

Enhanced visualization of choroidal vasculature map using structural OCT



Areg Noshadi, BS; Homayoun Bagherinia, PhD; Tom Callan, OD; Mary Durbin, PhD
Carl Zeiss Meditec, Inc., Dublin, CA

Poster # PB0174

PURPOSE

The analysis of the choroidal layer using structural OCT has become an important tool for the diagnosis of ocular diseases. Artifacts due to overlying superficial retinal vasculature shadows can lead to misinterpretation of the choroidal vasculature maps. We present a method to reduce the described artifacts from choroidal layer en face images for enhanced visualization and analysis.

METHODS

Algorithm

1. Create RPE retinal layer slab U from 40 μ m above RPE to 10 μ m below RPE.
2. Create choroidal layer slab I from 10 μ m below RPE to scleral-choroidal boundary
3. Choroidal layer slab X without vessel shadow artifacts

$$X = I - wU$$

- $w \in [0,1]$ is solved by minimizing the weighted average of the normalized cross-correlation square γ^2 of local region U_i and X_i (8x8 pixels) and local weight v_i

$$\min_w \sum_i v_i \gamma^2(U_i, X_i) / \sum_i v_i \text{ with } v_i = \text{Var}(U_i) \text{Var}(X_i)$$

- Explicit solution

$$w = \sum_i \text{Cov}(U_i, I_i) \text{Var}(U_i) / \sum_i \text{Var}^2(U_i)$$

Data and evaluation method

- 96 SS-OCT volume data of 500x500 A-scans over 12x12mm were acquired using PLEX® Elite 9000 (ZEISS, Dublin, CA). The volume data includes normal eyes and eyes with diseases such as Age-related Macular Degeneration
- A grader rated the level of enhancement as being (5) much improved, (4) improved, (3) about the same, (2) worse, or (1) much worse.

CONCLUSIONS

We present a method to reduce vessel shadow artifacts in choroidal layer slab images. Our approach is specifically useful for visualization and diagnosis of a variety of ocular diseases.

Email: areg.noshadi@zeiss.com

Disclosures: AN (C), HB (E), TC (E), MD (E): Carl Zeiss Meditec, Inc.

RESULTS

Figure 1 shows three examples of artifact removal. Our results showed 41 images were graded 5 and 47 images were graded 4. 8 remaining images were graded 3.

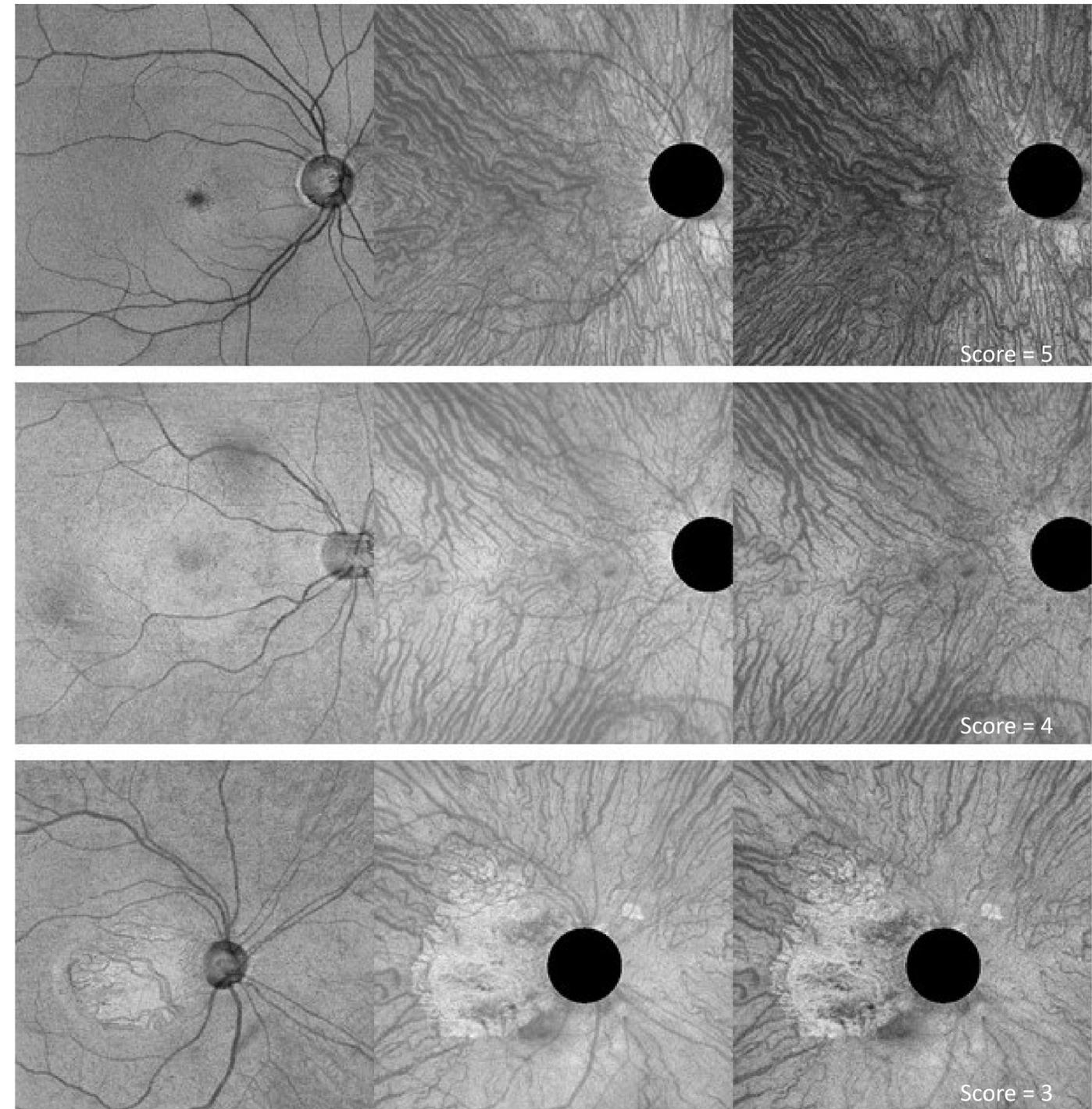


Figure 1. RPE retinal layer slabs (left), the corresponding choroidal layer slabs with vessel shadow artifacts (center), and the resulting choroidal slabs without artifacts (right).