


Innovative uses of OCT in Primary Care Optometry


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OCT in the "Healthy Patient" Practice

- Can I justify it?
- Do I have enough patients to support it?
- Can I afford it?


YES!

Let's look at how to do it.

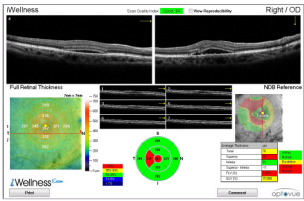


Step 1:


Realize that your healthy patient population may not be all that healthy.



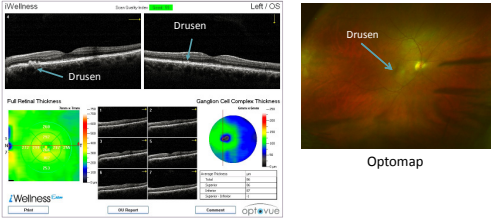

A Screening Scan

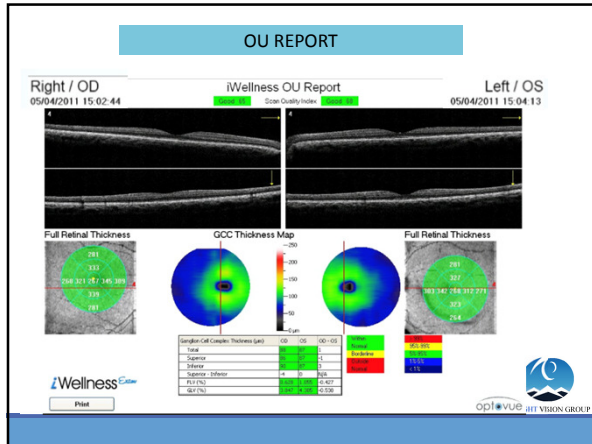


- Non-billable scan
- Tells you what you will see before you see the patient



See More Before You See the Patient

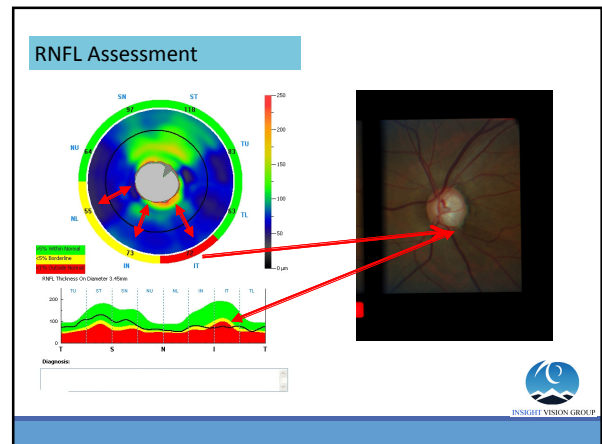
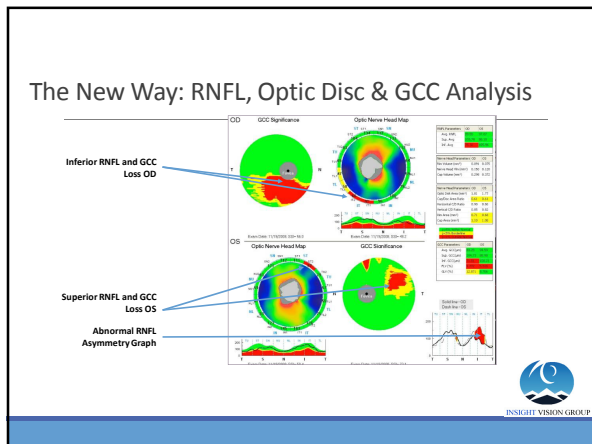
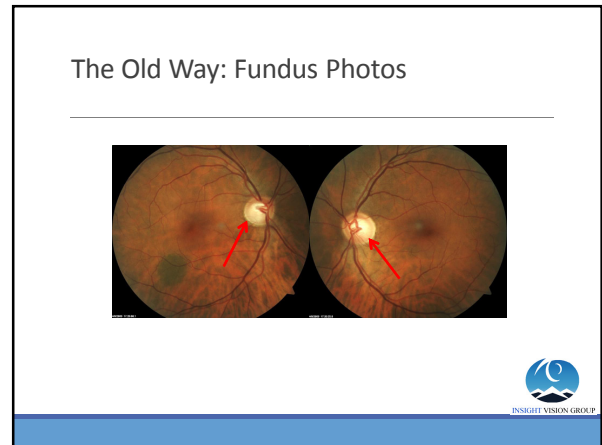
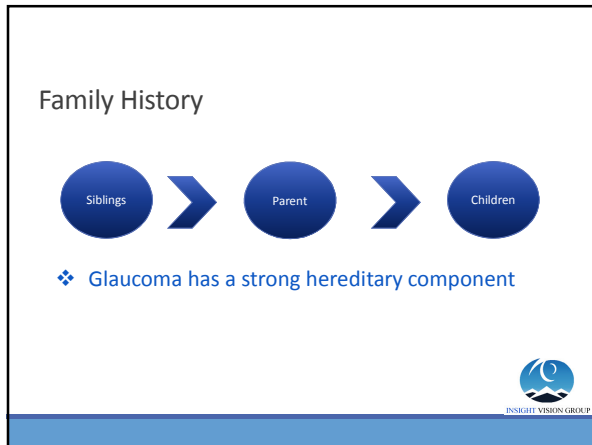





