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

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 x 128 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.

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 (R²) 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

Email: niranchana.manivannan@zeiss.com

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