Introduction to OCT-Angiography

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What we’ll be covering

- OCT Technology
  - Past, Present and Future
- OCT Angiography
  - Advantages and Disadvantages
- Clinical Cases

How Did We Get From Here…

...to here?

Groups of A-scans form to make the B-scan
Time Domain OCT
• In TD-OCT the depth information has to be subsequently probed by mechanically adjusting the length of the reference arm.
• This required motion limits the speed of the acquisition of an A-Scan, (e.g. the STRATUS has a 400 Hz A-Scan rate).

*Spectral Domain OCT
However, instead of changing the length of the reference arm, it is equivalent to use a different wavelength of the light. When broadband laser diodes became available, SD-OCT could use the different wavelengths to simultaneously obtain the depth information.

**TD vs. SD Comparison**

OCT Angiography
• Algorithm detects red blood cells moving through vessels.
• Eye tracking, reduces motion artifact, negates blinks, and ensures precise scan location on follow-up scans.

**OCT Angiography**

Total = 240,000 A-scans, ~ 5.0 secs
OCTA vs FA

Conventional IVFA shows dynamic phases of staining, leakage and pooling. OCTA does not.

OCT-A shows movement of red blood cells. Image captured is equivalent to mid-phase of FA.

OCTA vs FA

- No NEEDLES, Less TIME, Less Complicated - - - Lowered Risk
  - Single Scan - in a few seconds
- Seeing hard-to-see pathology = Confidence/More informed Referrals
- Depth Color Coded for easy assessment
- Multiple layer segmentation
  - Deep Retina Plexus Layer not Clinically Visible before OCT-A
- New Interpretation understanding necessary

OCT-A are flattened 2D images of 3D vasculature. Color Represents Depth in Tissue.

Color Depth Map combines superficial, deep and avascular maps- allows for depth visualization of blood flow from the ILM to ONLY the RPE.
Normal 3x3 Angio Cube OD - Full Retina (L) and Deep Plexus (R)

Normal Pt, 6x6 Scans

PED with CNV 6x6 mm OCT-A Scan

Visual detail from OCT Angiography correlates very well with traditional fluorescein angiography

VRI – Vitreo Retina Interface Map

BRVO 3x3 mm OCT-A Scan

FA of a CRVO

SD-OCT 3x3 images superimposed on FA
Overlays for display effect

FA of a CRVO

SD-OCT 3x3 images superimposed on FA
Overlays for display effect, not a software feature

PDR with NVD
FA (top) vs. OCT-A (middle)
OCT-A VRI interface (bottom)

Another KNOWN DIABETIC – Looks Good, right?
WRONG
Deep Plexus, Superficial Retina

…and the other eye...
Sup/Temporal Ischemia

AMD/CNV OD
Question: What is Projection Artifact/Der Correlation Tails?

AMD/CNV OD
Color Retina Depth Encoding
OCT-A 3x3
Blue/Cool Color indicates flow in the Avascular Layer, but the coding is weak.

AMD/CNV OD Custom RPE-RPE slab
OCT-A 3x3
Green indicates Sub RPE Blood Flow
Red indicates Pre RPE Blood Flow

AMD/CNV OD ("faux feeder" projection artifact removed
for clarity)
STAINING and POOLING? DOES IT MATTER ANYMORE?

Classic or Occult?

Classic CNV is well-defined on IVFA

Idiopathic CNV

Pt. 33: CSR – Central Serous Retinopathy

CSR: Last Visit – this would be missed my MOST docs at ALL LEVELS
Ctzn leakage = SRF. REFER THIS PT TO A RETINA SPECIALIST!
Superficial Deep Perfusion Density


Additional Resources


• [https://www.optovue.com/case-studies](https://www.optovue.com/case-studies)