Step 2: Find/Build your glaucoma practice with OCT

Clinical and Practical Recommendations

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The New Way: Angle Measurement with OCT

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GCC Assessment

Parameter	Thickness	Std Dev
Average	21.06	1.06
Superior	21.06	1.06
Inferior	21.06	1.06
SI	21.06	1.06
RNFL	21.06	1.06
RNFL	21.06	1.06

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Macular Ganglion cell density

Topography of Ganglion Cells in Human Retina

CHRISTINE A. CURCIO AND KIMBERLY A. ALLEN
THE JOURNAL OF COMPARATIVE NEUROLOGY 306:5-23 (1990)

- 50% of ganglion cells located in central 4.5mm (16°)
- Peak ganglion cell density is 15,000 cells/mm² in macula (white region left)
- Area represents only 7.3% of total retinal area
- RTVue Ganglion cell complex map covers central 6mm area

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Macula thinning in Glaucoma

- Greenfield et al, showed thinning of the macula in glaucoma patients using Time Domain (TD) OCT (Stratus)
- Guedes et al, also found significant macula thinning in glaucoma patients compared to normals with TD OCT

- Greenfield DS, Bagdasarian H, Knighton RW. Arch Ophthalmol. 2003; 121:41-46.
- Guedes V, Schuman JS et al. Ophthalmology 2003; 110: 177-189.

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Diagnostic Accuracy with TD OCT: Macula vs RNFL

- Medeiros et al, found the diagnostic accuracy of peripapillary RNFL thickness was significantly more accurate than macula thickness
- Wollstein et al, found similar results where RNFL thickness was significantly more accurate for detecting glaucoma than macula thickness

- Medeiros FA, Zangwill M, Bowd C et al. Am J Ophthalmol. 2005; 139:44-55
- Wollstein G, Ishikawa H, et al. Am J Ophthalmol 2005; 139: 39-43.

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Progression: Macula vs RNFL

- Using TD OCT, Medeiros et al, compared the accuracy for detecting progression using RNFL versus macula thickness and found the RNFL was significantly more sensitive and specific than macula thickness

- Medeiros FA, et al. Invest. Ophthalmol Vis Sci 2009; 50:5741-5748

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TD OCT Study Limitations

- Major disadvantage in these studies is that TD OCT typically measures full retinal thickness only (does not isolate ganglion cells)
- TD OCT does not have enough depth resolution to image and segment the ganglion cells accurately and reliably



Fourier Domain OCT Advantage

- FD OCT has twice the depth resolution as TD OCT
 - 5 microns vs 10 microns
- Allows imaging and segmentation of ganglion cell layers

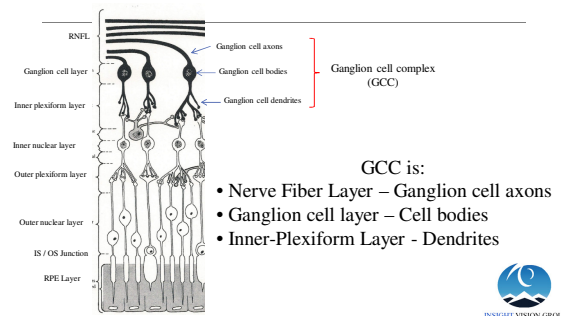


Fourier Domain OCT Advantage

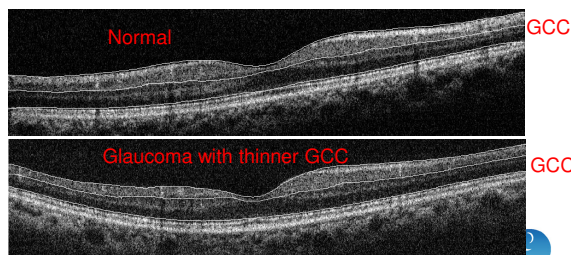
- Faster speed also allows for greater density of sampling points and reduces artifacts from eye-movements
 - RTVue FD OCT has 26,000 A scans/sec vs Stratus TD OCT with 400 A scans/sec



