BACKGROUND & STUDY AIM

- Previous work has shown that one-night of overnight wear of high-Dk silicone hydrogel (Si-H) lenses causes significant changes to epithelial barrier function (EBF).  
- The lowered EBF associated with soft lens wear may be due to insufficient tear flow.  
- To further explore the effects of reduced tear flow on EBF, we hypothesize that gas-permeable (GP) lenses will have less effect on EBF because GP lenses have much greater tear flow compared with soft lenses.  
- To test our hypothesis, we measured the effects of 30-night continuous wear (CW) on EBF for subjects fitted with high-Dk GP or Si-H lenses.

STUDY METHOD

Study Design

- Randomized parallel-group study

Subjects

- 74 subjects, 35 GP and 39 Si-H, completed the study.

TABLE 1. ln(P_e) values before and after lens wear

<table>
<thead>
<tr>
<th>Group</th>
<th>Baseline</th>
<th>Post 30-D CW</th>
<th>% Increase</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>-2.39 ± 1.3</td>
<td>-2.39 ± 1.3</td>
<td>0%</td>
<td>1.0000</td>
</tr>
<tr>
<td>PM</td>
<td>-2.25 ± 1.3</td>
<td>-2.29 ± 1.8</td>
<td>4%</td>
<td>0.8942</td>
</tr>
<tr>
<td>Si-H</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>-2.31 ± 1.3</td>
<td>-2.32 ± 1.5</td>
<td>1%</td>
<td>0.6077</td>
</tr>
<tr>
<td>PM</td>
<td>-2.41 ± 1.6</td>
<td>-2.42 ± 1.4</td>
<td>0%</td>
<td>0.9988</td>
</tr>
</tbody>
</table>

RESULTS

- There was no significant difference between the integrity of EBF between eyes at baseline visits and at the PM visit after 30-day CW (p values > 0.05). At AM visit after 30-day CW, the EBF was more reduced in the patched eye; this trend was not statistically significant (p = 0.0685).

CONCLUSIONS

- This is the first parallel-group study to assess the effect of high-Dk GP and Si-H lenses on the integrity of corneal epithelium after 30-day CW. The results of this study suggest the following:
  - There was a substantial decrease in EBF during 30-day CW with Si-H lenses, compared with GP lenses. However, it is unclear why the baseline permeability was much lower (although not statistically significant) in one eye wearing Si-H at the PM visit. Additional matched-pair multivariate analyses will be performed to confirm this finding to account for potential confounding factors.
  - Upon eye opening, subjects wearing GP lenses showed rapid recovery, which was opposite in effect from soft lens wearers.
  - Possible explanation: Upon awakening, normal ocular surface tear film is rapidly restored for GP wearers and effects of lens epithelial trauma were rapidly reversed. However, due to tear stagnation under a soft lens, the epithelium continued to be traumatized until all debris was removed from under the lens.
  - These findings suggest that restoration of normal ocular surface may be an important mechanism to avoid adverse clinical events in overnight lens wear. It seems that adequate tear flow under a lens upon eye opening may be necessary to decrease ocular morbidity associated with continuous wear.

REFERENCES


ACKNOWLEDGEMENTS

This work was supported by, in part, Menicon Co. Ltd.