Performance comparison of macular thickness generated from a low-cost OCT with a commercial OCT system

Niranchana Manivannan, PhD; Homayoun Bagherinia, PhD; Mahsa Darvishzadeh Varcheie, PhD; Luisa Ramirez, AS; Ali Fard, PhD

Carl Zeiss Meditec, Inc., Dublin, CA, USA

Poster #324 - C0161

PURPOSE

- Macular Thickness Analysis (MTA) is commonly used for diagnosing and monitoring patients.
- Technology constraints of low-cost OCT can result in limited image quality and can affect the MTA when compared to commercial OCT systems.
- The purpose of this study is to compare the performance of MTA generated using an automated scan selection method from a low-cost OCT with MTA generated from a commercial OCT system.

METHODS

- In this prospective study a low-cost OCT prototype system (ZEISS, Dublin, CA) and a commercial CIRRUS™ HD-OCT 5000 (ZEISS, Dublin, CA) were used to image 55 eyes with age-related macular degeneration.
- For each eye, operator acquired one 6 x 6 mm OCT volume with 512 x 128 A-scans from the commercial OCT system.
- Subjects were asked to self-acquire three 5.78 x 7 mm OCT volumes with 512 x128 A-scans from the low-cost OCT.
- For both commercial and low-cost OCT volumes, MTA was calculated over 5.78 x 5.78 mm area.
- The thickness maps from both systems were registered and the ETDRS grids were centered on the scans.
- An automated scan selection method was used to select the number of scans to generate thickness maps for low-cost OCT [1].
- Bland-Altman and regression analyses were used to compare the MTA from low-cost OCT with the commercial OCT.

The Macular Thickness Analysis generated using automated scan selection method from low-cost OCT system shows good agreement with commercial OCT

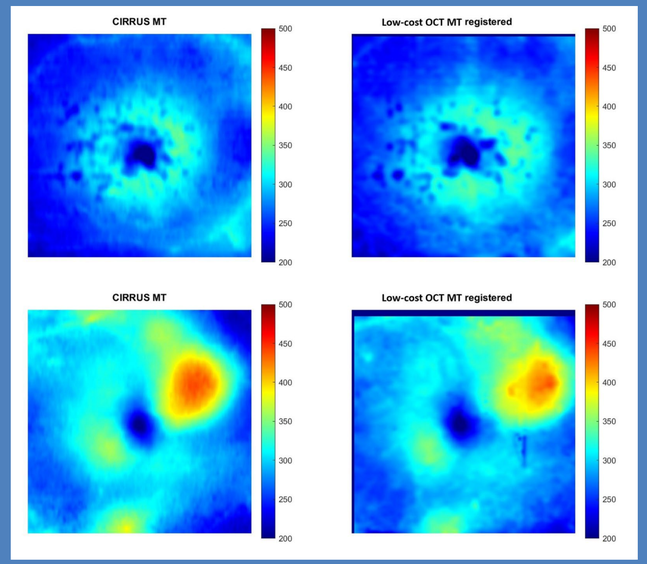

Figure 1. Macular thickness (MT) map from low-cost and commercial OCT for two subjects

ETDRS sector	R^2	Regression slope and intercept	Mean difference (µm)
Central	0.83	0.90X + 30.60	4.6
Inner Nasal	0.92	0.98X+2.87	-4.1
Inner Superior	0.97	1.03X-13.00	-5.2
Inner Temporal	0.93	0.99X+1.48	-2.8
Inner Inferior	0.96	1.00X-1.42	-0.2
Outer Nasal	0.94	0.99X+4.71	1.0
Outer Superior	0.95	1.02X-10.40	-5.1
Outer Temporal	0.91	1.01X+3.11	6.0
Outer Inferior	0.97	0.97X+3.74	-5.5

Table 1. Bland-Altman and regression analyses of MT between low-cost and commercial OCT

RESULTS

- The summary of results from automated scan selection method in the 55 eyes are as follows: in 1, 12 and 42 volumes, MTA was calculated using
  - 3 of 3,
  - 2 of 3 and
  - 1 of 3 acquisitions, respectively.
- Figure 1 shows examples of both low-cost OCT and commercial OCT thickness maps.
- Bland-Altman and regression analyses from various ETDRS sectors are shown in Table 1.
- The mean difference between low-cost and commercial OCT ranges from -5.5 to 4.6 µm.
- The coefficient of determination (R^2) ranges from 0.83 to 0.97 in the ETDRS sectors showing good correlation.

CONCLUSIONS

- The results from this study suggest that the MTA results from various ETDRS sectors of low-cost OCT show good correlation with MTA results from commercial OCT.
- This results suggests that the automated scan selection method may be effective in generating MTA in low-cost OCT system.

REFERENCES

[1] Fard, Ali, et al. "Robust macula thickness analysis using low-cost OCT." Investigative Ophthalmology & Visual Science 63.7 (2022).

Disclosures: NM (E), HB (E), MV (E), LR (E), AF (E) - Carl Zeiss Meditec, Inc.

Email: niranchana.manivannan@zeiss.com