Widefield OCTA vasculature visualization in SS-OCT

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PURPOSE

Widefield optical coherence tomography angiography (OCTA) imaging is important for visualization of microvascular diseases in peripheral retinal regions. This study demonstrates the OCTA vasculature visualization of superficial (SRL) and deep retinal layer (DRL) as well as choroidal layer (CL) over a scan region of 23 mm x 23 mm captured using an external lens attachment on a swept-source (SS) OCT system.

METHODS

- Scans of small number of subjects with various stages of diabetic retinopathy or retinal vein occlusion using PLEX[®] Elite 9000 (ZEISS, Dublin, CA, USA) SS-OCT system
- Each subject was scanned with an angiography scan over an extended scan area of 23 mm x 23 mm x 6 mm with a FOV of 90° using an external lens attachment
- Prototype multilayer segmentation (MLS) algorithm used to segment 9 retinal layers
 - Algorithm based on iterative method to segment inner limiting membrane (ILM) and retinal pigment epithelium (RPE)
 - Low segmentations confidence areas were interpolated
 - Segmentation of remaining layers using ILM and RPE as baseline
- ILM, inner plexiform (IPL), outer plexiform (OPL), Bruch's membrane (BM), and choroidal-scleral junction (CSJ) boundaries were used to generate SRL, DRL, and CL vascular slabs

CONCLUSION

We demonstrated OCTA vasculature maps generated over a scan region of 23 mm x 23 mm captured using an external lens attachment. The customized MLS separates retinal layers for more accurate visualization of OCTA vasculature maps. The larger FOV OCTA visualization continues to be an effective alternative to other widefield imaging modalities.

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RESULTS

Figure 1 shows examples of the segmentation of retinal layer boundaries superimposed on the OCT B-scans. The customized MLS algorithm separates the retinal layers which makes the visualization of OCT and OCTA slabs at different depths possible. Figure 2 shows examples of OCT and OCTA slabs from multiple scans.





with 5 segmented layer boundaries used to generate the slabs (top to bottom: ILM, IPL, OPL, BM, and CSJ).



Figure 2: OCT and OCTA slabs from multiple 23 mm x 23 mm x 6 mm scans. a) superficial capillary plexus with peripheral ischemia, b) superficial capillary plexus (left), deep capillary plexus (middle), and structural choroidal (right) slabs.



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