

## AUTHORS

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## **INSTITUTIONS (ALL):**

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## **Study Group:**

## ABSTRACT

**TITLE:** An automatic algorithm measuring the retinal intercapillary area to assess diabetic retinopathy

## **ABSTRACT BODY:**

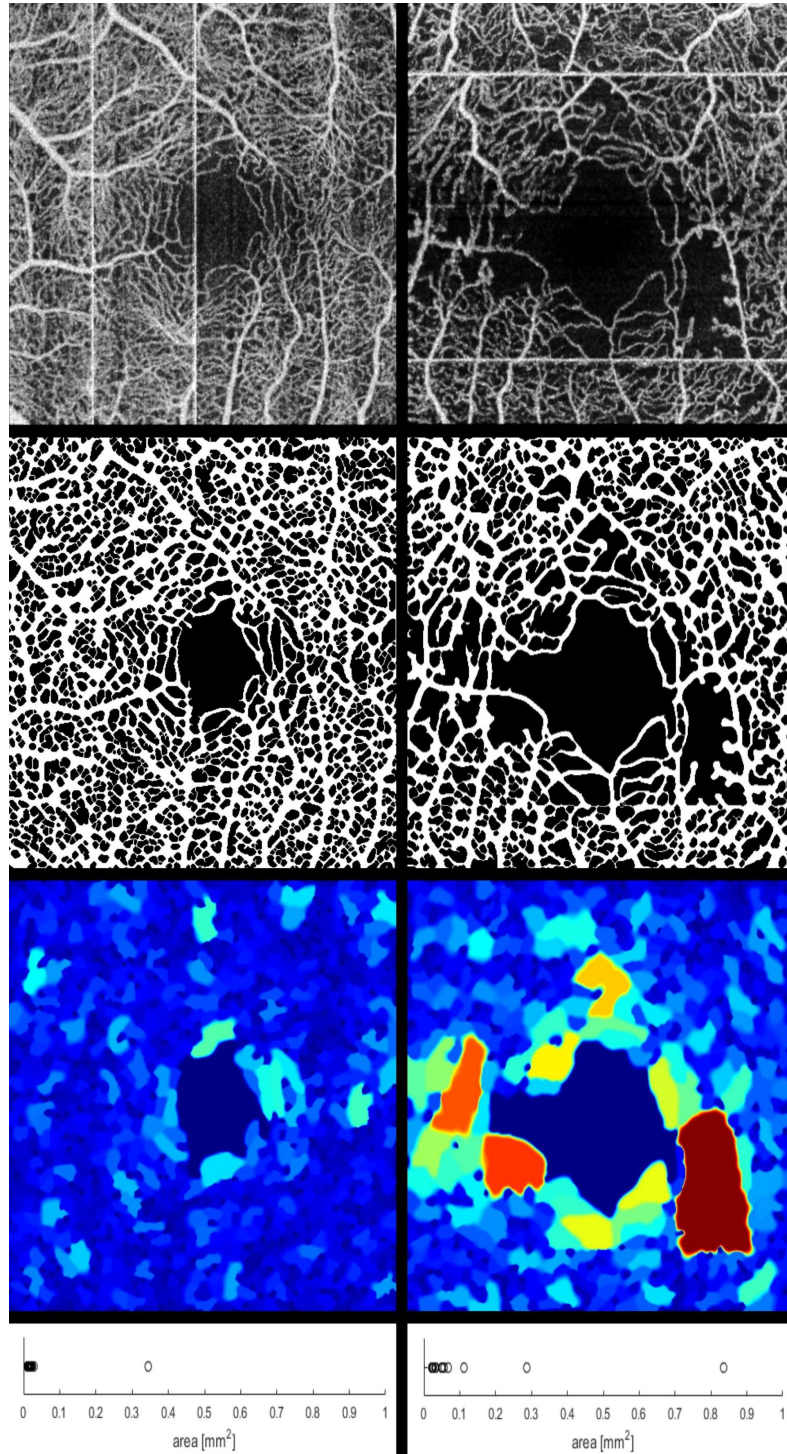
**Purpose:** Several studies demonstrated the utility of optical coherence tomography angiography (OCTA) in evaluating vascular abnormalities in patients with diabetic retinopathy (DR). Thus far, automatic quantitative analysis has focused on measurements of the foveal avascular zone (FAZ) and capillary density. Analysis of the intercapillary areas (ICA) of the perifoveum using manual segmentation has also been demonstrated. The purpose of this study is to develop a fully automated algorithm for quantifying retinal perfusion impairment using ICA displayed on OCTA images. The longer term objective is to develop sensitive and robust metrics for the diagnosis of DR and to quantify DR progression.

**Methods:** A 1050 nm, 400 kHz swept-source (SS)-OCT system was used to perform OCTA imaging of 89 eyes from 51 diabetic patients and 63 eyes from 32 normal subjects. Of the 89 eyes from diabetic patients, 51 eyes had no clinically detected retinopathy, 29 eyes had non-proliferative diabetic retinopathy (NPDR), and 9 eyes had proliferative diabetic retinopathy (PDR). OCTA en face images of the retinal vasculature were generated. The vessel structure in each image was highlighted using a vesselness filter; next, a binary image was obtained through a marching algorithm designed to exploit continuity constraints. Finally, the ICA were determined via connected components and subsequently used to generate false color images highlighting areas of non-perfusion.

**Results:** Representative ICA maps for a normal eye and a NPDR eye are shown in Figure 1. The ICA maps can visualize areas of non-perfusion and enable rapid assessment of the vascular changes that occur in DR. Similar, but less pronounced changes were observed in eyes of diabetics without retinopathy.

**Conclusions:** A fully automatic algorithm for quantifying ICA in OCTA images was developed. Preliminary results suggest ICA may be a useful metric for assessing diabetes and DR. Further work is needed to develop quantitative measures, validate the algorithm, and evaluate robustness in the presence of OCTA image artifacts.





Comparison of a normal eye (Column 1; 43 y/o female) and an NPDR eye with diabetic macular edema (Column 2; 51 y/o female) subject. (Row 1) En face OCTA images. (Row 2) Binarized vessel maps. (Row 3) ICA maps. (Row 4) Scatter plot showing the distribution of the 20 largest ICA surrounding, and including, the FAZ.

## **DETAILS**

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**CURRENT SECTION:** Multidisciplinary Ophthalmic Imaging Group

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**Other Registry Site (Abstract):**

**Registration Number (Abstract):**

**Date Trial was Registered (MM/DD/YYYY) (Abstract):**

**Date Trial Began (MM/DD/YYYY) (Abstract):**

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## **TRAVEL GRANTS and AWARDS APPLICATIONS**

**AWARDS:** ARVO Members-in-Training Outstanding Poster Award