New Study Shows the RTVue is more reproducible than Stratus, Cirrus, and Spectralis!

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Comparison of Retinal Nerve Fiber Layer Thickness in Normal Eyes Using Time-Domain and Spectral-Domain Optical Coherence Tomography

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This article compared the RNFL reproducibility of the RTVue with the Stratus, Cirrus, and Spectralis OCTs. They measured RNFL thickness in 40 normals on separate visits several weeks apart and they showed the RTVue reproducibility was better than all other OCTs. They found that only the RTVue showed significant improvement in reproducibility compared to the Stratus. The Cirrus and Spectralis were not significantly better than the Stratus. They looked at three variability measures, the coefficient of variation (CV), the intraclass correlation coefficient (ICC), and reproducibility. The coefficient of variation is a measure of repeatability and the lower the number the more repeatable the measure. The ICC is a measure of total variance compared to within subject variance and the higher the number the better. Reproducibility provides the 95% level of variability across visits, and so represents a significant change between visits. This means, if a patient is scanned on two different visits 100 times, the measurement result will be within the reproducibility number 95 out of 100 times. The lower the number, the smaller the change that can be picked up (more sensitive for detecting progression). The table below summarizes these measures across devices.

Reproducibility comparison for Avg RNFL

	CV	ICC	Reproducibility
RTVue	2.09	0.97	6.59
Stratus	2.86	0.94	8.83
Cirrus	3.03	0.92	8.89
Spectralis	3.91	0.9	11.72

The reproducibility values are the variability limits that must be exceeded between visits for a change to be significant. This change is 6.59 for the RTVue compared to 8.89 for Cirrus and 11.72 for Spectralis. This means the RTVue can detect a significant change of less than 7 microns while the change must be greater than 12 microns to be significant for the Spectralis. If a stable patient is scanned on two visits 100 times, then 95 times out of 100, the difference between visits will be 6.59 microns or less for the RTVue, and 11.72 microns or less for Spectralis. **In other words, a change of 7 microns is significant for the RTVue, while the change must be 12 microns to be significant for the Spectralis (and 9 microns for Cirrus). The RTVue is higher in sensitivity to change than the other instruments, detecting a lower change threshold than the other devices in the study.**

The authors state, "**In this study, all 4 machines were found to perform remarkably well. However, when comparing the 3 SD-OCT machines, we found the reproducibility of average RNFL values was lowest for RTVue and highest for Spectralis**." *(remember lower is better here because it is the number required for significant change to be detected)*

And, "**Indeed, for RTVue, reproducibility was improved when compared to Stratus. However, both the Cirrus and Spectralis devices did not improve on the reproducibility of the Stratus device**."

Another interesting finding from this study is the poor performance of the Spectralis which caused a number of scans to be excluded from the analysis. The authors state," A significant number of scans were withdrawn from analysis because of failure of Spectralis to accurately delineate RNFL boundaries. Of the 79 qualifying eyes in this study, 10 (12.6%) could not be used in analysis."

In summary, this study showed the reproducibility for RNFL measurements was best for the RTVue compared to the Stratus, Cirrus, and Spectralis. Only the RTVue showed improvement over the Stratus for reproducibility. Furthermore, a high percentage of scans from the Spectralis had to be eliminated because of "failure of Spectralis to accurately delineate RNFL boundaries."