Retinal Ganglion Cells extend through three retinal layers



GCC Thinning in Glaucoma



Revisiting the Macula

- Can imaging the ganglion cells in the macula with FD OCT improve glaucoma detection?



Diagnostic Accuracy: GCC vs FD OCT RNFL

- Rao et al, found GCC had similar accuracy levels as FD RNFL
- Seong et al, found similar results
- Kim et al, found values were higher for RNFL vs GCC in a group of **advanced** glaucoma patients, but GCC values were higher than RNFL in a group of **early** glaucoma patients

• Rao HL, Zangwill LM, Weinreb RN et al. Ophthalmology 2010; in press.
 • Seong M, Sung KR, Choi EH, et al. Invest Ophthalmol Vis Sci 2010; 51:1446-1452.
 • Kim NR, Lee ES, Sung GJ, et al. Invest Ophthalmol Vis Sci 2010



GCC Summary

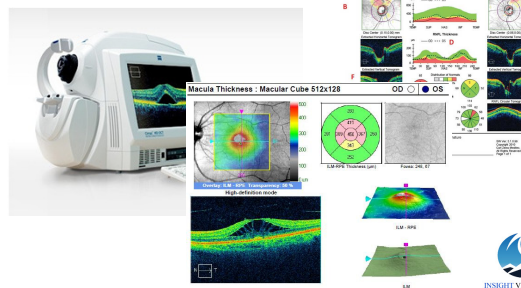
- GCC thickness correlates well with VF
- More reproducible and more accurate for detecting glaucoma than macula thickness with TD OCT
- Similar accuracy for detecting glaucoma as FD OCT RNFL thickness
- Best in early glaucoma



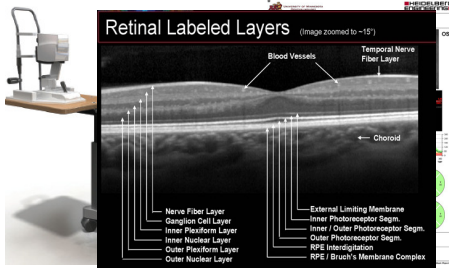
Optovue OCT



Zeiss "Cirrus" OCT



Heidelberg "Spectralis" OCT




Topcon OCT



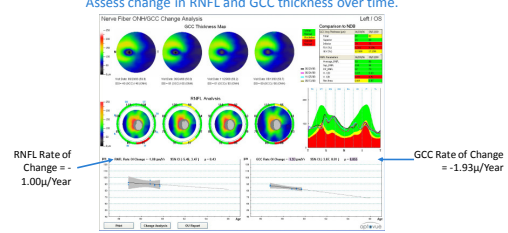
GCC Summary

- GCC thickness correlates well with VF
- More reproducible and more accurate for detecting glaucoma than macula thickness with TD OCT
- Similar accuracy for detecting glaucoma as FD OCT RNFL thickness
- Best in early glaucoma




The New Way: Trend Analysis

Assess change in RNFL and GCC thickness over time.

