OCT for Glaucoma

COPE Event #111227
Monday, April 25th, 2016

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Matossian Eye Associates
Disclosures:

- No relevant financial relationships to disclose
Traditional Modes of Glaucoma Diagnostic Testing

• Visual Field
  – Only functional test we have in glaucoma
  – Long test
  – Limitations include pt positioning, pt cooperation and accuracy
Traditional Modes of Glaucoma Diagnostic Testing

• Fundus Photography
  – Gold standard for documenting baseline nerve
  – Pt needs to be dilated
  – Limited by view: cataract, cornea, vitreous, pt fixation
Overview of OCT in Glaucoma: RNFL vs GCC

• RNFL = retinal nerve fiber layer
  – RNFL is the layer of retina feeding into the optic nerve
  – Changes in RNFL show up stream damage to optic nerve and hence preclinical changes with glaucoma
Overview of OCT in Glaucoma: RNFL vs GCC

• GCC = perifovial ganglion cell complex (or layer)
  – The ganglion cell complex (GCC) is defined as the three innermost retinal layers: the nerve fiber layer, the ganglion cell layer, and the inner plexiform layer.
  – Glaucoma preferentially damages these layers more than other retinal layers because these layers contain the axons, dendrites, and cell bodies for ganglion cells.
GCC, RNFL overlay

Right Eye

Not to scale
Overview of OCT in Glaucoma: RNFL vs GCC

• Studies have shown GCC to be thinner in eyes with advanced glaucoma

• Showed that GCC would be thinner in glaucoma eyes

• Compared eyes normal eyes, gl suspect eyes, early glaucoma eyes and advanced glaucoma eyes. Advanced glaucoma eyes had significantly lower GCC thickness than the other eyes. Used time domain optical coherence tomography (TD-OCT)

• Studies have shown more thin GCC in same hemifield as glaucomatous field loss.

• However RNFL has higher sensitivity and specificity for glaucomatous changes

• Shows that GCC thinning correlated with RNFL changes but RNFL is better for monitoring glaucoma
Types of OCT: SD-OCT vs TD-OCT

• TD-OCT = time domain OCT
  – older and less detail

• SD-OCT = spectral domain OCT
  – Has increased axial image resolution which allows for discrete segmentation and thickness measurements of GCC
OCT in Glaucoma Diagnosis

• Complements VF and Fundus Photography
  – Wedge RNFL defect correlates to arcuate VF defect
OCT in Glaucoma Diagnosis

• OCT correlates with various Disc findings on fundus photos
  – Shallow cupping
  – Deep cup
  – Thin optic rim
  – Notch on disc can be seen as wedge defect on OCT
Limitations of OCT

• Macular pathology will limit/affect GCC analysis
  – Macular degeneration
  – Myopic macular changes
  – Macular scar
  – Macular pucker
  – Macular edema
Limitations of OCT

• Visual defects far from central fixation will not be associated with any macular changes in GCC.
  
  – This is the case in many Early POAG pts
OCT in Glaucoma Diagnosis

- Optic Disc Cube
- GCC Analysis
- Progression Analysis
Case Presentations of OCT
Case 1: Optic Nerve Notch

- 73 yo M
- POAG
- s/p SLT, no meds
- Va: 20/20 OU
- IOP a bit up OD
- Inf notch of optic nerve
Case 1: Inferior Notch OD (OD 0.6/0.6; OS 0.5/0.5)
Case 1: VF of pt with early optic nerve notch
Case 1:
OCT
Inferior Optic Nerve Notch OD
Case 2: C:D Asymmetry with progression OD

- 81 yo F
- Mylenated NFL
- POAG - s/p SLT, no meds
- Target IOP mid teens
Case 2: C:D Asymmetry  (OD 0.6/0.6; OS 0.5/0.5)
Case 2: ? early SAS OD, wnl OS
Case 2: GCC wnl
Case 2: RNFL 2012
Case 2: RNFL 2014
Case 2: RNFL 2015
**Case 2: RNFL Guided Progression Analysis OD**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Baseline 1</th>
<th>Current</th>
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<tbody>
<tr>
<td>ID:</td>
<td></td>
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<tr>
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<tr>
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<tr>
<td>Doctor:</td>
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</table>

**Guided Progression Analysis (GPA™)**

<table>
<thead>
<tr>
<th>Baseline 1</th>
<th>Baseline 2</th>
<th>Exam 3</th>
<th>Exam 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>4000-8882</td>
<td>4000-8882</td>
<td>4000-8882</td>
<td>4000-8882</td>
</tr>
<tr>
<td>SS: 8/10</td>
<td>R2 SS: 7/10</td>
<td>R2 SS: 7/10</td>
<td>R2 SS: 7/10</td>
</tr>
<tr>
<td>Average Thickness: 70</td>
<td>Average Thickness: 71</td>
<td>Average Thickness: 66</td>
<td></td>
</tr>
</tbody>
</table>

**RNFL and ONH Summary Parameters**

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>Avg RNFL Thickness (um)</th>
<th>Inf Quant RNFL (um)</th>
<th>Sup Quant RNFL (um)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1</td>
<td>10/2/2012 10:09:39 AM</td>
<td>4000-8882</td>
<td>8/10</td>
<td>78</td>
<td>90</td>
<td>99</td>
<td>0.57</td>
<td>0.71</td>
<td>0.69</td>
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<tr>
<td>Baseline 2</td>
<td>11/4/2014 10:06:52 AM</td>
<td>4000-8882</td>
<td>R2</td>
<td>7/10</td>
<td>71</td>
<td>67</td>
<td>64</td>
<td>0.63</td>
<td>0.71</td>
</tr>
<tr>
<td>Current</td>
<td>12/15/2015 7:38:10 AM</td>
<td>4000-8882</td>
<td>R2</td>
<td>7/10</td>
<td>65</td>
<td>64</td>
<td>61</td>
<td>0.68</td>
<td>0.74</td>
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</tbody>
</table>

