

Widefield choroidal thickness measurement comparison between manual and multilayer segmentation



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PURPOSE

- Segmentation of the choroid layer in optical coherence tomography (OCT) remains valuable for analyzing retinal diseases.
- This study utilizes a multilayer segmentation (MLS) algorithm (introduced at [1]) to assess its performance compared to manual choroidal segmentation in terms of choroidal thickness measurements.

METHODS

- 25 scans from 14 patients (one or both eyes) with a variety of retinal diseases were collected by using PLEX® Elite 9000 (ZEISS, Dublin, CA) swept-source OCT (SS-OCT) with a scan pattern of Angio (15mm x15mm) (834 x 834 x 3072 pixels).
- Choroidal thickness maps (CTMs) were generated and defined as the distance between Bruch's membrane (BM) and the choroidal-scleral junction (CSJ) (Figure 1).
- In comparison, manual segmentation of BM and CSJ was performed by human graders.
- The CTMs generated through manual segmentation were compared to those by the MLS algorithm.
- The algorithm's performance was evaluated using the correlation between manual and automated methods for each subfield of the expanded ETDRS grid (Figure 2).
- Regression plots of the various fields within the ETDRS grid were also reported.

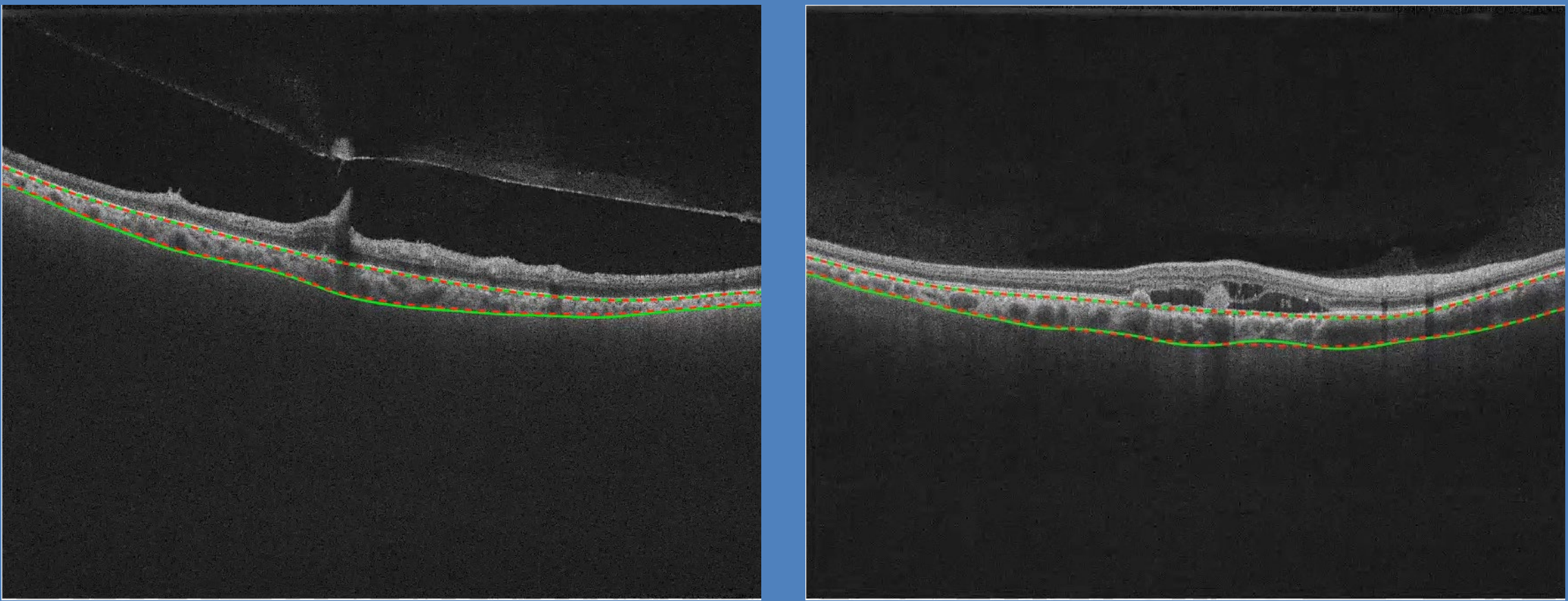


Figure 1. Examples of choroidal segmentation generated through MLS (solid green line) and manual (dashed red line) methods in two representative eyes.