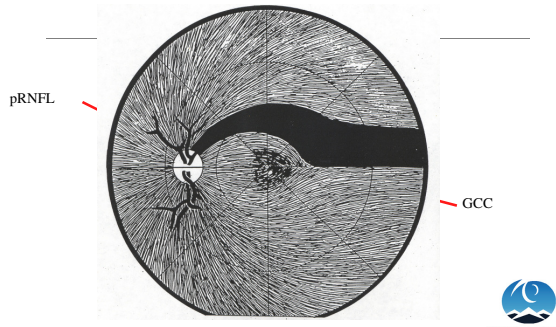


RNFL Rate of Change = -1.00µm/Year

GCC Rate of Change = -1.93µm/Year




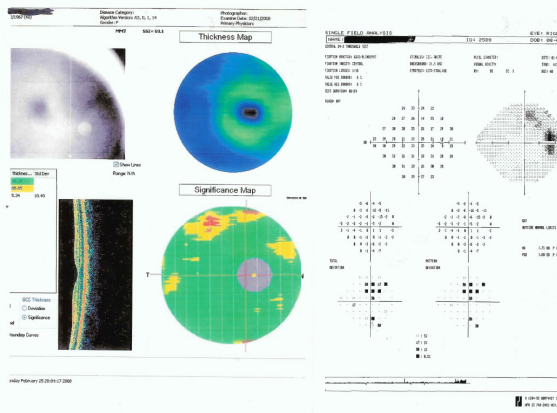
Overlay of the RNFL and GCC



pRNFL

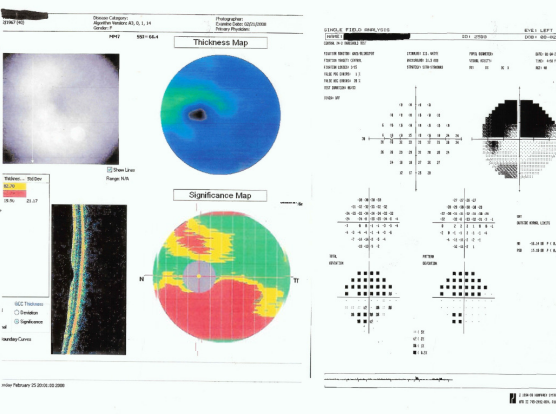
GCC





Thickness Map

Significance Map



Thickness Map

Significance Map

GCC Report: Normal

Patient Information

Exam Date and Quality


GCC Thickness Map

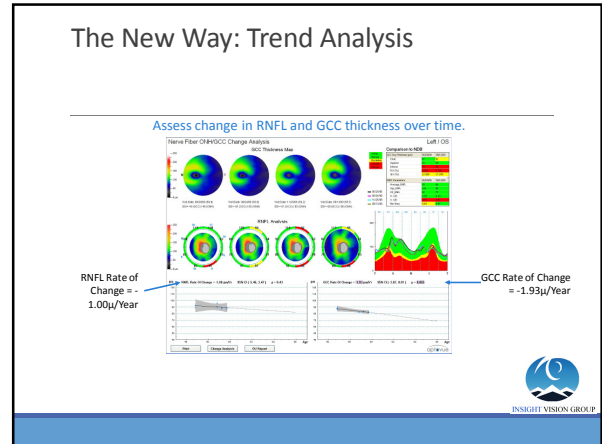
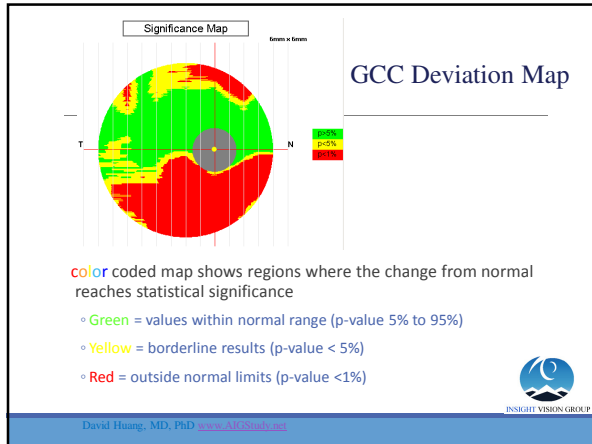
Deviation Map

Significance Map

Parameter Table

Fovea Mask





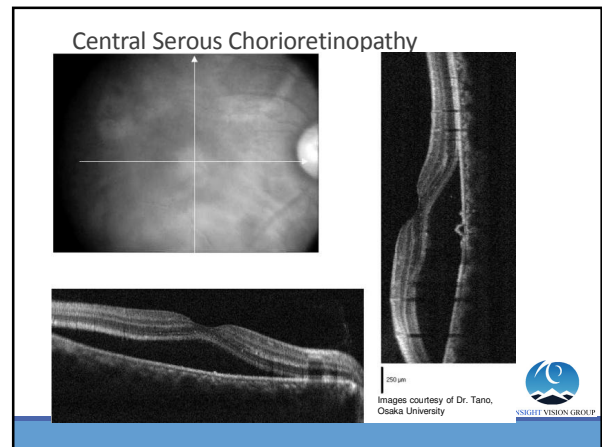
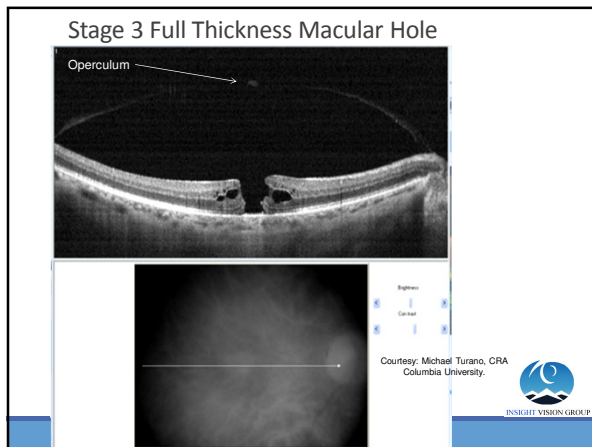
Billing and Coding: Glaucoma Year 1