**Likely Loss:** Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area the values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

**Possible Loss:**

**Likely Increase:** Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.

**Possible Increase**
Case 2: RNFL Guided Progression Analysis OS Gatling

Guided Progression Analysis: (GPA™)

Baseline 1: 10/2/2012 10:09:55 AM
Baseline 2: 1/14/2014 10:10:07 AM
Baseline 3: 12/15/2015 7:39:34 AM
Baseline 4: 7/39:34 AM
Exam 1: 10/2/2012 10:09 AM
Exam 2: 7:39 AM
Exam 3: 10/2/2012 10:09 AM
Exam 4: 7:39 AM

- Average Thickness: 76 µm
- Average Thickness: 80 µm
- Average Thickness: 80 µm
- Average Thickness: 80 µm
- Average RNFL Thickness: 78 µm
- Superior RNFL Thickness: 85 µm
- Inferior RNFL Thickness: 75 µm
- Average Cup-to-Disc Ratio: 7/10
- Average Cup-to-Disc Ratio: 7/10
- Average Cup-to-Disc Ratio: 7/10
- Average Cup-to-Disc Ratio: 7/10

RNFL and ONH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL Thickness (µm)</th>
<th>Inf Quadrant RNFL (µm)</th>
<th>Sup Quadrant RNFL (µm)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1: 10/2/2012 10:09 AM</td>
<td>4000-8882</td>
<td>SS: 7/10</td>
<td>78</td>
<td>96</td>
<td>95</td>
<td>1.15</td>
<td>0.63</td>
<td>0.60</td>
<td>0.372</td>
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<tr>
<td>Baseline 2: 1/14/2014 10:10 AM</td>
<td>4000-8882</td>
<td>R2: 7/10</td>
<td>80</td>
<td>106</td>
<td>94</td>
<td>1.25</td>
<td>0.61</td>
<td>0.57</td>
<td>0.354</td>
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<tr>
<td>Baseline 3: 12/15/2015 7:39 AM</td>
<td>4000-8882</td>
<td>R2: 8/10</td>
<td>80</td>
<td>104</td>
<td>97</td>
<td>1.22</td>
<td>0.60</td>
<td>0.57</td>
<td>0.317</td>
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Registration Methods:
- R2: Registration based on translation and rotation of OCT fundus
- R1: Registration based only on translation of disc center

- Likely Loss
- Possible Loss
- Possible Increase

Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have increased.
Case 3: Pigmentary Glaucoma

- 66 yo M
- s/p SLT, on Lumgian and Combigan
- Head trauma OD from fall on 3/2016
- Target IOP mid teens
Case 3: large vertical cup
(OD 0.6/0.5; OS 0.7/0.8)
Case 3: wnl OD, sup defect OS
Stable OU
Case 3: RNFL 2013
Case 3: RNFL 2014
Case 3: RNFL 2016
Case 3: RNFL Guided Progression Analysis OD

Guided Progression Analysis: (GPA™) OD  OS

Baseline 1  Current
Exam Date: 5/24/2013  4/15/2016
Exam Time: 10:24 AM  11:04 AM
Signal Strength: 8/10  8/10

Guided Progression Analysis: (GPA™) OD  OS

RNFL and ONH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL Thickness (µm)</th>
<th>Inf/Sup Quadrant RNFL (µm)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
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<tbody>
<tr>
<td>Baseline 1 1</td>
<td>5/24/2013 10:24:26 AM</td>
<td>4000-8968</td>
<td>R1</td>
<td>8/10</td>
<td>67</td>
<td>81</td>
<td>89</td>
<td>0.55</td>
<td>0.61</td>
</tr>
<tr>
<td>Baseline 2 2</td>
<td>5/23/2014 9:13:53 AM</td>
<td>4000-8968</td>
<td>R2</td>
<td>8/10</td>
<td>66</td>
<td>83</td>
<td>89</td>
<td>0.55</td>
<td>0.64</td>
</tr>
<tr>
<td>Current 3</td>
<td>4/15/2016 11:04:08 AM</td>
<td>4000-8968</td>
<td>R2</td>
<td>8/10</td>
<td>66</td>
<td>83</td>
<td>84</td>
<td>0.56</td>
<td>0.63</td>
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</tbody>
</table>

Registration Methods:
R1 - Registration based only on translation of disc center
R2 - Registration based on translation and rotation of CCT fundus

Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Rim Area the values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.
Case 3: RNFL Guided Progression Analysis OS

Guided Progression Analysis: (GPA™)

Baseline 1: 5/24/2013 10:25 AM
- 4000-8968
- GS: 8/10
- Average Thickness: 62

- 4000-8968
- GS: 8/10
- Average Thickness: 69

Current: 4/15/2016 11:04:53 AM
- R2: 7/10
- Average Thickness: 59

Guided Progression Analysis: (GPA™)

RNFL and ONH Summary Parameters

<table>
<thead>
<tr>
<th>Baseline 1</th>
<th>Baseline 2</th>
<th>Current</th>
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</thead>
<tbody>
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<td>Serial Number</td>
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<td>4000-8968</td>
</tr>
<tr>
<td>Registration Method</td>
<td>SS</td>
<td>R2</td>
</tr>
<tr>
<td>Ave RNFL Thickness (µm)</td>
<td>8/10</td>
<td>7/10</td>
</tr>
<tr>
<td>Sup Quadrant RNFL (µm)</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Inf Quadrant RNFL (µm)</td>
<td>68</td>
<td>78</td>
</tr>
<tr>
<td>Rim Area (mm²)</td>
<td>0.58</td>
<td>0.58</td>
</tr>
<tr>
<td>Average Cup-to-Disc Ratio</td>
<td>0.67</td>
<td>0.68</td>
</tr>
<tr>
<td>Vertical Cup-to-Disc Ratio</td>
<td>0.66</td>
<td>0.71</td>
</tr>
<tr>
<td>Cup Volume (mm³)</td>
<td>0.213</td>
<td>0.214</td>
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</tbody>
</table>

