

Evaluation of an OCT B-scan of interest tool in glaucomatous eyes



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PURPOSE

- B-scans from optical coherence tomography (OCT) cube scans are commonly reviewed during the clinical evaluation of the macula.
- A deep learning algorithm was previously trained to predict if a given B-scan might be flagged “of interest” based on ground truth labels from retinal specialists in healthy and eyes with retinal pathologies¹.
- In this preliminary study, the performance of a B-scan of interest tool was compared to a clinical assessment of OCT cube data in healthy and glaucomatous eyes.

METHODS

- A B-scan of interest algorithm was previously trained and tested on 76,544 B-scans (598 subjects) and 25,600 B-scans (200 subjects), respectively² (see Figure 1).
- An Image Quality (IQ) algorithm was also previously developed and used as a preliminary step in the overall tool workflow³.
- Retrospective OCT data were analyzed from an ongoing visual field (VF) study including 19 eyes of 19 patients in both healthy and glaucoma groups, using CIRRUS™ 5000 HD-OCT (ZEISS, Dublin, CA) and HFA3 (ZEISS, Dublin, CA).
 - At each visit, a qualified Macula 512x128 cube scan was used for inference.
 - Mean Deviation (MD) of a SITA Standard 24-2 VF was used to indicate disease severity.
- A trained grader reviewed each cube for image quality and assessed if either a) <10% or b) ≥ 10% of total good image quality B-scans of interest should be flagged.

An AI-based tool may help clinicians identify OCT B-scans with retinal co-morbidities in glaucomatous eyes

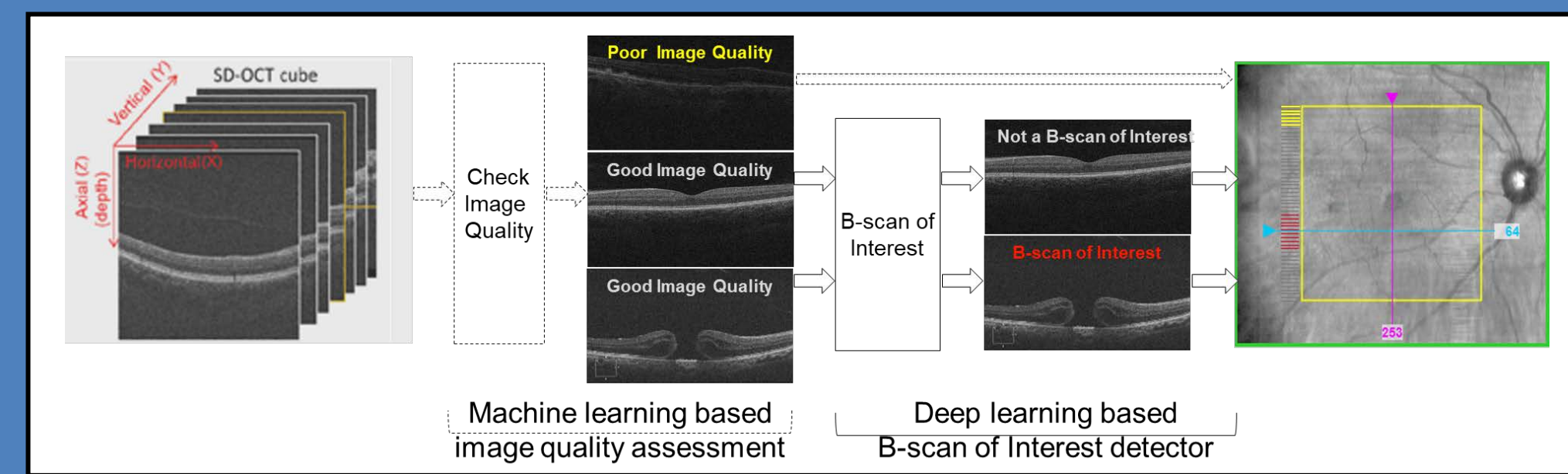


Figure 1. The tool checks OCT B-scans for image quality and flags for potential clinical interest.