Procedure	Code	Reimbursement
Initial Exam	92004	\$141.81
Visual Fields	92083	\$61.82
OCT – Posterior	92133	\$42.27
OCT – Anterior	92132	\$33.86
Pachymetry	76514	\$14.28
Gonioscopy	92020	\$25.87
1 Month Exam/IOP	99213	\$68.37
Fundus Photography	92250	\$66.40
4 Month Exam/IOP	99213	\$68.37
4 Month Exam/IOP	99213	\$68.37
Total Doctor Fees		\$591.42

Step 3:

Find a lot more retina disease in your practice.

Clinical and Practical Recommendations



Retinitis Pigmentosa

Images courtesy of Dr. Tano, Osaka University

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PED

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Optic Pit

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High Myope - VMT

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Billing and Coding: Diabetic Retinopathy

Procedure	Code	Reimbursement
Initial Exam	92004	\$141.81
Visual Fields	92083	\$61.82
OCT – Posterior	92133	\$42.27
Fundus Photography	92250	\$66.40
Follow-Up Exam (Frequency Determined by Findings @ Initial Exam)	99213	\$68.37
Follow-Up OCT – Posterior (Frequency Determined by Findings @ Initial Exam)	92133	\$42.27
Total Doctor Fees		\$422.94

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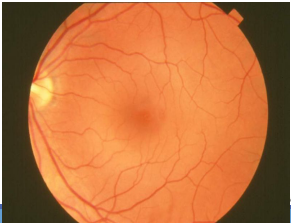
Case Study #1 (CA)

- 70 yo WF: Presents for cataract evaluation.
- CC: Glare & Haloes with night driving. Patient states that she has had long standing floaters with no recent flashes
- Pupils, EOMs & CVF all WNL
- SLE:
 - 1+ NS OD/2+-3+ NS OS
- Glare Testing: OD 20/60
OS 20/600

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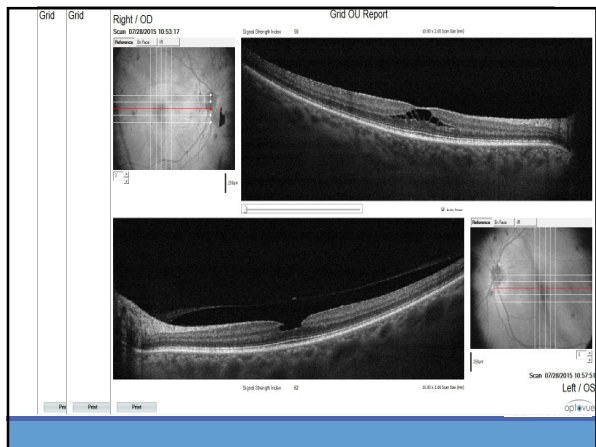
Case Study #1 (CA)

- DFE:
 - C/D 0.25 OD/0.2 OS
 - Mac/vessels/periphery clear




Case Study #1 (CA)

- Dx:
 - Uncomplicated cataract OU (OS>OD)
 - Good candidate for premium IOLs
- Are there any other tests you might like to run before referring for cataract surgery?
- We now run a Macular OCT on ALL cataract patients especially premium IOL patients!

Billing and Coding: AMD/Mac monitor


Procedure	Code	Reimbursement
Initial Exam	92004	\$141.81
Visual Fields	92083	\$61.82
OCT – Posterior	92133	\$42.27
Fundus Photography	92250	\$66.40
4 – 6 Month Exam Based on Initial Exam	99213	\$68.37
4 – 6 Month Follow-Up OCT Based on Initial Exam	92133	\$42.27
Total Doctor Fees		\$422.94



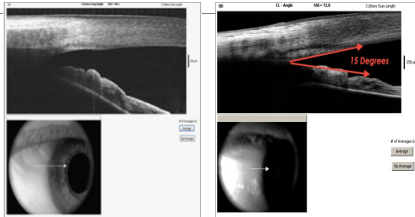
Step 4:

Maximize OCT value with anterior seg applications.