RNFL/ONH Summary OS

- Likely Loss
- Possible Loss
- Possible Increase
Case 4: Advanced POAG OD >> OS

- 71 yo F
- s/p LASIK OD
Case 4: POAG OD >> OS (OD 0.9/0.9; OS 0.3/0.4)
Case 4: IAS OD, wnl OS Stable OU
Case 4: GCC shows generalized thin OD

- This is consistent with POAG OD >> OS
Case 4: RNFL 2013

### ONH and RNFL OU Analysis: Optic Disc Cube 200x200

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average RNFL Thickness</td>
<td>57 µm</td>
<td>84 µm</td>
</tr>
<tr>
<td>RNFL Symmetry</td>
<td>62%</td>
<td></td>
</tr>
<tr>
<td>Rim Area</td>
<td>0.57 mm²</td>
<td>1.23 mm²</td>
</tr>
<tr>
<td>Disc Area</td>
<td>1.25 mm²</td>
<td>1.41 mm²</td>
</tr>
<tr>
<td>Average C/D Ratio</td>
<td>0.75</td>
<td>0.36</td>
</tr>
<tr>
<td>Vertical C/D Ratio</td>
<td>0.80</td>
<td>0.32</td>
</tr>
<tr>
<td>Cup Volume</td>
<td>0.275 mm²</td>
<td>0.045 mm²</td>
</tr>
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</table>

#### RNFL Deviation Map

- **Disc Center:** (-0.18, -0.06) mm
- **Extracted Horizontal Tomogram**
- **Extracted Vertical Tomogram**
- **RNFL Circular Tomogram**

#### Neuro-retinal Rim Thickness

- **OD:** 800 µm
- **OS:** 500 µm

#### RNFL Quadrants

- **OD:** 54, 29, 51
- **OS:** 111, 56, 55, 54

#### RNFL Clock Hours

- **OD:** 35, 60, 101, 133
- **OS:** 35, 60, 101, 131
Case 4: RNFL 2014
Case 4: RNFL 2015

- Note how poor scan of OS shows a false increased thinning inferiorly.
Case 4: RNFL Guided Progression Analysis OD

Guided Progression Analysis: (GPA™)

- Baseline 1: 2/11/2013 11:31:12 AM
- Baseline 2: 6/10/2014 11:13:36 AM
- Current: 8/21/2015 11:33:40 AM

Average Thickness:
- Baseline 1: 47 μm
- Baseline 2: 55 μm
- Current: 49 μm

RNFL and CNH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL (μm)</th>
<th>In Superior RNFL (μm)</th>
<th>Sup Quant RNFL (μm)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
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</thead>
<tbody>
<tr>
<td>8/2/2013 11:33:40 AM</td>
<td>4000-8968</td>
<td>SS: 6/10</td>
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<td>55</td>
<td>66</td>
<td>65</td>
<td>0.52</td>
<td>0.76</td>
<td>0.82</td>
<td>0.280</td>
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RNFL and CNH Summary Parameters

- Registration Methods:
  - R2: Registration based on translation and rotation of OCT fundus
  - R1: Registration based only on translation of disc center

- Likely Loss: Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area the values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

- Possible Loss: Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.
**Case 4: RNFL Guided Progression Analysis OS**

**Guided Progression Analysis (GPA™)**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Baseline 1</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID:</td>
<td>2/11/2013</td>
<td>8/21/2015</td>
</tr>
<tr>
<td>Time:</td>
<td>11:52 AM</td>
<td>11:36 AM</td>
</tr>
<tr>
<td>Exam 2</td>
<td>8/18/2014</td>
<td>11:14:34 AM</td>
</tr>
<tr>
<td>Serial Number:</td>
<td>4000-8968</td>
<td></td>
</tr>
<tr>
<td>Signal Strength:</td>
<td>8/10</td>
<td></td>
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**Guided Progression Analysis (GPA™)**

<table>
<thead>
<tr>
<th>OD</th>
<th>OS</th>
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**RNFL and ONH Summary Parameters**

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL Thickness (µm)</th>
<th>Sup Nearly RNFL (µm)</th>
<th>Cup Area (mm²)</th>
<th>Vt. Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
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</thead>
<tbody>
<tr>
<td>Baseline 1</td>
<td>2/11/2013</td>
<td>4000-8968</td>
<td>8/10</td>
<td>64</td>
<td>100</td>
<td>111</td>
<td>1.23</td>
<td>0.30</td>
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<tr>
<td>Baseline 2</td>
<td>6/16/2014</td>
<td>4000-8968</td>
<td>R1</td>
<td>9/10</td>
<td>86</td>
<td>102</td>
<td>1.20</td>
<td>0.36</td>
</tr>
<tr>
<td>Current</td>
<td>8/21/2015</td>
<td>4000-8968</td>
<td>R2</td>
<td>7/10</td>
<td>75</td>
<td>88</td>
<td>1.15</td>
<td>0.41</td>
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</table>

**Registration Methods**

- **R2**: Registration based on translation and rotation of OCT fundus
- **R1**: Registration based only on translation of disc center

**Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, and Cup Volume values have increased.**

**Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, and Cup Volume values have decreased.**
Case 5: Thin Sup and Inf Rim

- 78 yo F
- Max medical treatment
- s/p SLT
- Scheduled for Micropulse Laser
Case 5: Sup and Inf Thin (OD 0.85; OS 0.7)
Case 5: SAS and IAS OD, early SASOS Prog OU

Single Field Analysis - GPA
Eye: Right
Central 24-2 Threshold Test
Fixation Monitor: Gaze/Blind Spot
Background: 31.5 ADB
Strategy: SITA-Standard
Pupil Diameter: 3.5 mm
Date: 04-25-2014
Visual Acuity: 20/25
Time: 9:18 AM
Fixation Losses: 2/20
RX: -0.76 DS +1.26 DC x 20
False NEG Errors: 2%
Test Duration: 07:51
False POS Errors: 2%
GHT: Outside Normal Limits
VHI, 64%
MD, -14.14 dB P < 0.5%
PSD, 11.36 dB P < 0.5%
Possible Progression:
See GPA printout for complete analysis.
Baseline Exam:
09-12-2009
06-17-2010
Previous Follow-up Exams:
09-14-2012
09-09-2013
Total Deviation
Pattern Deviation

