.
- Choroid in macular regions (fovea, parafovea, and perifovea) exhibited slightly more thickening compared to peripheral areas (near-periphery and periphery)
 - 15.5 vs. $12.8 \mu\text{m}$ on day 1
 - 11.0 vs. $8.1 \mu\text{m}$ on day 7
- Peripheral refraction data showed that the multifocal GP lens can generate myopic defocus, Figure 4

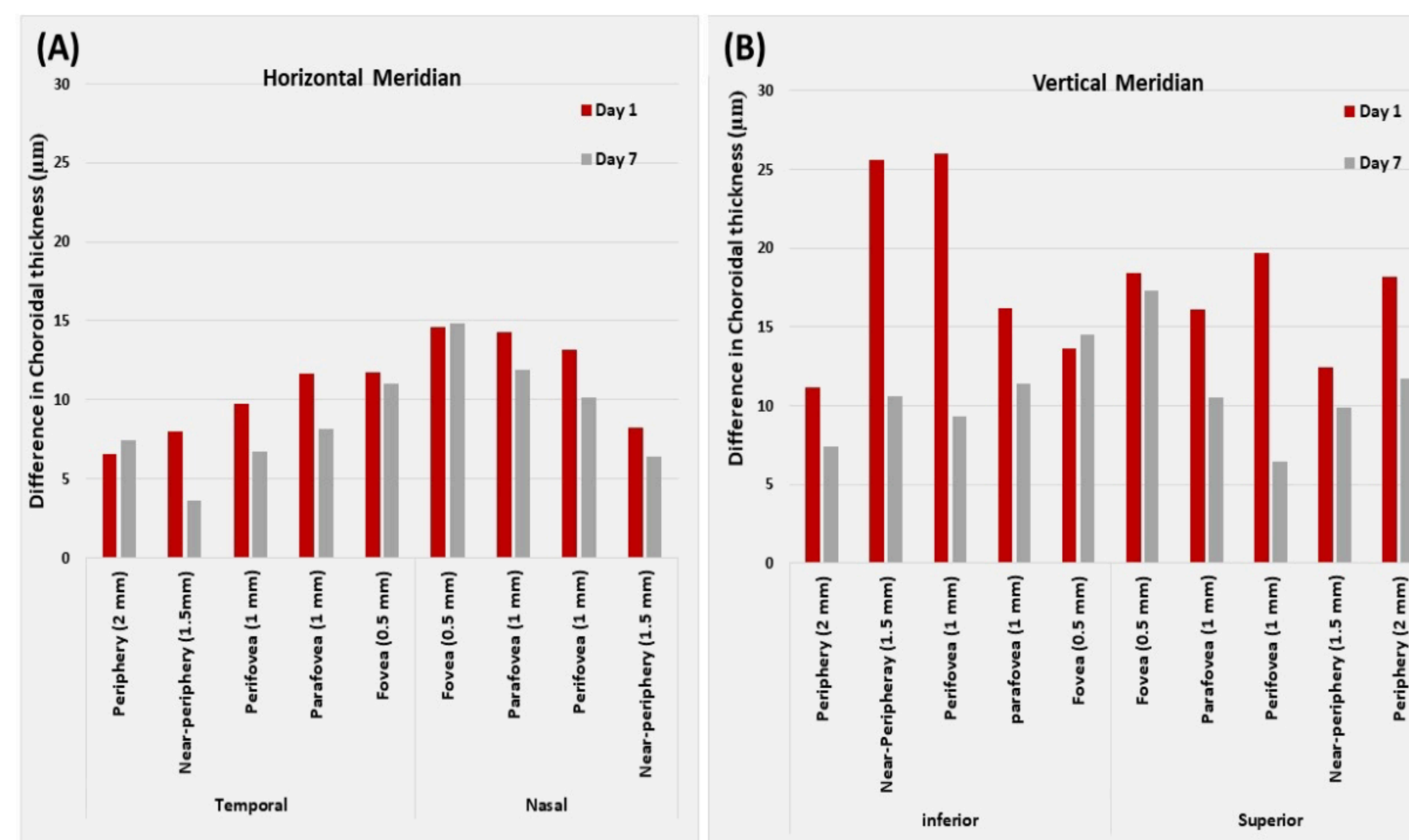


Figure 3. The magnitude of choroidal thickening along the 12 mm horizontal (A) and vertical (B) meridians at day 1 and day 7 of multifocal corneal gas permeable lens wear.

