

# Identification of diabetic retinopathy lesions: a comparison between widefield OCTA obtained by montaging 2 volumetric 15x15 mm scans and a single 15x15 angio scan

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## PURPOSE

Widefield optical coherence tomography angiography (OCTA) has the potential to improve the detection of peripheral retinal lesions in diabetic retinopathy that might otherwise be missed using conventional OCTA scans. Widefield OCTA can be obtained by combining multiple cube scans taken at different locations. In this study we assessed a new volumetric montage protocol designed to produce a 24 mm (Horizontal) x 15 mm (Vertical) scan, equivalent to an angular field-of-view of 88 deg (Horizontal) x 55 deg (Vertical) for the identification of peripheral vascular lesions.

## METHODS

- Ten eyes with diabetic retinopathy were imaged on PLEX® Elite 9000 Swept-Source OCT (ZEISS, Dublin, CA) by acquiring a central 15x15 angio scan followed by two lateral 15x15 angio scans at nasal and temporal fixations. All scans were acquired at 200 kHz scan rate.
- A set of common key points were selected from the distortion-corrected retinal image slabs to register them.
- Transformation vectors were calculated to correctly register the pair of retinal slabs.
- The transformation vectors were applied along all A-scan vectors to produce registered angio cubes of 24 mm (H) x 15 mm (V) x 6mm (D).
- The retinal slab from the resulting volumetric montage was compared to the retinal slab from the central single 15x15 scan to identify the extent of vascular lesions in the periphery.

## CONCLUSIONS

With a FOV of 24mm (H) x 15 mm (V) and a sampling resolution of 17  $\mu$ m, the proposed volumetric montage protocol expands the imaging capability of OCTA for the detection and classification of vascular peripheral lesions. The sampling resolution of 17  $\mu$ m should be adequate to provide quantitative measures in detecting early change in in patients with diabetes.

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## RESULTS

Figure 1 and Figure 2 show the retinal slabs and central B-scans from the volumetric montage protocol and from central 15x15 angio scan, respectively. Out of 10 eyes with diabetic retinopathy, 8 were found to have lesions beyond the central 15x15 angio scan. In addition, the quality of the montage, especially over the overlapping area of the 2 scans, was preserved with no noticeable artifact. The sampling resolution of the montage protocol of 17  $\mu$ m was found to be adequate to identify vascular lesions: ischemic area, microaneurysm, vessels tortuosity were commonly reported. Some of these lesions were also visible on the structural B-scan with flow signal overlaid.



Figure 1: Retinal slab (top) and central B-scan (bottom) of a diabetic retinopathy eye imaged using the dual 15x15 angio volumetric montage protocol. Structural B-scan is shown with flow signal overlay in red and green to indicate flow above and below the RPE respectively.

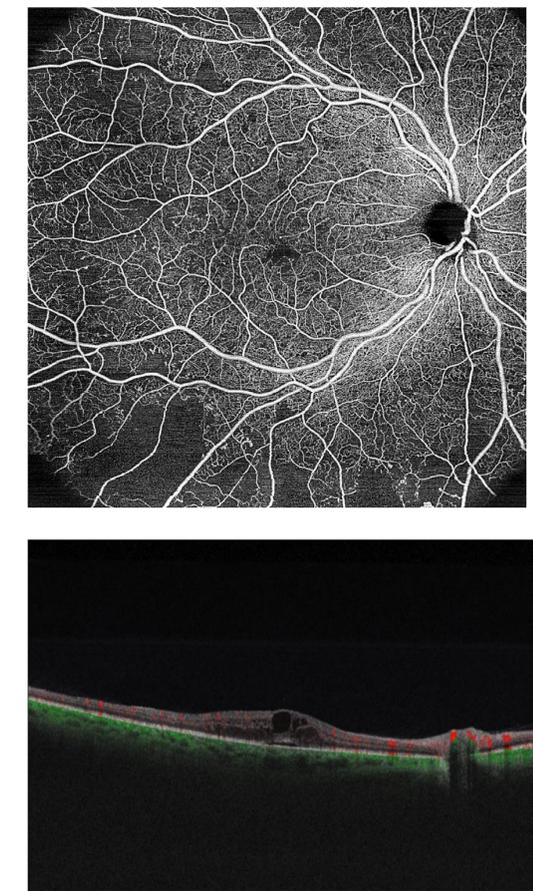


Figure 2: Retinal slab (top) and central B-scan (bottom) of the same eye images using a central 15x15 angio scan. Structural B-scan is shown with flow signal overlay in red and green to indicate flow above and below the RPE respectively.