Clinical and Practical Recommendations

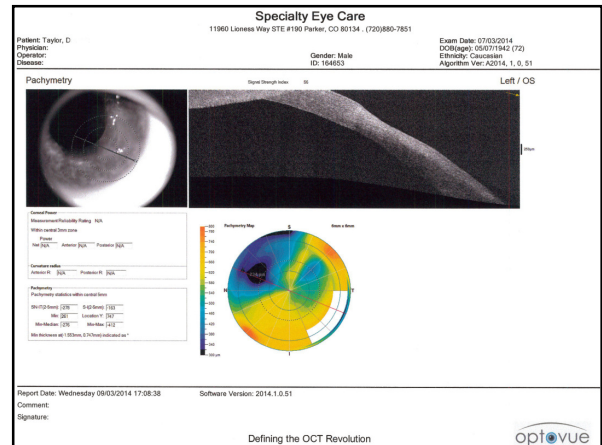
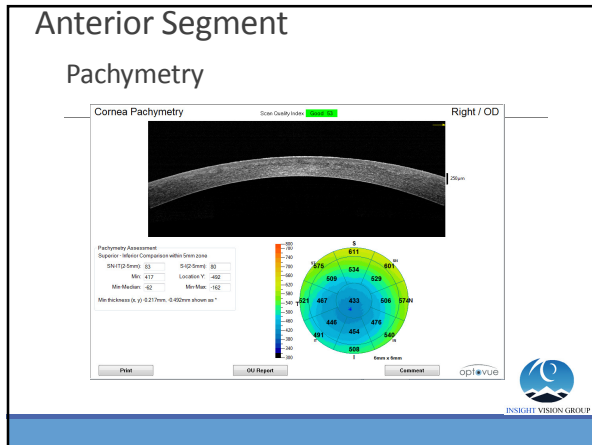
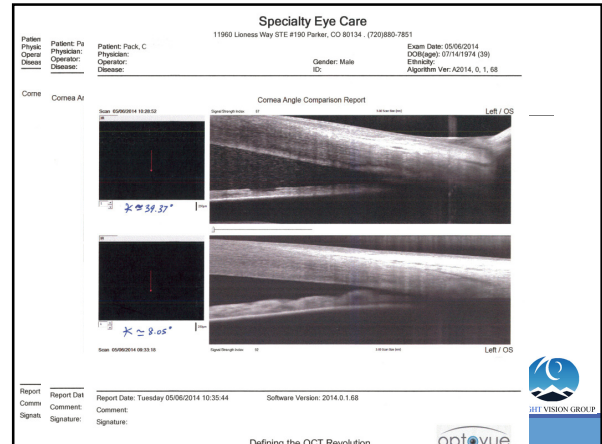
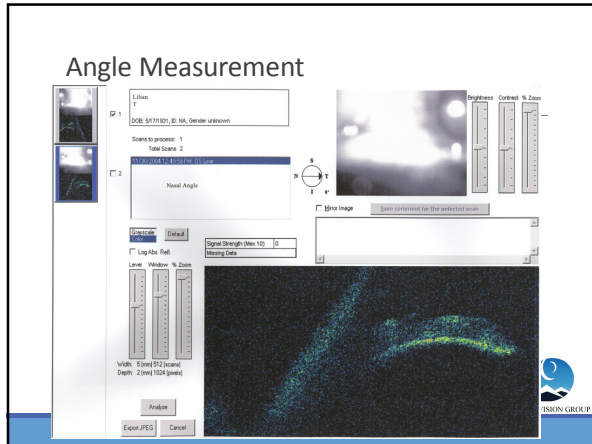


Angle Measurement



Normal Narrow





Tarsorrhaphy

- An effective procedure for non-healing epithelial defects*
 - The epithelial defects in 70 (90.9%) of the 77 eyes completely resolved.
 - Twenty-four (31.2%) of the 77 tarsorrhaphies were temporary and 53 (68.8%) were permanent.
- Conclusion:** Tarsorrhaphy is both safe and effective, with a 90.9% success rate and only minor complications.

* Cosar CB, Cohen EJ, Rapuano CJ, et al. "Tarsorrhaphy: Clinical experience from a cornea practice". *Cornea*. 2001;20(8):787-91

