Hydrogen Peroxide Effects on Enamel and Root Dentin Surfaces

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ABSTRACT

Crest® Whitestrips bleaching strips provide unit dose applications of peroxide for safe and effective tooth bleaching. **Objectives:** This study examined the effects of Crest® Whitestrips Supreme (CWSS) bleaching strips containing 14% hydrogen peroxide on the surface integrity of human enamel and root dentin. **Methods:** Human enamel and root dentin blocks were sectioned and mounted in methacrylate. Enamel was polished to a mirror finish with gamma alumina while dentin was prepared with 300 grit smear layer polish. Color determinations (CIELAB) of standardized areas on surfaces were taken by image analysis and surfaces were pre-measured for surface microhardness. Teeth were bleached with CWSS for 42 hours of treatment in a cycling regimen including continuous pooled saliva immersion with tid ½ hour treatments in peroxide gels. A control group (CTR) was untreated and cycled through saliva soaks. Following bleaching color values and surface microhardness were re-determined. Surface profilometry, SEM and air objective CLSM were used to confirm surface effects. **Results:** Colorimetric evaluations confirmed significant tooth bleaching for peroxide exposures.

VHN measurements for enamel:
CWSS Init=349±21-nsd CWSS 21h=355±13;
CWSS Init=350±15-nsd-CWSS 42h=356±12.
VHN measurements for dentin:
CWSS Init=56.2±1.8-nsd CWSS 21h=56.0±1.4;
CWSS Init=56.5±5.5-nsd CWSS 42h=56.0±5.8.

Surface morphology of enamel and dentin were not influenced during bleaching. **Conclusions: CWSS bleaching did not soften or etch surface enamel or root dentin, supporting the safety of this unit dose applied bleaching to oral hard tissue surfaces.**

INTRODUCTION

Crest® Whitestrips provide unit dose applications of peroxide in a gel matrix deposited on a flexible, disposable strip for conformable contact with the appropriate tooth surfaces. Crest Whitestrips Supreme is a new formulation designed to deliver 14% hydrogen peroxide in a regimen of 21 days used twice daily for 30 minutes. This product delivers better whitening than the original Crest Whitestrips Professional product. This study examined the effects of this new level of peroxide on dentin and enamel surfaces *in vitro*.

MATERIALS AND METHODS

Treatments:

- CWSS42hr: Crest Whitestrips Supreme bleaching strips, 3x daily for 42 hours, 30 minutes per exposure;
- CWSS21hr: Crest Whitestrips Supreme bleaching strips, 3x daily for 21 hours, 30 minutes per exposure;
- CTR42hr: Unbleached, but cycled same as 42 hr treated group
- CTR21hr: Unbleached, but cycled same as 21 hr treated group

Protocol

Enamel Specimen

Enamel Substrate Preparation

- Human Enamel and Human Root Dentin sectioned and mounted in methacrylate
- Enamel Polished with gamma alumina
- Dentin Polished to mimic smear layer
- Specimens hydrated and fluoridated by cycling in whole human saliva and twice daily 60 second toothpaste slurry exposure for 1 week prior to measurements

Baseline Measurements

Buehler Microhardness Tester

Treatment cycle

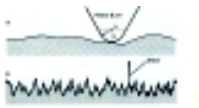
All specimens receive twice daily 60 second toothpaste slurry exposure

Bleach strips applied three times daily for 30 minutes to treatment subgroup

All specimens submerged in whole human saliva between treatments and overnight in 37°C.

Post-Treatment Measurements

Microhardness Indentation



Surface Profile

RESULTS

Surface Microhardness and Average Surface Roughness

ENAMEL	Baseline		Post Treatment
Treatment	VHN +/- sd		VHN +/- sd
CWSS 21 hr	349.1 +/- 21.0	- ns -	354.5 +/- 13.3
CTR 21 hr	350.3 +/- 15.7	- ns -	340.2 +/- 9.4
CWSS 42 hr	349.5 +/- 14.5	- ns -	356.1 +/- 11.6
CTR 42 hr **	350.3 +/- 15.9	- s -	307.0 +/- 22.7

ENAMEL	Baseline		Post Treatment
Treatment	Ra +/- sd		Ra +/- sd
CWSS 21 hr	0.0247 +/-	- ns -	0.0285 +/-
CTR 21 hr	0.0274 +/-	- ns -	0.0541 +/-
CWSS 42 hr	0.0256 +/-	- ns -	0.0342 +/-
CTR 42 hr **	0.0265 +/-	- s -	0.3800 +/-

* Significance tested at p< 0.05, students paired t test
** Deposition of mineral layer on Saliva control (non-treated) specimens

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CONCLUSION

Bleaching with new Crest® Whitestrips Supreme did not soften or etch surface enamel or root dentin, supporting the safety of this unit dose applied bleaching to oral hard tissue surfaces.

Bleaching with new Crest® Whitestrips Supreme seems to prevent the build-up of mineral deposits on enamel and dentin during use.

P&G

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