Eye: Left
Central 24-2 Threshold Test
Fixation Monitor: Gaze/Blind Spot
Background: 31.5 ADB
Strategy: SITA-Standard
Pupil Diameter: 4.0 mm
Date: 04-25-2014
Visual Acuity: 20/30
Time: 9:23 AM
Fixation Losses: 1/15
RX: -1.00 DS DC X
False NEG Errors: 11%
Test Duration: 05:55
False POS Errors: 3%
GHT: Borderline
VF, 93%
MD, -3.90 dB P < 1%
PSD, 2.84 dB P < 2%
Likely Progression:
See GPA printout for complete analysis.
Baseline Exams:
11-29-2007
03-12-2009
Previous Follow-up Exams:
09-14-2012
09-09-2013
Total Deviation
Pattern Deviation

MATOSSIAN EYE ASSO
501 HYDE PARK
DOYLESTOWN, PA 18901
TECH INITIALS #2
215 230 9200

MATOSSIAN EYE ASSO
501 HYDE PARK
DOYLESTOWN, PA 18901
TECH INITIALS #2
215 230 9200
**Case 5:**

- Sup and Inf thin OD c/w SAS and IAS on VF
- Inf thin OS c/w early SAS on VF

### ONH and RNFL OU Analysis: Optic Disc Cube 200x200

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average RNFL Thickness</td>
<td>60 µm</td>
<td>63 µm</td>
</tr>
<tr>
<td>RNFL Symmetry</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Rim Area</td>
<td>0.52 mm²</td>
<td>1.11 mm²</td>
</tr>
<tr>
<td>Disc Area</td>
<td>1.72 mm²</td>
<td>1.95 mm²</td>
</tr>
<tr>
<td>Average C/D Ratio</td>
<td>0.63</td>
<td>0.64</td>
</tr>
<tr>
<td>Vertical C/D Ratio</td>
<td>0.91</td>
<td>0.66</td>
</tr>
<tr>
<td>Cup Volume</td>
<td>0.470 mm³</td>
<td>0.197 mm³</td>
</tr>
</tbody>
</table>

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Extracted Horizontal Tomogram

Extracted Vertical Tomogram

RNFL Circular Tomogram

RNFL Quadrants

RNFL Clock Hours

Disc Center(-0.12,0.03) mm
Case 5: GCC
Case 6: NTG

- 66 yo F
- VF stable OD, prog OS
- OCT increased inf thin OS c/w disc photos
- Target IOP 10 range
- Intolerant of Alphagan and B-blocker (asthma)
- Scheduled SLT OS
Case 6: Thin inf/temp tim OS (OD 0.6/0.6; OS 0.6/0.5)
Case 6: wnl OD, Sup defect OS Prog OS
Case 6: RNFL 2013
Case 6: RNFL 2014
Case 6: RNFL Dec 2014
Case 6: RNFL 2015
Case 6: RNFL Guided Progression Analysis OD Stable

Guided Progression Analysis: (GPA™)

Baseline Analysis:
- **OD**: Baseline 1 (1/2/2013) and Current (12/20/2016)
- **OS**: Baseline 1 (1/2/2013) and Current (12/20/2016)

**RNFL and ONH Summary Parameters**

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL Thickness (μm)</th>
<th>Inf Quadrant RNFL (μm)</th>
<th>Sup Quadrant RNFL (μm)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1:</td>
<td></td>
<td></td>
<td>6/10</td>
<td>51</td>
<td>59</td>
<td>86</td>
<td>1.00</td>
<td>0.57</td>
<td>0.53</td>
<td>0.118</td>
</tr>
<tr>
<td>Baseline 2:</td>
<td>1/8/2014</td>
<td>R1</td>
<td>6/10</td>
<td>52</td>
<td>58</td>
<td>94</td>
<td>0.99</td>
<td>0.58</td>
<td>0.60</td>
<td>0.128</td>
</tr>
<tr>
<td>Current:</td>
<td>12/20/2016</td>
<td>R1</td>
<td>6/10</td>
<td>71</td>
<td>70</td>
<td>81</td>
<td>1.02</td>
<td>0.59</td>
<td>0.67</td>
<td>0.138</td>
</tr>
</tbody>
</table>

**Average RNFL Thickness**
- **OD**: Baseline: 81 μm, Current: 82 μm
- **OS**: Baseline: 71 μm, Current: 75 μm

RNFL Thickness Profiles

Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.
Case 6: RNFL Guided Progression Analysis OS Thinning in RNFL

Guided Progression Analysis: (GPA™)

Baseline 1: 1/2/2013 12:09:19 PM
Baseline 2: 1/18/2014 1:30:51 PM

Exam 3: 12/30/2014 11:30:22 AM
Exam 4: 12/9/2015 11:25:16 AM

Average RNFL Thickness Baseline 1: 76 μm
Average RNFL Thickness Baseline 2: 74 μm
Average RNFL Thickness Exam 3: 71 μm
Average RNFL Thickness Exam 4: 70 μm

Rate of change: Baseline 1 - Baseline 2: ±0.19 μm/Year
Rate of change: Exam 3 - Exam 4: ±0.07 μm/Year