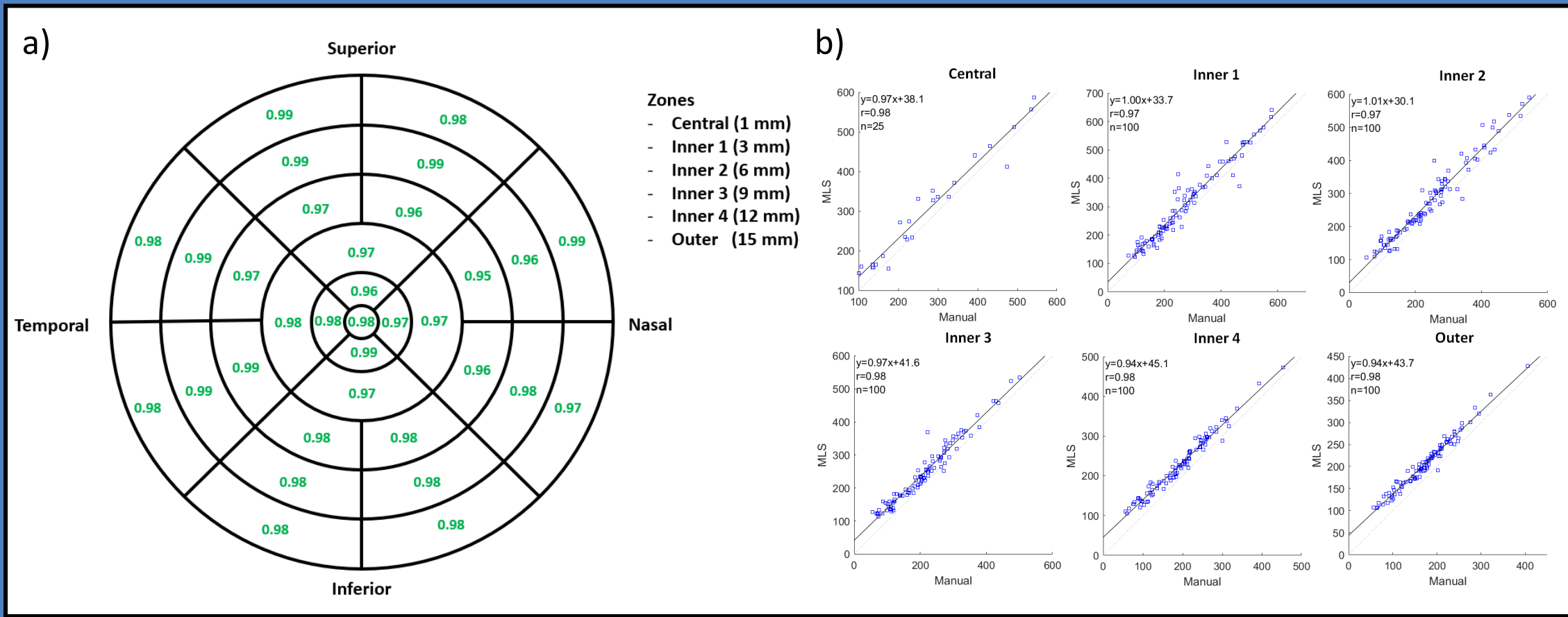


Figure 2. a) Expanded ETDRS zones and correlations (r) between Manual and MLS and b) regression plots for each ETDRS grid zone (units are in microns).

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Disclosures: AS (E), HB (E): Carl Zeiss Meditec, Inc.; JL (N); YS (N); PR (F): Carl Zeiss Meditec, Inc., Alexion, Gyroscope Therapeutics, Stealth Bio Therapeutics; PR (C): Annexon, Apellis, Bayer, Boehringer-Ingelheim, Carl Zeiss Meditec, Inc., Chengdu Kanghong Biotech, InflammX, Ocudyne, Regeneron, Unity Biotechnology; PR (I): Apellis, Ocudyne, Valitor, Verana Health., RW (C): Carl Zeiss Meditec, Inc.; RW (F): Carl Zeiss Meditec, Inc., Colgate Palmolive Company, Estee Lauder Inc; RW(P): US8,750,586, US8,180,134, US9,282,905, US9,759,544, US 10,354,378, US10,529,061

RESULTS

- Figure 2 shows the expanded ETDRS grids and the correlation of CTMs of 25 scans between manual and MLS.
- A strong correlation (>0.95) was found between manual and automated measurements for all subfields within the ETDRS grid.
- Overall, the MLS method demonstrated good performance compared to manual segmentation across the entire fields.

CONCLUSIONS

- In this study, we compared CTMs generated by manual and automated MLS methods. The results showed a strong correlation between the EDTRS subfields calculated by MLS and manual measurements.
- MLS could be utilized for automatic analysis of widefield choroidal thickness and provide valuable diagnostic insights for retinal diseases.

REFERENCES

[1] De Sisternes, Luis, et al. "Segmentation and characterization of intra-retina layer thickness in widefield SS-OCT: comparison of normal retina and diabetic retinopathy with/without macular edema." *Investigative Ophthalmology & Visual Science* 59.9 (2018): 1512-1512.