Ageing behaviour of a silorane-based composite regarding streptococcal adhesion

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Introduction: The aim of this in vitro study was to investigate the influence of artificial ageing on streptococcal adhesion to a silorane-based composite.

Methods: Standardized specimens (diameter 10mm, height 2mm) of a silorane-based composite (Filtek Silorane, 3M Espe, Seefeld, G) were prepared, and polished to high gloss using grinding paper and polishing paste. A nano-filled methacrylate-based composite was used as control (Filtek Supreme XT, 3M Espe). After assessment of surface roughness, specimens (n=15 for each treatment) were stored in ethanol for 7, 90 or 365 days, or thermally cycled (6000 cycles 5/55°C, 5min). Specimens were incubated either with phosphate buffered saline or natural whole saliva for 2h for pellicle formation, and subsequently with Streptococcus mutans suspension (2.5h, 37°C). Adherent bacteria were quantified using a fluorometric assay. Statistics: One-way ANOVA, Tukey-test (α=.05).

Results:

<table>
<thead>
<tr>
<th>Ageing protocol</th>
<th>Filtek Silorane Uncoated (Mean, SD)</th>
<th>Filtek Silorane Saliva-coated (Mean, SD)</th>
<th>Filtek Supreme XT Uncoated (Mean, SD)</th>
<th>Filtek Supreme XT Saliva-coated (Mean, SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 days</td>
<td>2409.1 (1834.5)</td>
<td>4478.9 (2415.2)</td>
<td>4338.1 (2014.9)</td>
<td>9605.9 (2569.5)</td>
</tr>
<tr>
<td>7 days</td>
<td>608.4 (454.2)</td>
<td>2355.8 (1937.6)</td>
<td>1503.8 (1030.1)</td>
<td>2125.8 (1625.8)</td>
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<tr>
<td>90 days</td>
<td>1658.9 (1296.6)</td>
<td>3531.2 (1002.5)</td>
<td>1016.5 (615.6)</td>
<td>3655.8 (1448.7)</td>
</tr>
<tr>
<td>365 days</td>
<td>3240.1 (1432.8)</td>
<td>7099.1 (2726.6)</td>
<td>720.6 (615.9)</td>
<td>3777.8 (2542.7)</td>
</tr>
<tr>
<td>Thermal cycling</td>
<td>4275.4 (4093.4)</td>
<td>3281.6 (1711.7)</td>
<td>5899.1 (1878.13)</td>
<td>11983.6 (7924.9)</td>
</tr>
</tbody>
</table>

Relative fluorescence intensities showed a decrease after storage in ethanol for 7 days, indicating a decrease in streptococcal adhesion. With the exception of uncoated Filtek Supreme XT, thermal cycling caused a significant increase in fluorescence intensities,
suggesting higher adhesion of streptococci. Prolonged alcohol storage caused a significant increase of fluorescence intensities with the exception of saliva-coated Filtek Silorane.

**Conclusion:** Within the limitations of an *in vitro* study it can be concluded that ageing influences microbial adhesion to composite materials decisively. The silorane-based composite features promising results for streptococcal adhesion after artificial ageing in ethanol and thermal cycling.