Ex Vivo Analysis of Lipid Deposition with Silicone Hydrogel Contact Lens and EOBO-Based Lens Care Solutions

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Introduction

- Lipid deposition is of particular concern with silicone hydrogel (SHy) contact lenses because the silicone in the material is hydrophobic. Over time, the silicone can reach the contact lens surface, extracting oil from the skin and through sweat pores from the tear film.
- The major lipid deposited on contact lenses is reported to be cholesterol.1
- Lipid deposition can have a negative effect on contact lens comfort and visual performance.2
- Lotrafilcon B lenses are manufactured with hydrophilic technology, which provides an ultra-thin shield around the outer surface to minimize the amount of exposed silicone.3
- Lotrafilcon B lenses have been shown to better resist lipid deposition than other types of SHy contact lenses within 30 days of wear.4
- Addition of the surfactant agent EOBO (polyoxyethylene-polyoxybutylene) to the packaging solution of spherical lotrafilcon B lenses (Air Optix® plus HydraGlyde®, AIRS®) has been shown to result in lesser retention of moisture on the lens surface on the first day of wear.5
- EOBO is included in OPTI-FREE® PureMoist® multi-purpose disinfecting solution (OFPM) and CLEAR CARE® PLUS with HydroGlyde® moisture matrix (CCP), for longer lasting lens surface wetting to further reduce lipid deposition.6

Methods

To compare the total cholesterol extracted from wear lotrafilcon B + EOBO contact lenses and care with care containing lens care solutions (OFPM and CCP) with the total cholesterol extracted from wear SHy contact lenses and care for multipurpose solutions (MPS) that do not contain EOBO.

Subjects

This was a multicenter, prospective, randomized, observer-masked, controlled parallel group study in which subjects were also masked to study lens and lens solution (OFPM or CCP). Current full-time wearers of lotrafilcon C monthly or senofilcon A 2-week replacement lenses, comfilcon A, or samfilcon A and who were currently using MPS that did not contain EOBO were recruited at eight sites, five in the USA, two in Germany, and one in Canada.

Study Design

Randomized 1:1 to lotrafilcon B lenses packaged in solution containing EOBO or to their habitual SHy contact lenses (senofilcon C, senofilcon A, comfilcon A, or samfilcon A). Subjects randomized to lotrafilcon B contact lenses were further randomized 1:1 to EOBO-containing CCP or OFPM. Subjects randomized to their habitual SHy lenses continued to use their habitual MPS/HRMS.

Table 1: Demographic characteristics of the study subgroups

- The demographic characteristics of the six subgroups were well balanced (Table 1).

Results

- A comparison of lotrafilcon B + EOBO lenses and care for with EOBO lens care solutions versus all combinations of habitual SHy contact lenses and HMPS showed that total cholesterol extraction was numerically lower in the lotrafilcon B group (Table 2).
- Total cholesterol extraction by lotrafilcon B + EOBO contact lenses and both EOBO-containing lens care solutions and by all combinations of habitual contact lenses/lens care solutions

<table>
<thead>
<tr>
<th>Total cholesterol extraction, µg</th>
<th>Habitual SHy MPS</th>
<th>Lymphocap B®</th>
<th>OFPM solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>1.5±0.7</td>
<td>0.8±0.5</td>
<td>1.1±0.6</td>
</tr>
<tr>
<td>95% CI of Difference</td>
<td>0.6–0.9</td>
<td>0.5–0.7</td>
<td>0.8–0.9</td>
</tr>
</tbody>
</table>

- Table 2. Total cholesterol extraction by lotrafilcon B + EOBO contact lenses and both EOBO-containing lens care solutions and by all combinations of habitual contact lenses/lens care solutions

- Table 3. Total cholesterol extraction by individual contact lens/lens care group

- Comparisons of individual combinations showed that ex vivo cholesterol extraction was significantly lower for lotrafilcon B + EOBO contact lenses cared for with both EOBO-containing lens care solutions than for any other contact lens MPS combination (p < 0.001, Figure 4, Table 3).

- Figure 4. Total cholesterol extraction by each habitual SHy and lotrafilcon B contact lenses with solutions

Conclusions

- The combination of lotrafilcon B contact lenses with packaging solution containing EOBO and the use of CCP and OFPM lens care solution regimens containing EOBO resulted in lesser cholesterol extraction than each of the habitual SHy/LMPS regimen tested.
- Both EOBO-containing lens care solutions (CCP and OFPM) showed similar low cholesterol deposition with lotrafilcon B lenses.

- Lipids are commonly extracted from contact lens materials using the solvents chloroform and methanol as used in this study. However, the effectiveness of these solvents across a broad range of contact lens materials is not known, and therefore could have contributed to differences found here.

References


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