OCT Interpretation in Retinal Disease

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Financial Disclosure

Jay M. Haynie is on the advisory board or has received honoraria from the following companies:

- Carl Zeiss Meditec
- Topcon Medical Systems

OCT Cross section of retinal Layers
**OCT Evolution:**

Thickness algorithms differ by system

- **Stratus:**
  - Includes SRF
  - Stops at CNV and RPE

- **Cirrus and Topcon:**
  - Includes SRF and CNV
  - Stops at RPE

- **Spectralis:**
  - Include SRF, CNV, PED
  - Stops at Bruch’s membrane

1. **External Limiting Membrane = ELM**
2. **ISOS / Photoreceptor integrity line**
3. **/ 4. Retinal Pigment Epithelium Complex**
4. **5. Bruch’s Membrane**

**OCT Artifacts**

- Look for Signal Strength
- Opacities lower it!
  - Dry Eye
  - Cloudy Cornea/Lens
  - Vitreous Densities

**OCT Artifacts**

Dry Eyes
- Images are only as good as the technician taking them
- Images depend on good fixation
- If something doesn’t look right, dilate the patient and take a look clinically

**VitreoMacular Traction**

**Epi Retinal Membrane (ERM)**

**ERM with lamellar macular hole**

**2 weeks post op**
Interpretation of OCT
Differentiate between inner and outer retinal disease as first step…..

Inner retina (most common)
Vascular disease – HTN and DM

73 year old man with a new scotoma OS
Poorly controlled diabetes, HTN

BRAO
Sudden loss of central vision
CRAO

Sudden loss of central vision
Referred with diagnosis of AMD

Macroaneurysm

BRVO with CME

55 year old man with sudden onset of decreased vision

Rhegmatogenous retinal detachment
Rhegmatogenous retinal detachment – MAC ON

Dry AMD Variants
- Drusen
- Drusenoid PED's
- Geographic Atrophy

AMD
- RPE detachment (PED)

Atrophic AMD

Wet AMD Variants
- Dry AMD changes
- Fluid
- PED
  - Serous
  - Hemorrhagic
  - Fibrovascular

WET AMD Variants
- Choroidal neovascular membrane
  - Active
    - Above RPE
    - Below RPE
**WET AMD Variants**
- Choroidal neovascular membrane
- Active
  - Above RPE

**WET AMD Variants**
- Choroidal neovascular membrane
- Active
  - Below RPE

**Vitelliform lesion vs. PED**
Far different prognosis

**Enhanced-depth imaging**
- Stratus
- Cirrus
- Spectralis
- Spectralis - EDI
- Cirrus 5000 – 100X Raster - EDI

**Central Serous Retinopathy**
- 69 year old male with maculopathy
- 350 microns
- 450 microns
74 year old female with maculopathy
Vitelliform macular dystrophy

74年齢の女性の視網膜色素上皮萎縮

Advanced RPE analysis with Cirrus OCT
Tracking of drusen and disease of the RPE as well as atrophy

Advanced RPE analysis of RPE atrophy

Photoreceptor Integrity Line = PIL
External Limiting Membrane = ELM

54年齢の女性、Plaquenil服用者
The retinal ganglion cell and inner plexiform complex is more sensitive to the demyelination process of MS and can be a prognostic marker in the expected quality of life and visual outcomes of patients with all subtypes of MS.

Regular monitoring with SDOCT may become standard for MS patients.

Disease entities (neurogenic) that will affect the ganglion cell complex will be seen by OD’s and it is becoming more common to share these patients with Neurology.

Alzheimers/Dementia  Stroke
Multiple Sclerosis  Glaucoma
Parkinsons Disease  ADHD
Myasthenia Gravis

In my experience these conditions will present with variable vision loss when the clinical examination, standard SD OCT scans, visual fields, pupils etc are intact initially.

When things don’t make sense….

LOOK at the Ganglion Cell Complex

Traditional Angiography versus OCT angiography

Will this change what we do?
Traditional Angiography Images

OCT Angiography (OCTA) Images

AngioPlex OCT Angiography from ZEISS

- new
- non-invasive
- microvasculature
- imaging technology

AngioPlex OCT Angiography allows visualization of both perfused vasculature and vascular abnormalities of the retina without the need of contrast.

AngioPlex Technology detects motion of scattering particles such as red blood cells within sequential OCT B-scans performed repeatedly at the same location of the retina.

AngioPlex Maps consist of reconstruction of the perfused microvasculature within the retina and choroid.

AngioPlex Maps consists of a 2D representation of retinal the vasculature of a particular region of interest.

AngioPlex Color Depth Map

The color depth map combines superficial, deep and avascular retina maps and allows for depth visualization of retinal blood flow.
AMD Cases
Pigment Epithelial Detachment

AngioPlex reveals no blood flow

(TB) 29 year old man with TYPE I Diabetes found to have PDR.

Angioplex images (NVD)

Diabetic MA’s and Ischemia

Not appreciated clinically

Microaneurysm lesions in Diabetes
Diabetic MA’s and Ischemia

Not appreciated clinically

PED with occult CNV - Neovascular AMD

AMD progression to GA

2010

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