Distribution of Retinal Layer Atrophy in Patients with Parkinson Disease and Association with Disease Severity and Duration

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Summary

Purpose

To evaluate the association of retinal layer thickness with neurodegeneration or Parkinson disease (PD) severity using spectral domain optical coherence tomography (SD-OCT).

Methods

A total of 129 eyes of PD patients and 129 eyes of age-matched healthy control subjects were scanned with the SPECTRALIS® SD-OCT to provide peripapillary RNFL-N and macular scans. These scans were automatically segmented to provide mean thickness values of all 10 layers of the retina. Layer thickness values of PD patients with disease history less than 10 years, PD patients with disease duration of greater than 10 years, and healthy control subjects were compared. The association among layer thickness values, PD severity, and disease duration were evaluated. Additional analysis were utilized to identify which layer is most sensitive to predict axonal atrophy.

Discussion

Compared to healthy control eyes, PD eyes showed statistically significant thinning of the retinal nerve fiber layer, ganglion cell layer, inner and outer plexiform layers. Parkinson disease eyes showed an increase in the inner nuclear layer (p<.05) compared with healthy control eyes. Parkinson disease duration and severity (as quantified by the Hoehn & Yahr scale) were inversely correlated with ganglion cell layer thickness and were predictive of axonal damage.

Conclusion

- SPECTRALIS provides precise segmentation and measurement of all retinal layers; these measurements may “improve Parkinson disease diagnosis.”
- Segmentation of the retinal layers may aid in predicting PD in early states of the disease, provide a means for diagnosis when it is challenging based on other parameters, or aid in monitoring treatment effectiveness.