CONT'D RESULTS

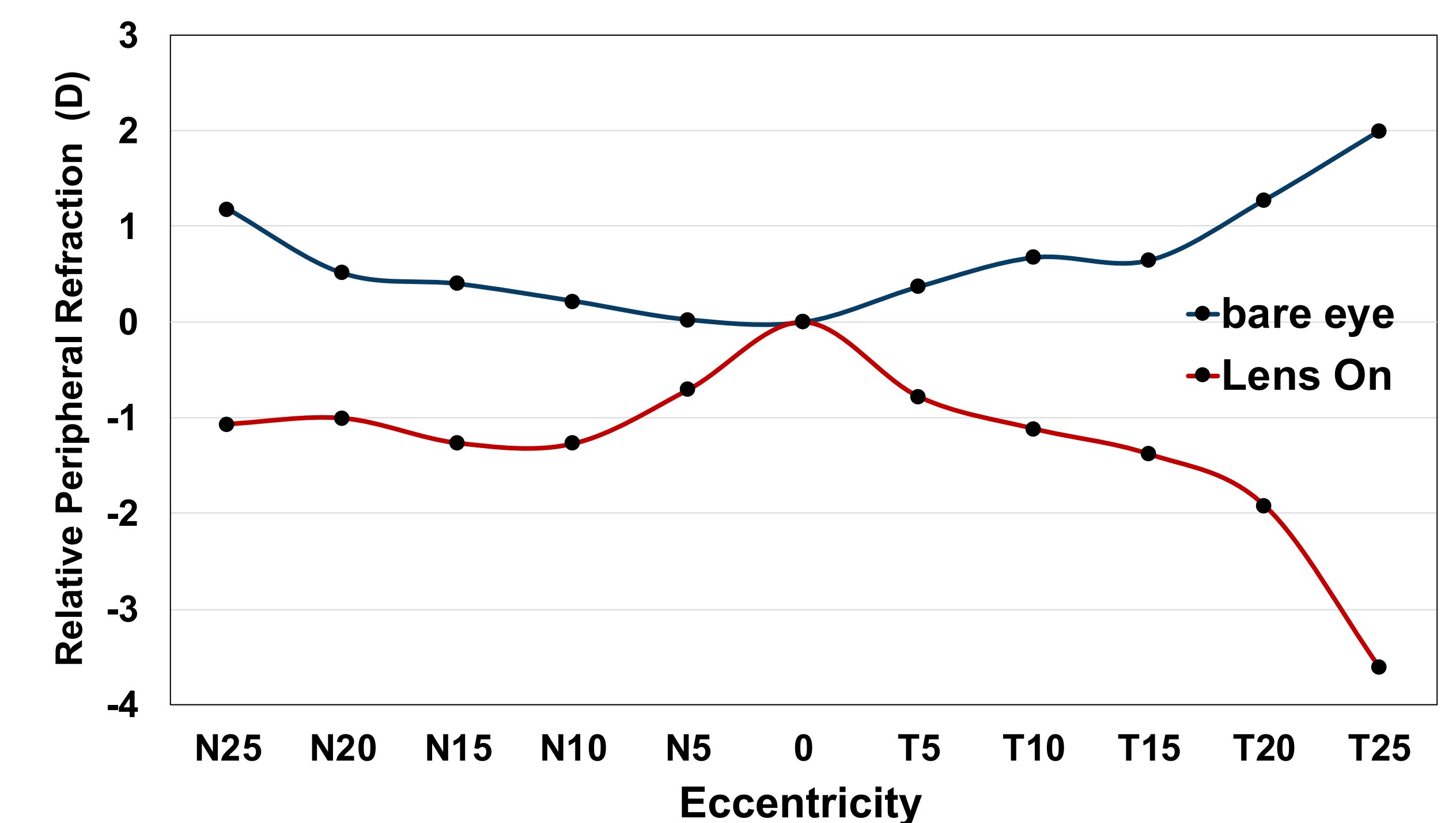


Figure 4. relative peripheral refraction of the right eyes with and without the multifocal GP lens.

CONCLUSION

- This pilot demonstrated multifocal corneal GP lenses can provide myopic defocus in peripheral retina, which led to short-term choroidal thickening.
- The observed quick choroidal response to myopic defocus suggests that it may predict the myopia control effect
- Several studies have indicated that choroidal response is a potential biomarker for clinicians to monitor the impact of myopic defocus during myopia control interventions.

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