Plaque Biofilm Disruption

*in vitro study*

In *vivo* tooth-cleaning efficacy of electric toothbrushes around brackets


**Objective**

To evaluate the cleaning efficacy of twelve different brush heads of two electric toothbrush actions (side-to-side and oscillating/rotating) around upper incisor brackets mounted on a custom model in a laboratory setting.

**Test Devices**

**Oscillating / rotating toothbrushes**

- Oral-B Professional Care 9500
  - MicroPulse EB 25
  - Precision Clean
  - Ortho Care
  - Dual Clean

**Side-to-side (sonic) toothbrushes**

- Oral-B Sonic Complete
  - Sonic CrissCross
  - Sonic Sensitive

- Philips Sonicare
  - Standard ProResults brush head
  - Compact ProResults brush head

- WaterPik SenSonic
  - Advanced Brush 2SRB-2WI
  - Small Brush SRSB-2

- WaterPik SenSonic SR 800E
  - Standard Brush SRBL-2I
  - Small Brush SR1B-2I

**Methodology**

Standard and Mini Diamond™ brackets were fixed on black-stained model teeth. The model teeth were then coated with white titanium oxide to simulate plaque accumulation and were brushed by a fixed, automated mechanism under constant conditions of load and equivalent duration of exposure. Twelve different brush heads with either side-to-side or oscillating-rotating action were tested. After brushing, the teeth were scanned, the images digitized and the surfaces re-appearing black were assessed utilizing custom software capable to detect gray-scale intensity. The quantification of the reduction of simulated plaque is expressed as a percentage of the total tooth area. ANOVA test was used for individual comparison of the brush types. Bonferroni/Dunn adjustment was applied for multiple testing.

**Results**

The Sonicare power toothbrush with compact ProResults brush head and standard ProResults brush head were statistically significantly better than other brush heads in the test at removing simulated plaque, with 81.7% and 80.8% observed reduction overall, respectively.
Conclusion

In this in vitro experiment, the Sonicare power toothbrush with the compact ProResults brush head and the standard ProResults brush head provided superior cleaning efficacy of teeth with fixed orthodontic attachments.

Brush Heads:
1. Oral-B® MicroPulse EB 25
2. Oral-B® Precision Clean
3. Oral-B® Ortho Care
4. Oral-B® Dual Clean
5. Oral-B® Sonic CrissCross
6. Oral-B® Sonic Sensitive

1. Sonicare Standard ProResults
2. Sonicare Compact ProResults

1. WaterPik® Advanced Brush 2SRB-2W1
2. WaterPik® Small Brush SRSB-2
3. WaterPik® Standard Brush SRBL-2I
4. WaterPik® Small Brush SRIB-2I

Horizontal bars: Medians; Boxes: Inter-quartile areas; Error bars: 10th and 90th percentile; Dots: Extreme values