OCT Interpretation in Retinal Disease

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Dedicated to excellence in care for the back of the eye.

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I have received honoraria or am on the advisory board for the following companies:

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Arctic DX + Macula Risk
Genentech
Lampa Advisory

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OCT Cross section of retinal Layers

- Ganglion Cell Layer
- Inner Nuclear Layer
- Outer Nuclear Layer
- External Limiting Membrane
- Presumed Photoreceptor Inner Segment Outer Segment Junction
- Retinal Pigment Epithelium
- Bruch Membrane
- Choriosclerotic venules
- Outer Plexiform Layer
- Inner Plexiform Layer
- Nerve Fiber Layer

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:**
  - Includes SRF, CNV, PED
  - Stops at Bruch’s membrane
Outer Retinal Complex
“Bright Bands”

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

Beautiful images, but…

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

9/23/2017
Interpretation of OCT
Differentiate between inner and outer retinal disease as first step.....

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

Outer retina
Disease of the photoreceptors
Disease of the RPE
AMD, CSR and dystrophic disease

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

Atrophic AMD

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

WET AMD Variants
- Choroidal neovascular membrane
- Active
  - Above RPE
  - Below RPE
82 year old man with AMD and progressive vision loss over the past 6 months.
Vitelliform lesion vs. PED

Far different prognosis

Choroidal nevus – obscures details of the choroid

Choroidal Melanoma

Enhanced-depth imaging

Central Serous Retinopathy

350 microns

450 microns

69 year old male with maculopathy

74 year old female with maculopathy

Vitelliform macular dystrophy

467

322
Advanced RPE analysis with Cirrus OCT
Tracking of drusen and disease of the RPE as well as atrophy

July 2011

July 2012

Advanced RPE analysis of RPE atrophy

54 year old woman taking Plaquesnil

Photoreceptor Integrity Line = PIL
External Limiting Membrane = ELM

Ganglion Cell Complex

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.
**Ganglion Cell Complex**

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
- Multiple Sclerosis
- Parkinsons Disease
- Myasthenia Gravis
- Stroke
- Glaucoma
- ADHD

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**

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**What’s Coming**

- Latest OCT Devices = Fourier Domain Detection
- Spectral Domain SD OCT (2006)
  - 70,000 A scans/sec
- Swept Source SS OCT (Research only)
  - 250,000 - 400,000 A scans/sec Better Light Sources
- Enhanced Depth Imaging (EDI)

**What’s Coming**

- Video OCT
- Measure retinal blood flow
- Better software
- Quantify GA, RPED, CNVM, CSR……..
Traditional Angiography versus OCT angiography

Will this change what we do?

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 Maps**
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

**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)**
AngioPlex versus FA imaging

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

Neovascular AMD