

Mineralization Assessment of a New MultiCare Whitening Toothpaste

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ABSTRACT

In vitro pH cycling studies are useful tools for the anticaries assessment of toothpastes. A pH cycling study was conducted to compare the anticaries potential of a new multi-purpose whitening toothpaste containing sodium fluoride (NaF-anticaries agent), soluble pyrophosphate (tartar control source) and a modified silica abrasive (enhanced cleaning potential) to a clinically proven NaF/pyrophosphate/silica toothpaste. Crowns of human molars (10 teeth/group) were subjected to 14 days of alternating demineralization (6hr, pH 4.5, Ca/P/acetate) and remineralization (17 hr, pH 7, Ca/P) with dentifrice treatment (1:3 slurry in DDW) 2x daily for 1 minute each (before and after the demineralization period). Dentifrice formulations compared were: a) a clinically proven tartar control toothpaste (Crest Tartar Control Toothpaste - 1100ppm F (NaF), 3.3% soluble pyrophosphate, silica abrasive); b) Crest MultiCare Whitening Toothpaste (1100 ppm F (NaF), 3.3% soluble pyrophosphate, modified silica abrasive); and c) placebo (<1ppm F, silica abrasive). Enamel crowns were assessed by cross-sectional microhardness, and mineral loss was calculated (Delta Z, vol. % min x micrometers). Mean Delta Z \pm SD values were: a) 250 \pm 243; b) 408 \pm 268; c) 2098 \pm 684, with a=b<c (p<0.05). These data support the protective nature of these fluoride/pyrophosphate containing formulations against the progression of carious lesions. **Under the conditions of this model system, modification to the abrasive system provides the same level of anticaries efficacy as the clinically proven formula.**

PURPOSE

To compare the anticaries potential of a new multi-purpose whitening toothpaste to a clinically proven toothpaste of similar composition.

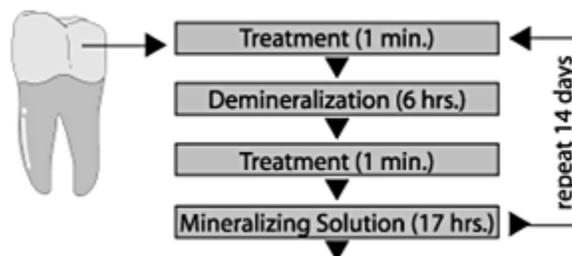
BACKGROUND

Our laboratory has developed a novel, silica abrasive technology designed to enhance tooth whitening through more efficient removal of extrinsic stain. This dentifrice contains sodium fluoride as the anticaries agent - combined with clinically proven pyrophosphate as a tartar control

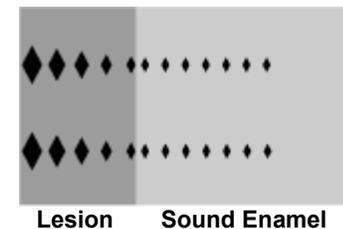
agent. A well-controlled, validated pH cycling method was chosen to compare the anticaries potential of the new formulation to that of a clinically proven formulation of similar composition.

MATERIALS AND METHODS

Enamel crowns (n=10 per group) were removed from roots, brushed with a warm detergent solution, polished with a 5 micron alumina slurry (using a felt wheel to follow the contour of the tooth surface), rinsed with deionized water, air dried then covered with acid resistant nail varnish leaving one exposed window on one surface. Only the window was exposed to dentifrice treatments and pH cycling according to the methods of Featherstone et al., (1986) (see pH cycling regimen below).



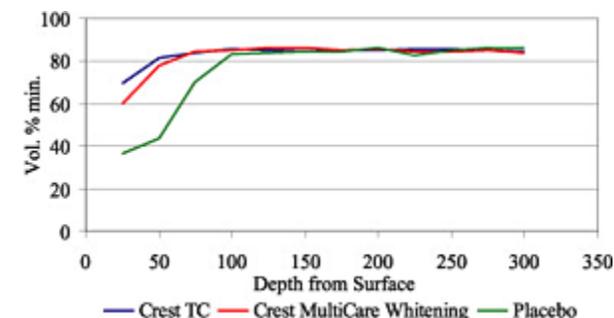
After 14 days of pH cycling, the crowns were rinsed with deionized water, sectioned longitudinally through the windows and embedded in epoxy resin following the methods of Featherstone et al., (1983) and ten Cate et al., (1985). The specimens were polished then the lesions were assessed by microhardness examination. Using a Knoop diamond, microhardness measurements were made beginning at 25 microns below the outer surface and at 25 micron steps to a distance of 300 microns below the surface, a distance sufficient to ensure the underlying sound enamel was included for reference (see schematic below).

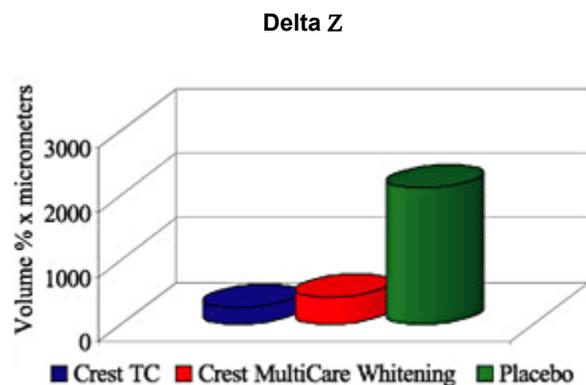


The lengths of the indentations were converted, via Knoop microhardness number, to volume % mineral again following the methods described by Featherstone et al., (1983) and ten Cate et al., (1985). The underlying sound enamel was assigned a value of 85% mineral by volume. The overall relative mineral loss from each lesion was calculated from the data according to the methods of White and Featherstone (1987) to provide Delta Z (mineral loss) values for each test group in units of volume % mineral x micrometers. The mineral loss profiles were compared to assess inhibition of caries initiation and progression (see mineral profiles and mineral loss chart - next column).

RESULTS

Mineral Profiles





CONCLUSION

Under the conditions of this model system, the new whitening dentifrice formulation provides similar anticaries efficacy to the clinically proven formula.

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