Sensitivity of patient refractive error to OCT quality and segmentation confidence for macular thickness maps using low-cost OCT

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PURPOSE

- Optical coherence tomography (OCT) signal quality and segmentation confidence are important for generating reliable macular thickness heat maps to monitor patient eye health in low-cost OCT.
- Here we demonstrate that correlation between the optical diopter correction of system using OCT quality and segmentation confidence is sufficiently high for use in creation of macular thickness maps without having to compensate for refractive error.

METHODS

- A low-cost line field OCT prototype was used to image two healthy patients in a diopter (D) range of -5 D to +5 D. Each eye was imaged using a macula scan with 128x512 A-scans over 7 mm x 5.8 mm. The patients were imaged at the 0D, +5D and -5D optical positions of the system, to measure the sensitivity over the full optical range.
- The OCT quality maps, segmentation confidence maps, and macular thickness maps were generated (Zacks et al., *IOVS* 2021; 62(8):2135; Kho et al., *IOVS* 2022; Fard et al., 63(7):3313; *IOVS* 2022, Vol.63, 3312).
- The average Pearson correlation coefficient was calculated between OCT quality maps for 0 D and -5 D scans as well for 0 D and +5 D scans. The correlation between segmentation confidence maps was repeated in the same manner.

RESULTS

Figure 1 shows an example of OCT quality maps, segmentation confidence maps, and macular thickness maps. Table 1 shows the average Pearson coefficient values between myopic and hyperopic eyes relative to the emmetropic eye. Our results show there is good correlation between the OCT quality for the 0 D and -5 D scans (myopic range). Similarly, there is good correlation between segmentation confidence maps, for scans in the myopic eye.

Pearson Coefficient	OCT Quality Maps	Segmentation Confidence Maps
Myopic Range	0.91	0.92
Hyperopic Range	0.66	0.76

Table 1: Average Pearson Correlation Coefficients over ± 5 D

CONCLUSIONS

We presented a technology for imaging patients without the need to compensate for their refractive error. We demonstrated that it is possible to use macular thickness maps for myopic patients, which can allow for reduction in complexity and cost of systems for low-cost OCT applications.

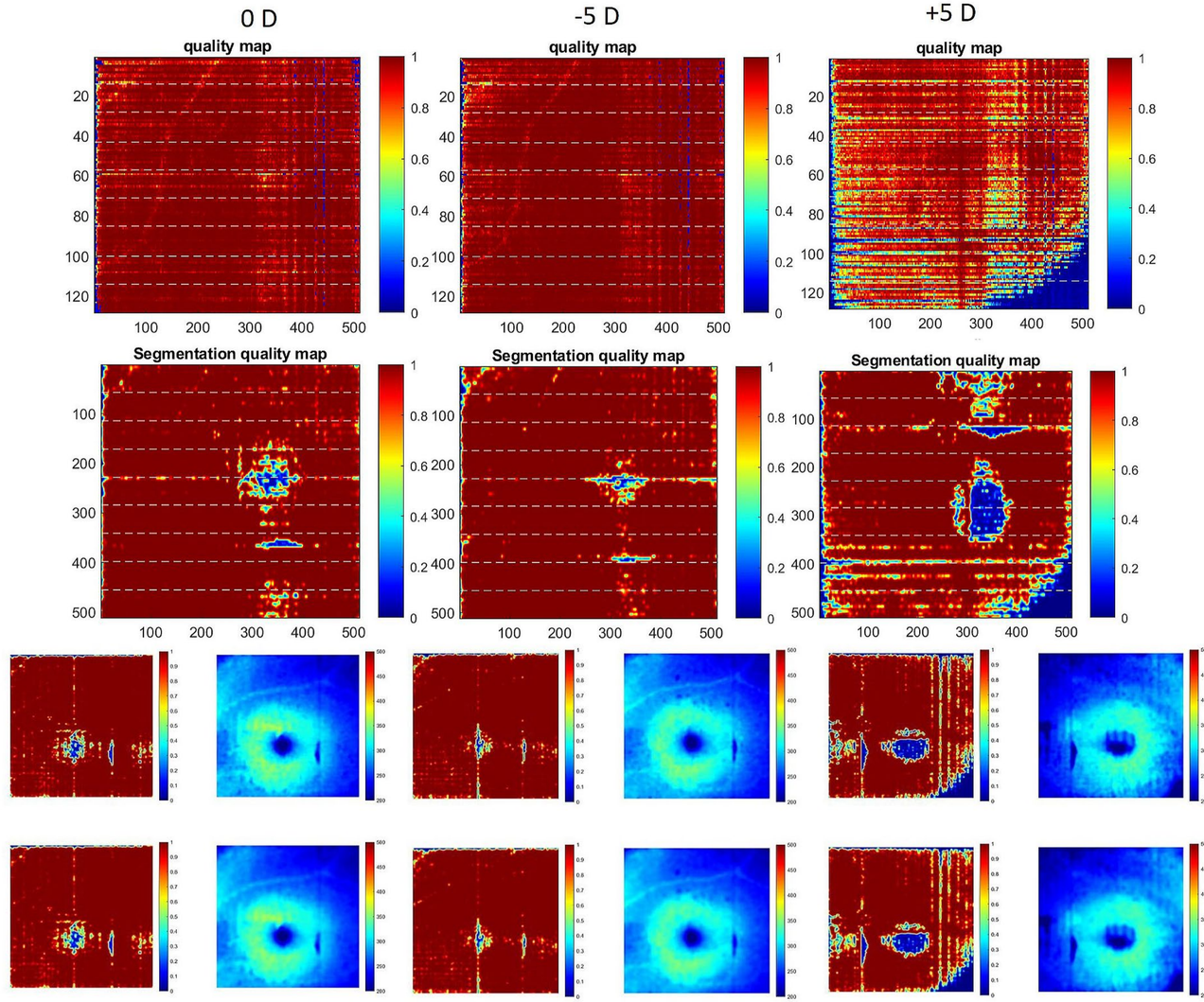

Figure 1: OCT quality and segmentation quality maps of healthy patient are shown in first 2 rows, and the corresponding macular thickness maps are shown in bottom 2 rows in three system imaging configurations

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