Lactoferrin Uptake Kinetics on Silicone Hydrogel and Conventional Hydrogel Contact Lens Materials

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Table 2: Characteristics of SH lens materials evaluated in this study.

<table>
<thead>
<tr>
<th>Proprietary name</th>
<th>Night &amp; Day</th>
<th>O2 Optix</th>
<th>PureVision</th>
<th>Acuvue Advance</th>
<th>Acuvue OASYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>USAN</td>
<td>Lotrafilcon A</td>
<td>Lotrafilcon B</td>
<td>Balafilcon A</td>
<td>Galyfilcon A</td>
<td>Senofilcon A</td>
</tr>
<tr>
<td>Water content</td>
<td>24%</td>
<td>33%</td>
<td>36%</td>
<td>47%</td>
<td>38%</td>
</tr>
<tr>
<td>Dk</td>
<td>140</td>
<td>110</td>
<td>91</td>
<td>60</td>
<td>103</td>
</tr>
<tr>
<td>Dk/t</td>
<td>0.08</td>
<td>0.08</td>
<td>0.09</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>FDA group</td>
<td>I</td>
<td>I</td>
<td>III</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Surface treatment</td>
<td>25 nm</td>
<td>25 nm</td>
<td>plasma coating</td>
<td>Plasma oxidation</td>
<td>None</td>
</tr>
</tbody>
</table>

Figure 2 compares the lactoferrin deposition on two CH lens materials. Etafilcon A deposited the greatest amount of lactoferrin compared to omalufilcon A and the amount of lactoferrin deposition increased significantly after day 7 (p<0.05). At the end of 28 days, etafilcon A deposited 11.3±1.9 µg lactoferrin/lens and omalufilcon A deposited 6.8±2.0 µg lactoferrin/lens, which was significantly different (p=0.03).

Figure 3 shows that balafilcon A deposited significantly more lactoferrin than all the other SH lens materials (p<0.05) and that the degree of deposition increased significantly after day 7 (p=0.05), with each time-point thereafter monotonously increasing (p<0.05). Galyfilcon A and senofilcon A demonstrated a moderate amount of deposition, while lotrafilcon A and lotrafilcon B deposited the least amount of lactoferrin. There were no statistical differences between the five SH lens materials until day 7 (all p>0.05).

At day 28, there was a statistical difference between lotrafilcon A and lotrafilcon B versus all other SH lenses (p<0.05), and a statistical difference between galyfilcon A and senofilcon A versus all other SH lenses (p<0.05). At the end of 28 days the amount of lactoferrin in µg was 11.8±2.9 for balafilcon A, 2.1±0.9 for galyfilcon A, 3.1±1.6 for lotrafilcon B, 5.4±1.1 for galyfilcon A and 5.6±0.6 for senofilcon A.

Conclusions
- Radiolabelling is a sensitive and reproducible technique to determine small quantities of protein deposited on contact lenses.
- Lactoferrin deposition onto hydrogel lens materials is time dependent, with longer sorption times resulting in higher degrees of deposition.
- Currently available SH lens materials broadly fall into one of three categories, based on their surface treatment. Interestingly, these three ‘families’ of SH lenses show significant differences from each other in terms of their lactoferrin deposition. Thus, the degree of lactoferrin deposition is dependent on the ionicity and also the surface treatment of the material under test.

References

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