Automated Vessel Density Detection in Fluorescein Angiography Images Correlates With Vision in Proliferative Diabetic Retinopathy

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Summary

• We developed an algorithm that can quickly and reliably quantify retinal vessel density from FA images

• We found a positive correlation between computed vessel density and BCVA in PDR patients, but not CRT
Retinal Non-Perfusion and PDR
Assessing Retinal Blood Flow

Fluorescein Angiography
Optical Coherence Tomography Angiography

Arya and Waheed, 2018
Shortcomings of Quantifying Retinal Vessels

Limitation of the peripheral retina captured on OCTA
Inability to quantify FA beyond manual vessel detection

Sadda, et al 2015
Contrast Affects Vessel Visualization
Automate vessel detection and quantification from FA images

Correlate vessel density and vision in diabetic retinopathy
We performed a secondary analysis of the RECOVERY trial.

We designed an algorithm to detect retinal vessels from FA images.
We designed an algorithm to detect retinal vessels from FA images.
Secondary analysis of the RECOVERY trial images
Automated vessel detection is unaffected by contrast.

Vessel density calculations are reliable and fast.

Differences in vessel density correlate with BCVA, but not CRT.
Automated vessel detection is unaffected by contrast
Vessel density calculations are reliable and fast.
Vessel density correlates with BCVA

\[ r = 0.407, \quad p=0.0075 \]
Vessel density correlates with BCVA

BCVA=90 (a)  BCVA=86 (b)  BCVA=72 (c)  BCVA=67 (d)
Vessel density does not correlate with CRT

\[ r = 0.0533, \ p = 0.7376 \]
Our algorithm quickly and reliably quantifies retinal vessel density from FA images.

We found a positive correlation between computed vessel density and BCVA in PDR patients, but not CRT.

Future directions include studying longitudinal vessel density changes.
THANK YOU

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