INTRODUCTION
Clinical evaluation of the retinal nerve fiber layer (RNFL) is essential for the diagnosis and follow-up of glaucomatous patients.

- RNFL atrophy precedes optic disc damage and visual field defects in glaucoma.
- Detection of RNFL atrophy
  - Previous studies have investigated the usefulness of optical coherence tomography (OCT) for the detection of RNFL atrophy.
  - Cirrus OCT and 3D OCT have different optic disc circle scan diameters (3.46 mm vs. 3.4 mm), scan area (centered on the optic disc vs. centered on the optic disc or the fovea), analysis software, and ethnicity of normative database (Caucasians, Hispanic, Indians, and Africans vs. Japanese and Caucasians).
- Disc stereophotography, red-free fundus photography, Swedish Interactive Threshold Algorithm 30-2 perimetry

PURPOSE
To compare the abilities of two different spectral-domain optical coherence tomography devices for the detection of a localized retinal nerve fiber layer defect.

PATIENTS and METHODS
- Observational, case-control study
- Subjects
  - 42 normal subjects (normal eyes)
  - 48 patients with a localized RNFL defect on red-free RNFL photographs (glaucomatous eyes)

- Exclusion criteria
  - Subjects with retinal abnormality, opaque media, a history of retinal laser procedure, neurologic diseases, previous intracocular surgery other than uncomplicated cataract surgery, poor quality red-free fundus photographs, or unreliable visual field

- Examinations
  - Complete ophthalmologic examinations
  - Disc stereophotography, red-free fundus photography, Swedish Interactive Threshold Algorithm 30-2 perimetry
- Cirrus HD-OCT model 4000 (software Ver. 5.1; Carl Zeiss Meditec, Dublin, CA, U.S.A.)
- 3D OCT-2000 (software Ver: 6.11G; Topcon, Tokyo, Japan)

- Data analysis
- Parameters: circumpapillary RNFL (cpRNFL) thickness and ganglion cell complex
- Sensitivity, specificity, and area under the receiver operating curves (AUCs) of parameters

RESULTS
Demographics and ocular characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Normals (n=42)</th>
<th>Glaucomatous eyes (n=48)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yrs</td>
<td>51.0 ± 12.7</td>
<td>55.4 ± 11.6</td>
<td>0.09*</td>
</tr>
<tr>
<td>Gender (M/F)</td>
<td>17 - 25</td>
<td>18 - 30</td>
<td>0.92</td>
</tr>
<tr>
<td>Intracocular pressure, mmHg</td>
<td>14.2 ± 3.3</td>
<td>15.7 ± 3.0</td>
<td>0.51*</td>
</tr>
<tr>
<td>Spherical equivalent, D</td>
<td>-0.9 ± 1.7</td>
<td>-4.4 ± 2.3</td>
<td>0.21*</td>
</tr>
<tr>
<td>Visual field</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Deviation, dB</td>
<td>-8.5 ± 1.4</td>
<td>-3.1 ± 3.3</td>
<td>0.001*</td>
</tr>
<tr>
<td>Freeze standard deviation, dB</td>
<td>2.2 ± 1.1</td>
<td>5.3 ± 3.4</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

Comparison of RNFL thickness measurements between normal eyes and glaucomatous eyes

- **Comparison of cpRNFL thickness**
  - Cirrus OCT
    - Showed significant differences in all clock-hour segments except for the 9-, 4-, and 3 o'clock segments, 4 quadrants, and average thickness.
  - 3D OCT
    - Showed significant differences in all clock-hour segments except for the 9-, 5-, 4-, and 3 o'clock segments, inferior and superior quadrants, and average thickness.
  - Multiple regression analyses of all cpRNFL parameters measured by the Cirrus OCT were greater than those measured by the Cirrus OCT.

- **Comparison of macular GCC parameters by the 3D OCT**
  - Average thickness and superior and inferior thicknesses of the RNFL, ganglion cell layer (GCL) + inner plexiform layer (IPL), and RNFL + GCL + IPL had significantly decreased in the glaucomatous eyes.

Agreement of measurements between Cirrus OCT and 3D OCT
- **Correlation of thickness measurements between the two devices was statistically significant (R² = 0.86, P < 0.001).**
- **Agreement of measurements between the two devices had a proportional bias (slope of regression line - 0.16, P = 0.015).**

Comparison of AUCs of Cirrus OCT and 3D OCT
- **AUC values of cpRNFL thickness data by the Cirrus OCT were generally greater than those by 3D OCT.**
- The largest AUCs were not significantly different between the two devices (Cirrus OCT: 0.90; 3D OCT: 0.89, P = 0.80).

Comparison of AUCs of Cirrus OCT and 3D OCT

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>cpRNFL thickness</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Average</td>
<td>80.9 (77.6 - 83.9)</td>
<td>92.0 (89.1 - 94.2)</td>
<td>85.7 (82.3 - 89.2)</td>
<td>97.6 (94.5 - 99.8)</td>
</tr>
<tr>
<td>Inferior segment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 o'clock segment</td>
<td>91.7 (88.5 - 95.1)</td>
<td>95.2 (92.4 - 98.0)</td>
<td>89.6 (86.2 - 94.0)</td>
<td>97.6 (94.5 - 99.8)</td>
</tr>
<tr>
<td>11 o'clock segment</td>
<td>91.7 (88.5 - 95.1)</td>
<td>95.2 (92.4 - 98.0)</td>
<td>89.6 (86.2 - 94.0)</td>
<td>97.6 (94.5 - 99.8)</td>
</tr>
<tr>
<td>1 o'clock segment</td>
<td>85.7 (82.3 - 89.2)</td>
<td>97.6 (94.5 - 99.8)</td>
<td>68.8 (65.1 - 72.6)</td>
<td>97.6 (94.5 - 99.8)</td>
</tr>
<tr>
<td>2 o'clock segment</td>
<td>85.7 (82.3 - 89.2)</td>
<td>97.6 (94.5 - 99.8)</td>
<td>68.8 (65.1 - 72.6)</td>
<td>97.6 (94.5 - 99.8)</td>
</tr>
</tbody>
</table>
| Sensitivities and specificities based on the internal normative database

Sensitivities and specificities based on the internal normative database

**CONCLUSION**
Cirrus OCT and 3D OCT showed similar abilities for the detection of a localized RNFL defect although they have different measurements protocols.

**REFERENCES**