OCT Angiography

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KEYVAN KOUCHAN MD FRCS(C) OBO
TORONTO RETINA INSTITUTE
MISSISSAUGA RETINA INSTITUTE
MT. SINAI HOSPITAL
UNIVERSITY OF TORONTO

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OCT Angiography

NON-INVASIVE MICROVASCULAR ENHANCED IMAGING TECHNOLOGY

Intrinsic motion of RBC’s in the vessels imaged in space over time
Functional assessment of vasculature
En Face projections used to view
NO CONTRAST MEDIUM injected
3D depth resolved images

SSADA (Split Spectrum Amplitude Decorrelation Angiography) algorithm
Spectral Domain OCT system
En Face 3d Visualization
Motion Correction technology

Motion Contrast used to image the flow in retinal vasculature

PRINCIPLES OF OCT ANGIOGRAPHY
Visualizing flow through motion contrast

FLOWING WATER CAN BE DISTINGUISHED FROM A STATIC BACKGROUND BY COMPARING SEQUENTIAL VIDEO FRAMES TO HIGHLIGHT MOTION

 MOTION CONTRAST IS SIMILARLY USED IN OCT ANGIOGRAPHY TO DISTINGUISH BLOOD FLOW IN THE VESSEL FROM STATIC TISSUE
OCT Angiography


Normal Macula

304 x 304 x 640 image volume scanned in ~3s

Normal Optic Disk

304 x 304 x 640 image volume scanned in ~3s
**OCT Angiography**

**EN FACE Visualization - Segmentation of Cube**

Can be automated or manual adjusted!

- Superficial capillary
- Deep capillary
- Outer Retina
- Choriocapillary

**OCT Angiography**

**EN FACE Visualization - Auto Segmentation Settings**

**Superficial Retinal Vascular Plexus**

Consistent with our typical view on fluorescein angiography

Diabetic retinopathy, retinal artery and vein occlusions

**OCT Angiography**

**EN FACE Visualization - Auto Segmentation Settings**

**Deep Retinal Vascular Plexus**

Brand new area of imaging

Traditional FA showed smudgy leakage but no details

Affected in many conditions but may be primary site of pathology in MAC TEL or RAP

**OCT Angiography**

**EN FACE Visualization - Auto Segmentation Settings**

**Outer Retina**

Brand new area of imaging

Chosen to look at specifically as it is avascular in normal humans

Vascularization is always pathology!

Will be useful to specifically look for CNVM above the RPE, RAP lesions, etc.
OCT Angiography

En FACE visualization - auto segmentation settings

**Choriocapillaris**

Primary site of pathology in ARMD, mCNV

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OCT Angiography

**Angioflow Image: Field size 8-6-3 mm with AngioVue**

8x8  6x6  3x3

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OCT Angiography

En FACE visualization - auto segmentation settings

**Optic Disk**

- Vitreous
- Radial Peripapillary Capillaries
- Superficial Retinal Vascular Plexus
- Deep Retinal Vascular Plexus

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Retinal Vascular Layers Imaged by Fluorescein Angiography and Optical Coherence Tomography Angiography

Richard F. Spaide, MD; James M. Klineciv Jr, MD; Michael J. Cooney, MD

JAMA 2015

What % of our traditional FA vasculature is represented by the inner retinal plexus?

95%
Retinal Vascular Layers Imaged by Fluorescein Angiography and Optical Coherence Tomography Angiography

RADIAL PERIPAPILLARY CAPILLARIES WELL APPRECIATED WITH OCTA NOT FA

mCNV?, wAMD?, CSR?

66F distorted vision OS x 2 mo
20/30 OD, 20/100 OS
Past Dx of CSR OU
h/o myopia s/p CE/IOL OU
61 F slightly blurred OU
20/40 OU
Borderline DM
telangiectatic vessels temporal to fovea OU
- M poor vision OD x yrs; recently worse
- 20/25 OD
- No remote macular laser OD ~ 20 yrs ago

CSR vs CNV?
Summary

OCTA uses multiple OCT B scans to deduce movement of RBCs in blood vessels.

Algorithms such as SSADA improve image quality.

En face technology allows segmentation of superficial retinal vessels, deep retinal vessels, outer retina, and choriocapillaris.

OCTA allows visualization of PP vessels: implications for glaucoma management?

Strengths: detection of CNV, mac ischemia, telangiectasia

Drawbacks: prone to errors, lack of leakage info, limited to poster pole