Specificity of SD-OCT Glaucoma Analyses in a Population of Young Healthy Adults

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Purpose

Optical Coherence Tomography (OCT) currently lacks evidence to support its use for glaucoma detection in UK primary care.[1] This is an urgent research gap. Specificity is a key concern for low-prevalence conditions such as glaucoma. In line with STARD principles,[2] specificity should ideally be assessed in a clinically representative, at-risk population.

But, because primary open-angle glaucoma (POAG) is uncommon in young healthy adults, this group may provide a best-case estimate of OCT false-positive without confounding from true glaucomatous structural change.

This preliminary diagnostic accuracy study estimated the specificity of the Revo FC-130 SD-OCT (Optopol Technology, Zawiercie, Poland) in a sample of healthy young adults, with comparative measurements also obtained using the Heidelberg Spectralis (Heidelberg Engineering, Germany).

This study is a step to investigate OCT utility for glaucoma detection by community optometrists.

Methods

Participants
65 healthy adults (mean age 20.7y, SD 3.3y; range 18-40y).

Index Tests
Revo FC-130 SD OCT (3D optic disc scan).
Spectralis SD-OCT (Circular RNFL scans).

Image Classification
Results classified as:
“within normal limits” / “borderline”/“outside normal limits” using manufacturer-defined normative databases.

“Borderline” results
To address the ambiguity of “borderline” results, these were analysed under two approaches:
More conservative: treated as test negative.
Less conservative: treated as test positive.

Primary outcome measure
The proportion of healthy eyes correctly classified as “within normal limits” per device Specificity (1 − false positive rate).

Results

Table 1: Overall Specificity for Revo-FC 130.

Borderline Classification	Specificity	95%CI
Borderline as negative test outcomes	0.82	0.70-0.89
Borderline as positive test outcomes	0.57	0.45-0.68

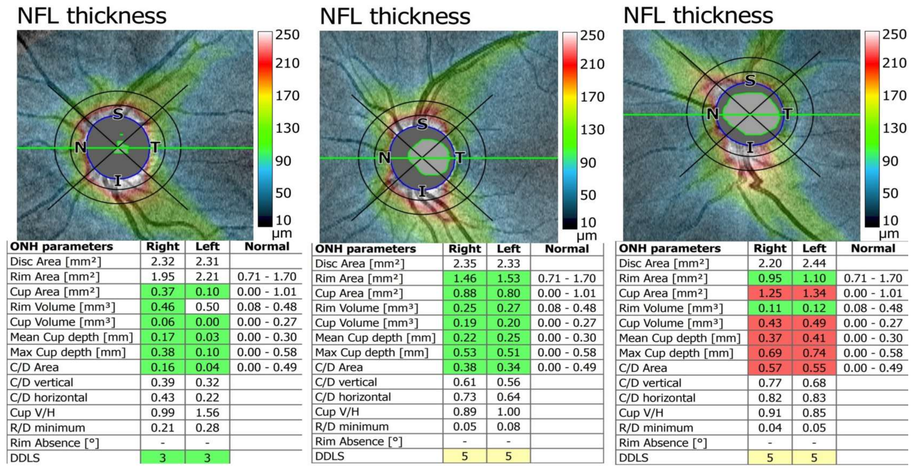

Figure 1: Revo FC-130 SD-OCT outputs from three participants demonstrating the spectrum of automated classifications (Within Normal Limits, Borderline, and Outside Normal Limits) observed in healthy young adults.

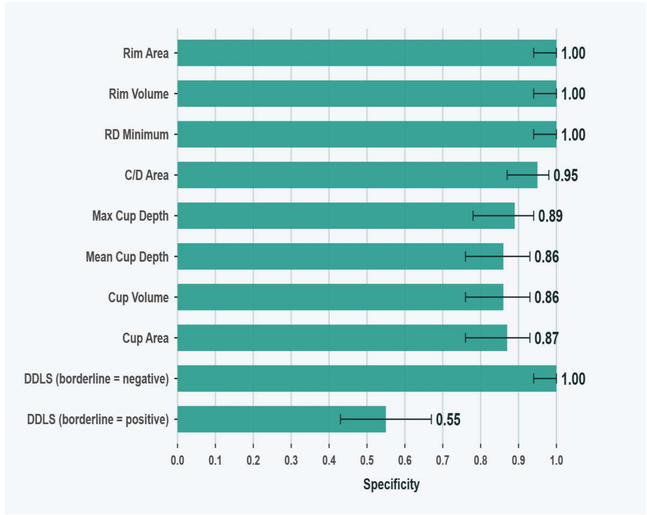

Figure 2: Specificity of Optic Nerve Head Parameters for Revo FC 130 SD-OCT. Error bars represent 95% confidence intervals.

Table 2: Quadrant-specific peripapillary RNFL specificity for Revo FC-130 and Spectralis SD-OCT.

	Superior	Inferior	Nasal	Temporal
Revo FC-130	1.00 (0.94-1.00)	1.00 (0.94-1.00)	1.00 (0.94-1.00)	1.00 (0.94-1.00)
Spectralis	1.00 (0.94-1.00)	0.97 (0.90-0.99)	1.00 (0.94-1.00)	0.91 (0.82-0.96)

Conclusion

Revo FC-130 demonstrated high specificity for RNFL parameters (1.00, 95% CI: 0.94-1.00) but lower specificity and greater variation for ONH parameters.

RNFL quadrant comparison between the devices showed uniform specificity for Revo, while Spectralis showed lower specificity in the inferior and temporal sectors.

Similar to Swanson et al. (2019), these findings demonstrate that using a small group of healthy young adults can provide a valuable “first pass” approach for estimating false positive rates and evaluating the diagnostic specificity of OCT devices. Specificity, measured in such cohorts, likely represents a best-case estimate relative to older adults. Given that the prevalence of optic nerve head damage in young adults is very low, a reference test may not be required.

These findings provide the basis for future studies assessing specificity in a clinically more relevant at-risk population.

References

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