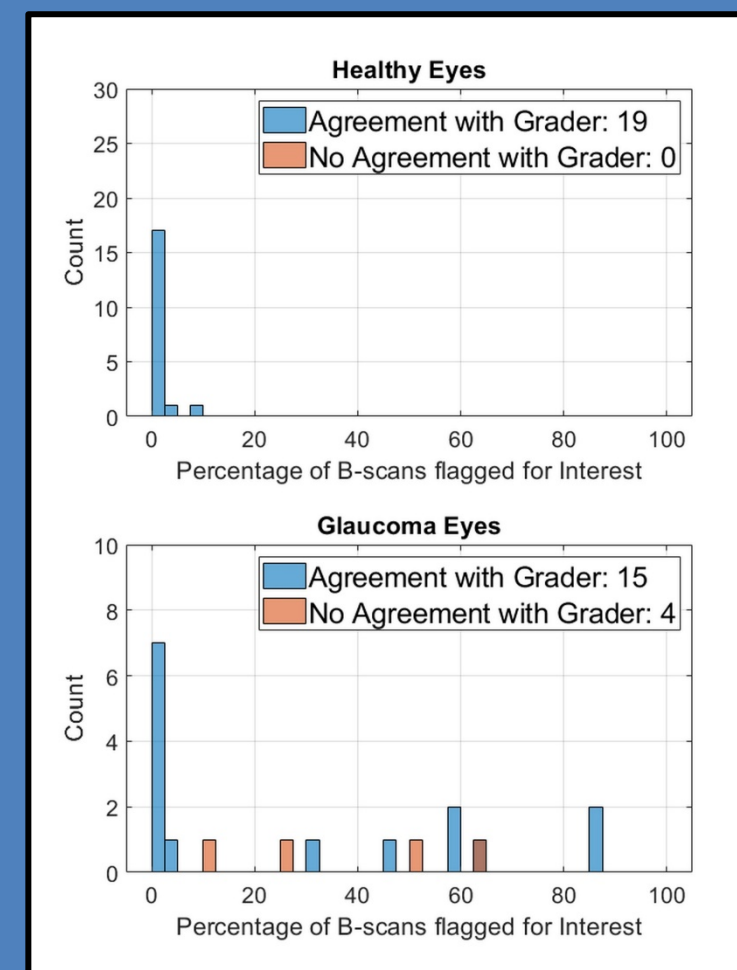


Figure 2. Observed agreement between algorithm and grader.

