Concern has been raised regarding the effects of scleral contact lens wear on intraocular pressure. Many theories have been proposed regarding mechanisms for potential scleral lens induced intraocular pressure (IOP) changes:
1. Compression of episcleral veins
2. Disruption to angle and trabecular meshwork anatomy
3. Suction forces induced by lens settling and eyelid tension

Challenges in methodology have limited research in this area, as few techniques are available for measuring IOP during scleral lens wear. A study by Nau et al., using pneumotonometry, found no significant change in IOP after two hours of scleral lens wear, measured on the sclera during lens wear.

The aim of this study was to determine if scleral lenses affect IOP in healthy neophyte lens wearers.

Material and Methods
Five healthy subjects 24-25 years old with no previous history of scleral lens wear were fitted with 16.3 mm diameter scleral lenses. All IOP values were measured after 5 minutes, 2 hours, and 8 hours. Three IOP measurements were taken and averaged at each time period. IOP measurements taken without lenses were compared to those taken with lenses at corresponding times.

Average IOP (mmHg)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Time of CL Wear</th>
<th>OD Baseline</th>
<th>OS Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 min</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2 hr</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>8 hr</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>5 min</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>2 hr</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
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<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

Intraocular pressure measurements with the Diation device were highly variable, especially during contact lens wear. The data presented above is only from two (of five) subjects in which the recommended measurement technique was possible with scleral contact lens wear due to ocular anatomy. In these two subjects, a small increase in IOP with scleral lens wear was found after 5 minutes, 2 hours, and 8 hours of lens wear. Figure 3 illustrates statistical analysis of the IOP differences found in the two patients.

References

Discussion
The significance of these findings is unclear, and conclusions cannot be made due to the small number of subjects. This study illustrates the difficulty yet importance of determining reliable methods for measuring IOP during scleral lens wear. The transpalpebral scleral tonometer described above was not designed for use during contact lens wear, and the technique adjustments made to achieve measures may have created some variation in the data. The Diation device was further complicated by anatomical variations in eyelids and orbits, the relatively large size of the contact lens, and subjects flinching during measurements.

Further studies are warranted regarding this topic, and novel techniques may be required to assess IOP during scleral lens wear. Indirectly measuring IOP via episcleral venous blood flow or via 24-hour monitoring devices should be considered. IOP effects on subjects with corneal disease, glaucoma, and narrow angles also should be investigated. It is imperative to confirm the safety of scleral lens wear as it relates to IOP due to the rapid increase in use of these medical devices.

Does Scleral Lens Wear Influence Intraocular Pressure?
Emily Korszen OD, Patrick Caroline, Beth Kinoshita OD, Matthew Lampa OD, Mark André, Randy Kojima, and Eef van der Worp BOptom PhD
Pacific University College of Optometry, Forest Grove, Oregon

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