RNFL and ONH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Ave RNFL Thickness</th>
<th>Inf Quadrant RNFL</th>
<th>Sup Quadrant RNFL</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1:</td>
<td>12/9/2013</td>
<td>4000-8882</td>
<td>8/10</td>
<td>76</td>
<td>70</td>
<td>107</td>
<td>0.89</td>
<td>0.63</td>
<td>0.61</td>
<td>0.162</td>
</tr>
<tr>
<td>Baseline 2:</td>
<td>1/8/2014</td>
<td>4000-8882</td>
<td>8/10</td>
<td>74</td>
<td>69</td>
<td>101</td>
<td>0.88</td>
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<td>0.62</td>
<td>0.173</td>
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<tr>
<td>Baseline 3:</td>
<td>12/30/2014</td>
<td>4000-8882</td>
<td>7/10</td>
<td>71</td>
<td>66</td>
<td>102</td>
<td>0.93</td>
<td>0.65</td>
<td>0.60</td>
<td>0.192</td>
</tr>
<tr>
<td>Baseline 4:</td>
<td>12/9/2015</td>
<td>4000-8882</td>
<td>5/10</td>
<td>70</td>
<td>61</td>
<td>99</td>
<td>0.94</td>
<td>0.64</td>
<td>0.65</td>
<td>0.181</td>
</tr>
</tbody>
</table>

Registration Methods:
- R2 - Registration based on translation and rotation of OCT fundus
- R1 - Registration based only on translation of disc center

Comparison to baseline, statistically significant loss of tissue detected:
- For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

Comparison to baseline, statistically significant increase detected:
- For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.
Case 7: Mild POAG

- 87 yo F
- Travatan Z
Case 7: OD 0.55/0.5; OS 0.3
Case 7: wnl OU

Single Field Analysis - GPA

Central 24-2 Threshold Test

Fixation Monitor: Gaze/Blind Spot
Fixation Target: Central
Fixation Losses: 0/15
False POS Errors: 4%
False NEG Errors: 5%
Test Duration: 05:14

Fovea: 33 dB

Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA* - Standard
Pupil Diameter: 3.0 mm
Date: 04-12-2016
Time: 9:27 AM
RX: +2.25 DS DC X
Age: 67

GHT: Outside normal limits
VFI: 97%
MD: -1.25 dB
PSD: 2.29 dB P < 5%

No Progression Detected
See GPA printout for complete analysis

Baseline Exams:
02-12-2007 12-18-2008
Previous Follow-up Exams:
06-18-2014 04-22-2015

Possible Progression
See GPA printout for complete analysis

Baseline Exams:
02-12-2007 12-18-2008
Previous Follow-up Exams:
06-18-2014 04-22-2015

↓ P < 5% Deterioration
△ P < 5% (2 consecutive)
△ P < 5% (3+ consecutive)
X Out of Range

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Case 7: RNFL 2012
Case 7:
RNFL
2014
Case 7: RNFL 2015
Case 7: RNFL Guided Progression Analysis OD

Guided Progression Analysis: (GPA™) OD  ●  OS

<table>
<thead>
<tr>
<th>Name</th>
<th>Baseline 1</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>10/25/2012</td>
<td>10/28/2016</td>
</tr>
<tr>
<td>DOB</td>
<td>12:15 PM</td>
<td>12:37 PM</td>
</tr>
<tr>
<td>Gender</td>
<td>4000-8882</td>
<td>4000-8882</td>
</tr>
<tr>
<td>Signal Strength</td>
<td>9/10</td>
<td>9/10</td>
</tr>
</tbody>
</table>

Guided Progression Analysis: (GPA™) OD  ●  OS

RNFL and ONH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL Thickness (µm)</th>
<th>Inf Quadrant RNFL (µm)</th>
<th>Sup Quadrant RNFL (µm)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1:</td>
<td>10/25/2012</td>
<td>4000-8882</td>
<td>R1</td>
<td>70</td>
<td>91</td>
<td>73</td>
<td>0.91</td>
<td>0.66</td>
<td>0.73</td>
<td>0.228</td>
</tr>
<tr>
<td>Baseline 2:</td>
<td>2/18/2014</td>
<td>4000-8882</td>
<td>R2</td>
<td>65</td>
<td>83</td>
<td>70</td>
<td>0.96</td>
<td>0.63</td>
<td>0.69</td>
<td>0.184</td>
</tr>
<tr>
<td>Current:</td>
<td>10/28/2015</td>
<td>4000-8882</td>
<td></td>
<td>66</td>
<td>85</td>
<td>71</td>
<td>0.99</td>
<td>0.62</td>
<td>0.67</td>
<td>0.176</td>
</tr>
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</table>

Registration Methods
R1 - Registration based on translation and rotation of OCT fundus
R2 - Registration based on translation of disc center

Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area the values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.
Case 7: RNFL Guided Progression Analysis OS

Guided Progression Analysis: (GPA™)

Baseline 1
10/25/2012 12:16:36 PM
4000-8882
SS: 9/10
Average Thickness: 78

Baseline 2
2/18/2014 12:23:19 AM
4000-8882
R1 SS: 6/10
Average Thickness: 63

Exam 3
10/25/2015 12:38:50 PM
4000-8882
R1 SS: 6/10
Average Thickness: 68

Exam 4
10/28/2015 12:58:15 PM
4000-8882
R1 SS: 5/10
Average Thickness: 68

Average RNFL Thickness
Average Cup-to-Disc Ratio

RNFL and DNH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>RNFL Thickness Profile Progression</th>
<th>RNFL Thickness Profiles Progression</th>
<th>RNFL Thickness Profiles Progression</th>
<th>RNFL Thickness Profiles Progression</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/25/2012</td>
<td>12:16:36 PM</td>
<td>SS 8/10</td>
<td>Avg RNFL Thickness (μm)</td>
<td>nearby values increased</td>
</tr>
<tr>
<td>4000-8882</td>
<td>79</td>
<td>98</td>
<td>94</td>
<td>1.21</td>
</tr>
<tr>
<td>4000-8882</td>
<td>83</td>
<td>100</td>
<td>95</td>
<td>1.21</td>
</tr>
<tr>
<td>10/28/2015</td>
<td>12:38:50 PM</td>
<td>R1 5/10</td>
<td>Sup Quadrant RNFL (μm)</td>
<td>1.37</td>
</tr>
<tr>
<td>4000-8882</td>
<td>88</td>
<td>96</td>
<td>98</td>
<td>0.57</td>
</tr>
</tbody>
</table>

Registration Methods
K2 - Registration based on translation and rotation of OCT fundus
R1 - Registration based only on translation of disc center

Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have increased.

Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.
Case 7: GCC

- Inf thinning on GCC c/w increased cupping OD
Case 8: Optic Neuropathy

OS

- 35 yo M
- Pituitary macroadenoma → s/p surgical resection with decompression of optic chiasm
Case 8:
Case 8: VF
Case 8: RNFL

- Inf thinning OS c/w optic neuropathy
Case 9: Optic Disc Drusen

- 86 yo M
- Multiple optic disc drusen OU
Case 9: Optic Disc Drusen

3/6 OD[R]

5/6 OS[L]
Case 9: RNFL

- General thinning in absence of cup
- Elevation instead of pit on cross section
Case 10: Glaucoma Suspect

- 61 yo F
- OHT and Family Hx (father and sister)
Case 10: Glaucoma Suspect (0.1 OU, vasucarc loop OS)
Case 10: RNFL
Case 10: RNFL Guided Progression Analysis OD

Guided Progression Analysis (GPA™) OD 

Baseline 1: 6/18/2013 2:40 PM, 4000-8882, SS: 7/10, Average Thickness: 32 μm
Baseline 2: 9/3/2014 12:12 PM, 4000-8882, SS: 7/10, Average Thickness: 59 μm
Baseline 3: 4/19/2016 9:10 AM, R1: SS: 9/10, Average Thickness: 39 μm

Exam 1: 6/18/2013 2:40 PM, 4000-8882, SS: 7/10
Exam 2: 9/3/2014 12:12 PM, 4000-8882, SS: 7/10
Exam 3: 4/19/2016 9:10 AM, R1: SS: 9/10
Exam 4: 4/19/2016 9:10 AM, R1: SS: 9/10

Average RNFL Thickness vs. Age (Years)

Guided Progression Analysis (GPA™) OD

RNFL and ONH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL Thickness (μm)</th>
<th>Inf Quadrant RNFL (μm)</th>
<th>Sup Quadrant RNFL (μm)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1: 1</td>
<td>5/18/2013 2:40:43 PM, 4000-8882</td>
<td>SS</td>
<td>7/10</td>
<td>92</td>
<td>119</td>
<td>101</td>
<td>1.70</td>
<td>0.40</td>
<td>0.38</td>
<td>0.008</td>
</tr>
<tr>
<td>Baseline 2: 2</td>
<td>9/3/2014 12:12:24 PM, 4000-8882</td>
<td>R2</td>
<td>6/10</td>
<td>89</td>
<td>111</td>
<td>105</td>
<td>1.61</td>
<td>0.29</td>
<td>0.16</td>
<td>0.001</td>
</tr>
<tr>
<td>Current: 3</td>
<td>4/19/2016 8:10:32 AM, 4000-8882</td>
<td>R1</td>
<td>9/10</td>
<td>89</td>
<td>116</td>
<td>104</td>
<td>1.60</td>
<td>0.32</td>
<td>0.30</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Registration Methods:
R2 - Registration based on translation and rotation of OCT fundus
R1 - Registration based only on translation of disc center

Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area the values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.
Case 10: RNFL Guided Progression Analysis OS

Guided Progression Analysis: (GPA™)

Baseline 1: 6/19/2013 2:41:52 PM
4000-8882 69.10
Average Thickness: 78

Baseline 2: 9/3/2013 12:12:58 PM
4000-8882 69.10
Average Thickness: 86

Exam 3: 4/19/2016 9:11:16 AM
4000-8882 69.10
Average Thickness: 78

Exam 4: 9/11/16 AM
4000-8882 69.10
Average Thickness: 81

RNFL and ONH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Data/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL Thickness (μm)</th>
<th>Inf Quadrant RNFL (μm)</th>
<th>Sup Quadrant RNFL (μm)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline1:</td>
<td>6/18/2013 2:41:52 PM</td>
<td>4000-8882</td>
<td>10/10</td>
<td>78</td>
<td>86</td>
<td>97</td>
<td>1.64</td>
<td>0.23</td>
<td>0.18</td>
<td>0.000</td>
</tr>
<tr>
<td>Baseline2:</td>
<td>9/3/2013 12:12:58 PM</td>
<td>4000-8882</td>
<td>R1</td>
<td>9/10</td>
<td>86</td>
<td>104</td>
<td>100</td>
<td>1.62</td>
<td>0.13</td>
<td>0.12</td>
</tr>
<tr>
<td>Current:</td>
<td>4/19/2016 9:11:16 AM</td>
<td>4000-8882</td>
<td>R1</td>
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<td>81</td>
<td>97</td>
<td>93</td>
<td>1.72</td>
<td>0.13</td>
<td>0.14</td>
</tr>
</tbody>
</table>

RNFL Thickness Profiles

RNFL/ONH Summary OS

- Likely Loss
- Possible Loss
- Possible Increase
Case 10: GCC
Case 11: Glaucoma Suspect C:D Asymmetry

- 54 yo M
- OHT and C:D asymmetry
- No Fam hx
- s/p SLT
Case 11: Gl Suspect
(OD 0.4; OS 0.5)
Case 11: VF

**Central 24-2 Threshold Test**

- **Fixation Monitor:** OFF
- **Fixation Target:** Central
- **Background:** 31.5 ASB
- **Visual Acuity:**
- **Pupil Diameter:**
- **Stimulus:** III, White
- **Strategy:** SITA = Standard
- **Time:** 12:41 PM
- **RX:** +2.00 DS DC X
- **Age:** 63
- **Date:** 05-27-2015
- **False POS Errors:** 16 %
- **False NEG Errors:** 5 %
- **Test Duration:** 05:29
- **Fixation Losses:** 6/14 xx
- **Fixation Gains:** 0/0
- **FOVEA:** OFF