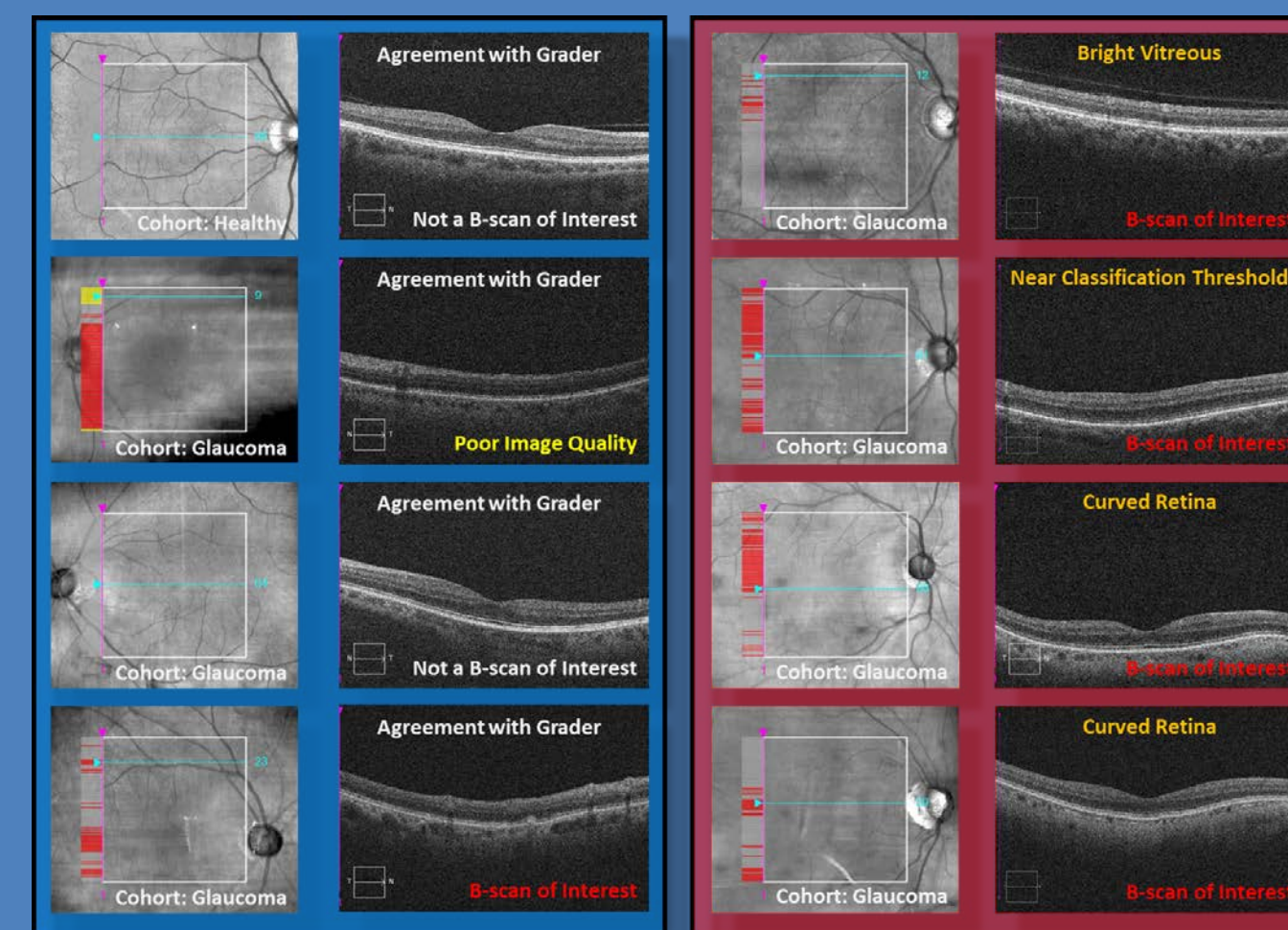


Figure 3. Examples of agreement (left) and disagreement (right) between algorithm and grader.

RESULTS

- Mean age was 56.4 (standard deviation, SD: 7.7; range: 44.3 to 73.1) years and 73.4 (SD: 9.5; range 60.6 to 97.9) years for healthy and glaucomatous eyes ($p < 0.001$).
- Mean VF MD was 0.66 (SD: 0.91; range: -0.62 to 2.62) dB and -6.39 (SD: 6.67; range: -23.16 to 1.63) dB in healthy and glaucomatous eyes ($p < 0.001$).
- Observed grader and algorithm agreement (95% confidence interval) was 100.0 (82.4,100.0)% and 79.0 (54.4, 94.0)% in healthy and glaucomatous eyes (see Figure 2).
- B-scans from the four disagreement cases included the presence of unusual retinal curvature (two cases), unusual contrast in the vitreous, and other false positives with inference scores near the algorithm cut-off (see Figure 3).

CONCLUSIONS

- The findings in this study suggest excellent agreement between an OCT B-scan of interest tool and clinical assessment in healthy eyes, and reasonable agreement in glaucomatous eyes for detecting the presence of pathologies typically associated with retinal disease.
- As a result, a B-scan of interest tool may be a useful workflow aid to identify retinal disease co-morbidities in glaucomatous eyes.
- Future investigations to confirm the clinical performance of this tool may potentially include additional data collection, as well as more detailed annotations.

References

- ¹Yu et al. IOVS 2020; 61(9): Abstract PB0085.
- ²Ren et al. IOVS 2020; 61(7): Abstract 1635.
- ³Elezaby et al. IOVS 2020; 61(9): Abstract PB0090.

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