

# Agreement of macula thickness map in low-cost OCT



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## PURPOSE

Macular Thickness Analysis (MTA) is an important tool for diagnosing and monitoring patients with retinal disease. The robustness of MTA can be limited in low-cost devices due to the quality of the optical coherence tomography (OCT) data. In this study we evaluate the agreement of MTA between repeat scans of the same eye using a low-cost OCT prototype.

## METHOD

- A low-cost OCT prototype system (ZEISS, Dublin, CA) was used to image one eye three times on each of 42 subjects with a range of ocular pathologies, including age-related macular degeneration (AMD).
- The inner limiting membrane (ILM) and the retinal pigment epithelium (RPE) of each OCT volume were segmented. Macular thickness (MT) maps were created by measuring the difference between the ILM and RPE.
- Two MT maps (out of the three per subject) were selected based on a segmentation quality algorithm. The two MT maps were registered to each other.
- The ETDRS grid with 9 sectors was placed at the center of each map. The ETDRS grid consisted of three concentric circles with radiuses of 0.5, 1.5, and 2.89 mm (Figure 1).
- Each ETDRS sector value was calculated by averaging the MT values within the sector.
- Linear regression and Bland-Altman analyses was used to compare the MT maps.

## RESULTS

Figure 1 below shows both examples of MT maps acquired from three patients using the low-cost OCT, and the applied 9 sector ETDRS grid. Table 1 below shows the statistical comparison between the ETDRS sectors using two MT maps per subject. All sectors show an absolute mean difference of less than 2 microns. The 95% lower and higher limits of agreement varied between -18 and 19 microns. R-squared values varied between 0.85 and 0.99.

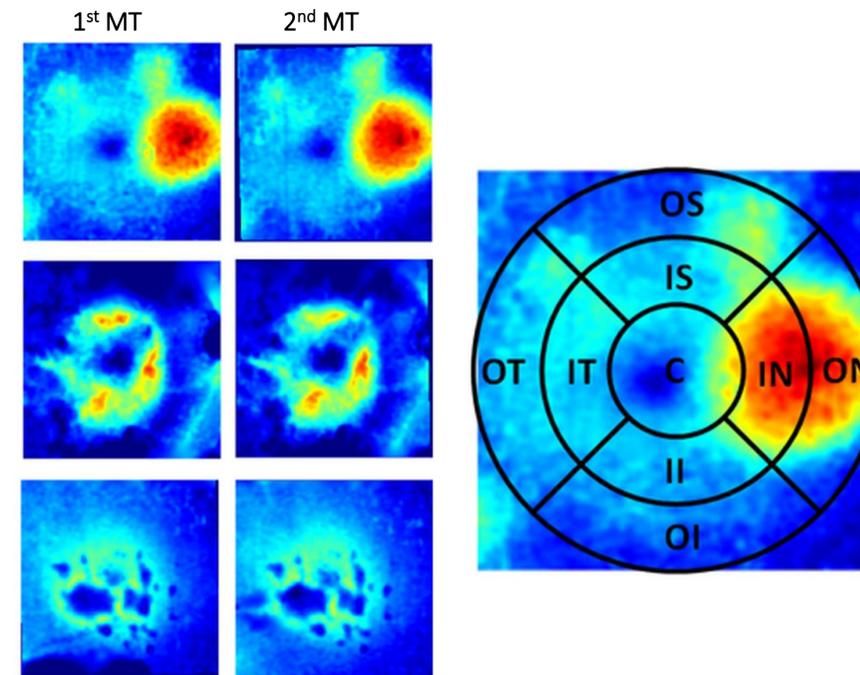


Figure 1. Left: two MT maps of three patients; Right: ETDRS grid

ETDRS Sector	R-squared (Slope, intercept)	Mean difference [microns]	95% lower and higher limits (+/- 1.96 SD) [microns]
Central (C)	0.98 (0.99,1.31)	-1.5	-10, 7.2
Inner Nasal (IN)	0.99 (1.02,-7.97)	-1.4	-7.5, 4.8
Inner Superior (IS)	0.99 (1.01,-2.14)	0.16	-5.2, 5.5
Inner Temporal (IT)	0.98 (0.96,12.7)	0.26	-8.3, 8.8
Inner Inferior (II)	0.99 (1.01,-5.15)	-0.84	-7.3, 5.6
Outer Nasal (ON)	0.98 (1.02,-6.47)	-0.89	-11, 9.3
Outer Superior (OS)	0.96 (0.96,11.7)	0.3	-12, 13
Outer Temporal (OT)	0.97 (1.03,-9.53)	0.15	-7, 6.7
Outer Inferior (OI)	0.85 (0.86,38.8)	0.4	-18, 19

Table 1: Regression and Bland-Altman analyses comparing ETDRS grid sectors generated by two scans per patient

## CONCLUSION

This study demonstrated the agreement between two MT maps generated from two scans per eye using the low-cost OCT prototype. Our results show good correlation and agreement between two MT maps which is important for diagnosing and monitoring patients using macular thickness analysis.

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Disclosures: KR (E), HB (E), SAB (E): Carl Zeiss Meditec, Inc.