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Abstract
Several toothbrush abrasion experiments were conducted using Meridol dentifrice (4075 D1: 02-007, GABA) and either Meridol (santfr/doux) soft toothbrushes or Crest toothbrushes. All experiments were conducted with an applied load of 200 grams on the toothbrush head and a slurry of 50% Meridol dentifrice / 50% saline that was continuously stirred and recycled. This combination of toothbrushes and dentifrice was used to evaluate the abrasion resistance of Pulpdent Seal-n-Shine (SNS) (lot # 030604).

When applied to an extracted human tooth as a surface sealant, as a restorative material for minor enamel defects, as a composite sealing material, or as an enamel crack sealing material, longevity and resistance to abrasion was demonstrated by Seal-n-Shine.

Materials and Methods
Trials were conducted using a toothbrush abrasion machine in which the toothbrush was held stationary while the test surface was cycled back and forth beneath the toothbrush surface. One test cycle was completed when the test surface was moved beneath the full surface of the toothbrush head in a forward and reverse direction. Previous studies have indicated that these conditions simulate human toothbrushing. Every 5,000 cycles has been correlated to roughly six months of individual toothbrush use.1

Four experiments were conducted to evaluate abrasion resistance and longevity of Seal-n-Shine when used in different applications.

- The first group of tests measured the wear resistance of SNS when applied to the surface of Embrace WetBond Pit and Fissure Sealant (lot #040224, Pulpdent).
- The second group of tests evaluated the adhesion/abrasion resistance of SNS when used to seal a minor enamel surface defect.
- The third group of tests evaluated the adhesion/abrasion resistance of SNS when applied near the CEJ of an etched tooth surface.
- In a fourth group, SNS was used to seal a midline tooth fracture of a central incisor.

Trial 1
Wear resistance of SNS when applied to the surface of Embrace WetBond Pit and Fissure Sealant

In the first group of experiments, Seal-n-Shine was applied to cured Embrace WetBond Pit and Fissure Sealant, and the SNS was light cured for 20 seconds using a Demetron 150 curing light. The thickness of SNS was measured at 0.24 mm using a digital caliper (Absolute Digimatic, Mitutoyo).

After conducting 20,000 cycles of abrasion, equivalent to approximately two years of toothbrushing, the surface of SNS was observed and the thickness measured. SNS remained intact and adherent to Embrace Pit and Fissure Sealant. No pitting, cracking or crazing of either the SNS or the pit and fissure sealant was observed, although minor scratches were observed on the surface of the SNS as a result of the toothbrushing process.
Trial 2

Adhesion/abrasion resistance of SNS when used to seal a minor enamel surface defect

In a second group of experiments, SNS was placed into an artificially created notch in an extracted human tooth. A notch defect approximately 0.5 mm deep and 2 mm long was cut into the enamel surface of the tooth using a small diamond bur. This defect was washed and etched with Etch Royale (lot #040226, Pulpdent) and then washed and lightly air-dried, leaving the surface slightly moist. The defect was filled with SNS and light cured.

The tooth was positioned so that the brushing action would be from side-to-side (mesial/distal). After 20,000 cycles of abrasion, the tooth and SNS were examined. The entire restoration was intact and the margins were smooth and appeared to be sealed when probed with a dental explorer.

Trial 3

Adhesion/abrasion resistance of SNS when applied near the CEJ of an etched tooth surface

The third group of experiments evaluated the placement of SNS on etched enamel. Enamel was etched (Etch Royale, lot #040226, Pulpdent), and a minimum thickness of SNS was applied using a flocked tip applicator and cured for 20 seconds with a Demetron 150 curing light. No other surface treatment of the tooth was performed. The tooth was positioned so that the brushing action would be from side-to-side (mesial/distal).

Conclusion
After 40,000 cycles of toothbrushing, Seal-n-Shine remains attached to etched enamel. This simulates approximately four years of toothbrushing.

Trial 4

SNS used to seal a midline tooth fracture

A fourth trial was conducted to demonstrate the ability of SNS to seal a cracked tooth. A central incisor with a midline fracture was etched with Etch Royale (lot # 040226, Pulpdent), washed and lightly air-dried, leaving the surface slightly moist. A single application of SNS was applied to achieve a minimum thickness and light cured for 20 seconds (Demetron 150).

The toothbrush was a Crest dual action, soft, compact size toothbrush. The tooth was positioned so that the brushing action would be from side-to-side (mesial/distal).

Conclusion
After 40,000 cycles of toothbrushing, Seal-n-Shine remains attached to etched enamel. This simulates approximately four years of toothbrushing.

Reference