Whitening Agents with ACP: Enamel Caries Formation and Progression

*in vitro study*


**Objective:**
To evaluate the effect of whitening agents containing amorphous calcium phosphate (ACP) on human enamel caries formation and progression

**Materials:**
- 15 human teeth
- 9.5% hydrogen peroxide ACP (DayWhite Excel 3, Discus Dental)
- 6% hydrogen peroxide ACP (NiteWhite Turbo, Discus Dental)
- 16% carbamide peroxide ACP (NiteWhite, Discus Dental)

**Methodology:**
Fifteen teeth with sound enamel surfaces were divided into four portions. Each tooth portion was assigned to a treatment group: Group 1) No Treatment Control; Group 2) DayWhite Excel 3 9.5% hydrogen peroxide ACP; Group 3) NiteWhite Turbo 6% hydrogen peroxide ACP; Group 4) NiteWhite 16% carbamide peroxide ACP. The teeth were treated according to the manufacturer’s recommendations followed by synthetic saliva, on a daily basis for 14 days. Control tooth portions were exposed only to synthetic saliva. A modified ten Cate solution was used for in vitro enamel caries formation and progression. The teeth were treated prior to lesion formation, and before lesion progression 1 and lesion progression 2 periods. Longitudinal sections were taken after lesion formation, lesion progression 1 and lesion progression 2 periods for polarized light study and statistical analysis (ANOVA, DMR).
Results:

Mean lesion depths were:

- **Lesion Formation Period**: Control 108±15um; DayWhite 93±11um; NiteWhite Turbo 48±7um (P<.05); NiteWhite 16% 105±12um.

- **Progression Period 1**: Control 171±18um; DayWhite 126±13um (P<.05); NiteWhite Turbo 96±9um (P<.05); NiteWhite 16% 132±12um (P<.05).

- **Progression Period 2**: Control 228±20um; DayWhite 165±17um (P<.05); NiteWhite Turbo 129±11um (P<.05); NiteWhite 16% 152±16um (P<.05).

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**Mean Lesion Depths**

<table>
<thead>
<tr>
<th></th>
<th>Group 1: Control</th>
<th>Group 2: DayWhite Excel 3 - 9.5% hydrogen peroxide ACP</th>
<th>Group 3: NiteWhite Turbo 6% hydrogen peroxide ACP</th>
<th>Group 4: NiteWhite 16% carbamide peroxide ACP</th>
</tr>
</thead>
<tbody>
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<td>Lesion Formation Period</td>
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<tr>
<td>Progression Period 2</td>
<td>228±20um</td>
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**Conclusion:**

Whitening agents containing calcium phosphate have a reduced susceptibility to in vitro enamel caries lesion initiation and progression.