Reliability and validity of Cirrus and Spectralis optical coherence tomography for detecting retinal atrophy in Alzheimer’s disease

Polo V, Garcia-Martin E, Bambo MP, Pinilla J, Larrosa JM, Satue M, Otin S, and Pablo LE


Summary

Purpose

To evaluate the ability of the SPECTRALIS® and CIRRUS spectral-domain optical coherence tomography (SD-OCT) instruments to detect macular and retinal nerve fiber layer (RNFL) atrophy in Alzheimer’s disease (AD), and to evaluate the reliability of the two SD-OCT instruments.

Methods

Seventy-five AD patients and 75 age- and sex-matched healthy control (HC) subjects were included in this study. All participants underwent full neurologic and neuro-ophthalmologic examinations to determine AD diagnosis, and had three serial good-quality scans acquired on each device using macular and glaucoma RNFL imaging protocols. In addition, three RNFL-N scans were taken with the SPECTRALIS using the Nsite Analytics™ protocol, which provides the unique papillomacular bundle (PMB) thickness and the nasal/temporal (N/T) ratio parameters. Macular and RNFL thickness measurements were assessed using the automated segmentation algorithms of each respective SD-OCT instrument and these measurements were correlated with disease duration and severity using the Mini-Mental State Examination (MMSE). The reliability of the data from each instrument was assessed as repeatability of the three measurements taken with each respective scan protocol.

Discussion

Results from the study indicated that AD patients showed significantly thinner macular and RNFL thickness measurements when compared with HCs on both SD-OCT instruments. While macular and RNFL mean thickness measurements did not significantly correlate with the MMSE score on all three scan protocols, RNFL mean thickness measured by the SPECTRALIS correlated with disease duration. Furthermore, mean and superior RNFL thickness measurements on the SPECTRALIS were significantly thinner in patients with severe cognitive impairment (MMSE≤9) compared with patients with mild cognitive impairment (MMSE 19-24 points). The Nsite Analytics application also detected significant PMB thinning and a significant increase in the N/T ratio in AD patients compared with HC subjects.

Conclusion

• “The Nsite Axonal application of the Spectralis OCT provides the most sensitive measure for detecting subclinical RNFL atrophy in AD.”
• “The SPECTRALIS OCT is more reliable and more readily detects retinal pathologies than the CIRRUS OCT.”

SPECTRALIS is a registered trademark of Heidelberg Engineering GmbH. RTVue is a registered trademark of Optovue, Inc. All trademarks are the property of their respective owners. All Rights Reserved.