

Assessing Diurnal Variation in Choroidal Thickness

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To the Editor:

We read with interest the article by Toyokawa et al¹ describing the differences between morning and evening choroidal thickness measurements in Japanese subjects, which the authors concluded could be attributed to diurnal variation. This study, however, does not provide strong evidence for the pattern of diurnal variation, because measurements at only two time points do not provide compelling evidence of a specific trend.

We would like to highlight three other studies in healthy subjects that provide additional evidence to support the presence and pattern of diurnal variation in choroidal thickness. These studies measured choroidal thickness over at least five time points during a single day, allowing a more comprehensive analysis of the trend and pattern of diurnal variation.²

In a study of 12 healthy individuals, Tan et al³ performed sequential spectral-domain optical coherence tomography (SD-OCT) scans using the Spetralis OCT (Heidelberg Engineering, Heidelberg, Germany). The authors found significant diurnal variation in subfoveal choroidal thickness, with a mean amplitude (difference between the thickest and thinnest values) of $33.7 \pm 21.5 \mu\text{m}$, despite virtually no change in the neurosensory retinal thickness measured at the same time. This is greater than the mean of $20.3 \mu\text{m}$ reported by Toyokawa et al (the calculated difference between the morning and evening foveal choroidal thickness). One wonders

whether, in the patients studied by Toyokawa et al, there may have been other time points when the choroidal thickness may have been thicker or thinner than their reported values, and whether this would have affected the amplitude of choroidal thickness variation. Tan et al also demonstrated a decreasing trend of choroidal thickness progressively from 9 a.m. to 5 p.m., consistent over 2 separate days, in contrast to the apparent increase between morning and evening measurements reported by Toyokawa et al.

Similarly, a study conducted in Japanese patients by Usui et al,⁴ which was performed over a 24-hour period, reported the same decreasing trend in choroidal thickness from 9 a.m. to 6 p.m., with the thinnest measurements occurring at 6 p.m. Furthermore, the reported amplitude was $33.0 \pm 14.3 \mu\text{m}$, consistent with that reported by Tan et al. Chakraborty et al⁵ used an optical biometer instead of OCT to measure choroidal thickness and also reported a significant diurnal variation in choroidal thickness, with a mean change of $29 \pm 16 \mu\text{m}$, but reported a differing pattern of diurnal variation between the 2 days.

In summary, we agree with Toyokawa et al that there appears to be significant diurnal variation in choroidal thickness in normal individuals, although the exact pattern of diurnal variation, and whether this is consistent in all individuals, remains uncertain. Therefore, when assessing choroidal thickness in clinical practice and trials, it is important to take into account the time of measurements.

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