OCT & Me
How Optical Coherence Tomography Changed the Life of a Small Town Optometrist

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What Is O.C.T. and Why Should I Give A Rip?

D15.02  Histoplasma capsulatum retinitis
D19.60  Malignant neoplasm of choroid
D24.60  Benign neoplasm of choroid
D28.03  Hemangiom of retina
D50.00  Retinal detachment w/retinal defect, unspecified
D50.01  A recent retinal detachment, partial, w/ single defects
D50.02  Partial, w/ multiple defects
D50.03  Partial, w/ giant tear
D54.04  Partial, w/ retinal dialysis
D54.05  Total or subtotal
D54.06  Old retinal detachment, partial
D54.07  Total or subtotal
D54.10  Retinoschisis, unspecified

362.29  Macular degeneration (senile) of retina, unspecified
362.31  Neovascular senile macular degeneration of retina
362.32  Exudative senile macular degeneration of retina
362.33  Cystoid macular degeneration of retina
362.34  Macular cyst, hole or paetiaholus of retina
362.35  Toxic maculopathy of retina
362.36  Macular pucker of retina
362.37  Peripheral retinal degeneration, specified
362.38  Paving stone degeneration of retina
362.39  Microvascular degeneration of retina
362.43  Lattice degeneration of retina
363.15 Pigment
363.20 Chorioretinitis, unspecified
363.21 Pars planitis
363.22 Harada’s disease
363.40 Choroidal degeneration, unspecified
363.41 Siderosis of choroid
363.42 Diffuse secondary atrophy of choroid
363.43 Angioid streaks of choroid
363.63 Choroidal rupture
363.70 Choroidal detachment, unspecified
363.71 Serous choroidal detachment
363.72 Hemorrhagic choroidal detachment
364.22 Glaucomatocyclitic crises
364.53 Pigmentary degeneration
367.73 Goniosynechiae

368.40 Visual field defect, unspecified
368.41 Scotoma involving central area
368.42 Scotoma of blind spot area
368.43 Sector or arcuate defects
368.44 Other localized visual field defect
368.45 Generalized contraction or constriction
367.01 Papilledema, unspecified
367.02 Papilledema associated w/ intracranial pressure
367.03 Papilledema associated w/ decreased ocular pressure
367.04 Posterior-Kennedy syndrome
377.90 Unspecified disorder of optic nerve or visual pathways
373.20 Buphthalmos, unspecified
373.21 Simple buphthalmos
373.22 Buphthalmos associated w/ other ocular anomalies

364.74 Papillary membranes
364.77 Resection of chamber angle
365.00 Preglaucoma, unspecified
365.01 Open angle glaucoma w/ borderline findings
365.02 Anatomical narrow angle glaucoma
365.03 Glaucoma, steroid responders
365.04 Glaucoma, ocular hypertension
365.10 Open-angle glaucoma, unspecified
365.11 Primary open angle glaucoma
365.12 Low tension glaucoma
365.13 Pigmentary glaucoma
365.14 Glaucoma of childhood
365.15 Residual stage of open angle glaucoma
365.20 Primary angle closure glaucoma
365.21 Intermittent angle closure glaucoma
365.22 Glaucomatous stage
365.23 Chronic angle closure glaucoma

365.21 Intermittent angle closure glaucoma
365.30 Glaucomatous stage
365.31 Residual stage
365.42 Glaucoma associated w/ anomalies of iris
365.41 Glaucoma associated w/ chamber angle anomalies
365.44 Glaucoma associated w/ other anterior segment
365.50 Pseudophakic glaucoma
365.52 Pseudophakic glaucoma
365.64 Glaucoma associated w/ tumours or cysts
365.65 Glaucoma associated w/ orbital trauma
365.81 Hypersecretion glaucoma
365.82 Glaucoma w/ increased episcleral venous pressure
365.89 Other specified glaucoma
365.90 Unspecified glaucoma

Tools We Use
To See The
Retina

Ophthalmoscope

Hermann Von Helmoltz
1850
Photography

Flourescein Angiography

Ultrasound
CME – Vitreous Traction

CME – No Vitreous Traction

Optical

Utilizing light and the principles of optics
Coherence
The study of how correlated two waves are.

Tomography
Images by sections or sectioning through the use of a penetrating wave.

How OCT Works
Spectral Domain Vs. Fourier Domain OCT

The reference mirror moves back and forth over a distance that corresponds to the axial (depth) range of interest in the sample. The data acquisition is synchronized with the scan cycle of the reference mirror. Each cycle provides one axial scan that contains information on the reflected signal strength versus depth in the sample. A transverse scan mirror steers the probe beam over a transverse dimension. The OCT image is a representation of reflected signal strength over axial and transverse dimensions.
The reference mirror is stationary. The spectral interferogram is the spectrum of the combined reference and sample reflections. Reflections from different depths of the sample produce spectral modulations of different periodicities. The Fourier Transform converts the spectral modulations into depth information (axial scan).

**What Are We Looking At?**

**Micrometer (micrometre)**

**What Does An OCT Measure?**

**One Micrometer**

1 meter

Equals

1/1000 meter or 0.0032808399 inches

**µ**

20-100 µ
Macula

8 µ

212 µ - 182 µ
Problems We Evaluate...

Macular Degeneration
Macular Edema

Macular Holes
Glaucoma is a progressive optic neuropathy characterized by structural changes of the optic nerve and retina that are associated with the development of visual functional defects.
The CD Ratio gets larger as axons get sicker. Glaucoma is the ONLY disease where the cupping gets worse.

Retinal Nerve Fiber Layer

The Retinal Ganglion Cell Layer gets thinner as axons get sicker.
Figure 1. Reflectivity maps (bottom) and corresponding OCTx images (top) of one normal eye (left) and two glaucomatous eyes (middle and right).
Other Structures