**Total Deviation**

- 28 29 30 31 32 33 34 35
- 27 26 25 24 23 22 21 20
- 19 18 17 16 15 14 13 12
- 11 10 9 8 7 6 5 4
- 3 2 1

**Pattern Deviation**

- 28 29 30 31 32 33 34 35
- 27 26 25 24 23 22 21 20
- 19 18 17 16 15 14 13 12
- 11 10 9 8 7 6 5 4
- 3 2 1

*** Excessive High False Positives ***

GHT
Abnormally High Sensitivity
VFI 98%
MD +0.57 dB
PSD 2.68 dB P ≤ 2%

*** Low Test Reliability ***

GHT
Outside normal limits
VFI 99%
MD -0.42 dB
PSD 2.00 dB P ≤ 5%

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Case 11: RNFL

**ONH and RNFL OU Analysis: Optic Disc Cube 200x200**

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average RNFL Thickness</td>
<td>103 µm</td>
<td>96 µm</td>
</tr>
<tr>
<td>RNFL Symmetry</td>
<td>82%</td>
<td></td>
</tr>
<tr>
<td>Rim Area</td>
<td>1.28 mm²</td>
<td>0.99 mm²</td>
</tr>
<tr>
<td>Disc Area</td>
<td>1.56 mm²</td>
<td>1.66 mm²</td>
</tr>
<tr>
<td>Average C/D Ratio</td>
<td>0.43</td>
<td>0.63</td>
</tr>
<tr>
<td>Vertical C/D Ratio</td>
<td>0.33</td>
<td>0.63</td>
</tr>
<tr>
<td>Cup Volume</td>
<td>0.108 mm³</td>
<td>0.238 mm³</td>
</tr>
</tbody>
</table>

**RNFL Deviation Map**

**RNFL Thickness**

**RNFL Circular Tomogram**

**RNFL Quadrants**

**RNFL Clock Hours**

**Extracted Vertical Tomogram**

**Extracted Horizontal Tomogram**

**Disc Center (0.12,0.00) mm**

**Disc Center (0.03,0.09) mm**
Case 11: RNFL Guided Progression Analysis OD

Guided Progression Analysis: (GPA™) OD ♂ OS

Baseline 1 | Current
---|---
Exam Date: 12/11/2012 | 4/19/2016
Exam Time: 3:07 PM | 10:03 AM
Serial Number: 4000-8682 | 4000-8682
Signal Strength: 10/10 | 8/10

Guided Progression Analysis: (GPA™) OD ♂ OS

Baseline 2 | Exam 3 | Baseline 2 | Exam 4
---|---|---|---
Exam Date: 10/1/2014 | 4/19/2015 | 10:03:16 AM | 10:08:47 AM
Exam Time: 2:13:16 PM | 10:03:16 AM | 4000-8682 | 4000-8682
Serial Number: 4000-8682 | 4000-8682
Signal Strength: 9/10 | 9/10

RNFL and ONH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL Thickness (μm)</th>
<th>Inf Quadrant RNFL (μm)</th>
<th>Sup Quadrant RNFL (μm)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline1</td>
<td>12/1/2012 3:07:12 PM</td>
<td>4000-8682</td>
<td>R1</td>
<td>10/10</td>
<td>107</td>
<td>149</td>
<td>125</td>
<td>1.34</td>
<td>0.47</td>
<td>0.38</td>
</tr>
<tr>
<td>Baseline2</td>
<td>10/1/2014 2:54:16 PM</td>
<td>4000-8682</td>
<td>R1</td>
<td>8/10</td>
<td>97</td>
<td>136</td>
<td>102</td>
<td>1.35</td>
<td>0.48</td>
<td>0.45</td>
</tr>
<tr>
<td>Current</td>
<td>4/19/2016 10:09:47 AM</td>
<td>4000-8682</td>
<td>R1</td>
<td>8/10</td>
<td>103</td>
<td>146</td>
<td>104</td>
<td>1.28</td>
<td>0.43</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Registration Methods:
R1 = Registration based on translation of disc center
R2 = Registration based on translation and rotation of OCT fundus

Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.
Case 11: RNFL Guided Progression Analysis OS

Guided Progression Analysis: (GPA™)

Baseline 1: 12/11/2012 3:08:27 PM
Serial Number: 4000-8882
Average Thickness: 81
R1: 55: 8/10

Baseline 2: 10/1/2014 2:15:55 PM
Serial Number: 4000-8882
Average Thickness: 80
R1: 55: 8/10

Guided Progression Analysis: (GPA™)

Exam 3: 4/19/2016 10:10:40 AM
Exam 4: 4/19/2016 10:10:40 AM
Serial Number: 4000-8882
Average Thickness: 86
R1: 9/10

Guided Progression Analysis: (GPA™)

RNFL and ONH Summary Parameters

<table>
<thead>
<tr>
<th>Exam Date/Time</th>
<th>Serial Number</th>
<th>Registration Method</th>
<th>SS</th>
<th>Avg RNFL Thickness (µm)</th>
<th>Inf Quadrant RNFL (µm)</th>
<th>Sup Quadrant RNFL (µm)</th>
<th>Rim Area (mm²)</th>
<th>Average Cup-to-Disc Ratio</th>
<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1: 1</td>
<td>12/11/2012</td>
<td>4000-8882</td>
<td>SS</td>
<td>9/10</td>
<td>91</td>
<td>133</td>
<td>103</td>
<td>1.20</td>
<td>0.59</td>
<td>0.56</td>
</tr>
<tr>
<td>Baseline 2: 2</td>
<td>10/1/2014</td>
<td>4000-8882</td>
<td>R1</td>
<td>8/10</td>
<td>85</td>
<td>110</td>
<td>106</td>
<td>1.19</td>
<td>0.59</td>
<td>0.57</td>
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<tr>
<td>Current: 3</td>
<td>4/19/2016</td>
<td>4000-8882</td>
<td>R1</td>
<td>9/10</td>
<td>88</td>
<td>111</td>
<td>107</td>
<td>0.99</td>
<td>0.63</td>
<td>0.63</td>
</tr>
</tbody>
</table>

Registration Methods:
R2 - Registration based on translation and rotation of OCT Fundus
R1 - Registration based only on translation of disc center

- **Likely Loss**
  - Compared to baseline, statistically significant loss of tissue detected.
  - For Average RNFL, Superior RNFL, and Inferior RNFL, Rim Area values have decreased.
  - For Cup-to-Disc Ratios and Cup Volume values have increased.

- **Possible Loss**
  - Compared to baseline, statistically significant increase detected.
  - For Average RNFL, Superior RNFL, and Inferior RNFL, Rim Area values have increased.
  - For Cup-to-Disc Ratios and Cup Volume values have decreased.
Case 11: GCC
Case 12: POAG OS > OD

- 83 yo F
- Well controlled POAG
- Combigan and s/p SLT
Case 12: OD 0.4/0.4; OS 0.7/0.7
Case 12: IAS OS c/w cupping
Case 12: RNFL

- Superior thinning OS c/w IAS on VF and cupping
Case 12: RNFL Guided Progression Analysis OD

Guided Progression Analysis (GPA™) OD  OS
Baseline 1: 5/30/2012 11:05:38 AM 3/12/2016 8:42 AM
Average Thickness: 77
Average Cup-to-Disc Ratio: 0.10 ± 0.03 Year
Rate of change: 0.10 ± 5.36 μm/Year

Baseline 2: 2/24/2013 11:25:53 AM 4/00-6988
Average Thickness: 82
Average Cup-to-Disc Ratio: 0.10 ± 0.03 Year
Rate of change: 0.10 ± 5.36 μm/Year

Exam 3: 3/16/2014 9:47:08 AM 4:00-6988
Average Thickness: 77
Rate of change: 0.32 ± 8.66 μm/Year

Exam 4: 3/12/2015 8:42:25 AM 4:00-6988
Average Thickness: 78
Rate of change: 0.32 ± 8.66 μm/Year

RNFL and ONH Summary Parameters

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<tr>
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<th>Avg RNFL Thickness (μm)</th>
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<th>Sup Quadrant RNFL (μm)</th>
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<th>Vertical Cup-to-Disc Ratio</th>
<th>Cup Volume (mm³)</th>
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</thead>
<tbody>
<tr>
<td>Baseline 1: 5/30/2012 11:00:38 AM</td>
<td>4000-6988</td>
<td>R2</td>
<td>9/10</td>
<td>77</td>
<td>95</td>
<td>94</td>
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<tr>
<td>Baseline 2: 7/24/2013 11:25:53 AM</td>
<td>4000-6988</td>
<td>R2</td>
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<td>82</td>
<td>107</td>
<td>101</td>
<td>0.83</td>
<td>0.64</td>
<td>0.63</td>
</tr>
<tr>
<td>3/19/2014 9:47:08 AM</td>
<td>4000-6988</td>
<td>R1</td>
<td>8/10</td>
<td>77</td>
<td>102</td>
<td>95</td>
<td>0.81</td>
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<td>0.64</td>
</tr>
<tr>
<td>Current: 3/12/2015 8:42:25 AM</td>
<td>4000-6988</td>
<td>R1</td>
<td>8/10</td>
<td>76</td>
<td>101</td>
<td>96</td>
<td>0.86</td>
<td>0.64</td>
<td>0.62</td>
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Registration Methods:
R2 = Registration based on translation and rotation of OCT fundus
R1 = Registration based only on translation of disc center

Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area the values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.
Case 12: RNFL Guided Progression Analysis OS

Guided Progression Analysis: (GPA™)

### Baseline 1
- Exam Date: 5/30/2012
- Time: 11:01 AM
- Serial Number: 4000-8968
- Signal Strength: 8/10
- Average Thickness: 77 ± 3.04

### Baseline 2
- Exam Date: 7/24/2013
- Time: 11:26 AM
- Serial Number: 4000-8968
- Signal Strength: 8/10
- Average Thickness: 67 ± 1.56

### Exam 3
- Exam Date: 3/19/2014
- Time: 6:48 AM
- Serial Number: 4000-8968
- R2: 8/10
- Average Thickness: 67 ± 0.61

### Exam 4
- Exam Date: 3/12/2016
- Time: 8:42 AM
- Serial Number: 4000-8968
- Signal Strength: 8/10
- Average Thickness: 67 ± 0.60

### Rate of change for each exam:
- Baseline 1 to Baseline 2: 0.04/0.02 µm/year
- Baseline 2 to Exam 3: 0.01/0.03 µm/year
- Exam 3 to Exam 4: 0.01/0.03 µm/year

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<tr>
<td>5/30/2012</td>
<td>4000-8968</td>
<td>R2</td>
<td>8/10</td>
<td>77</td>
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<tr>
<td>7/24/2013</td>
<td>4000-8968</td>
<td>R2</td>
<td>9/10</td>
<td>67</td>
<td>85</td>
<td>76</td>
<td>1.02</td>
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<tr>
<td>3/19/2014</td>
<td>4000-8968</td>
<td>R2</td>
<td>8/10</td>
<td>67</td>
<td>88</td>
<td>74</td>
<td>0.92</td>
<td>0.57</td>
<td>0.64</td>
<td>0.123</td>
</tr>
<tr>
<td>3/12/2016</td>
<td>4000-8968</td>
<td>R2</td>
<td>7/10</td>
<td>67</td>
<td>84</td>
<td>77</td>
<td>0.93</td>
<td>0.58</td>
<td>0.67</td>
<td>0.133</td>
</tr>
</tbody>
</table>

- **Registration Methods**: R2 - Registration based on translation and rotation of OCT fundus, R1 - Registration based only on translation of disc center.

- **Likely Loss** Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

- **Possible Loss** Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.
Questions?
THANK YOU

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