

Effects of a Hexametaphosphate Chewing Gum on Enamel Surfaces

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ABSTRACT

Hexametaphosphate (Glass H Sodium Polyphosphate, HMP) is an effective Calcium-Phosphate-Surface-Active-Builder used for calculus and extrinsic stain control in fluoridated dentifrices. HMP dentifrices have proven to be well tolerated in the clinical setting and laboratory studies reveal no damaging effects to caries preventive effects of fluoride. The incorporation of HMP into chewing gums provides a convenient form to provide patients with added stain and calculus benefits between brushing, though chewing gum applications do not provide concomitant application of topical fluoride. **Objectives:** The purpose of these studies was to assess the effects of HMP chewing gum salivary expectorate (CGSE) on enamel surfaces *in vitro* in a method adapted for chewing gum exposures. **Methods:** Bovine incisor blocks were sectioned, mounted in PMMA, ground and polished to a gamma alumina finish. Specimens were evaluated for surface microhardness (Vickers) at 200 g load (5 indents per specimen) prior to treatments and separated into groups of 4. Treatments included: i) a single 20 minute CGSE exposure (pre vs. post); ii) 5 x 20 minute CGSE exposure; iii) 4 hour CGSE exposure (compared to placebo gum). CGSE exposure included collection of saliva expectorate during 20 minute (•) chewing of gum containing HMP (Glass H, FMC) with saliva collection following periods of 5', 5', 10' with pooling. Average VHN for groups were compared (Students t, $p < 0.05$). **Results:** Pre-Post treatment values (\pm SD) included: i): 332 ± 32 nsd 325 ± 15 ; ii): 307 ± 40 nsd 312 ± 22 . Four hour treatment comparisons iii): Placebo gum: 329 ± 24 nsd HMP gum 324 ± 35 . Profilometry showed no changes in surface roughness either. **Conclusions:** Exposure of enamel to saliva generated by chewing gums containing HMP produced no changes in surface microhardness. These results help support the safety of HMP chewing gum to oral hard tissues.

INTRODUCTION

Chewing gums present a convenient and popular form for oral hygiene intervention. Dentifrices have commonly applied calcium phosphate surface active builders (CPSAB) for the control of dental stains and calculus formation (White *et al.*, *J Clin Dent*. Vol. XIII No. 1, 2002, Pg. 1-5, Special Edition). The application of CPSAB's in chewing gum form demands demonstration of passivity for oral hard tissues and restoratives – as the gum vehicle does not ordinarily contain concomitant application of topical fluoride.

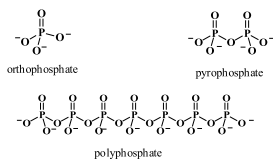
MATERIALS AND METHODS

Treatments:

- Wrigley's® Orbit™ White Chewing Gum with Crest® Dual Action Whitening™
- Sodium Hexametaphosphate (Glass H) in a standard gum base



CPSAB Condensed Phosphates



Sodium Hexametaphosphate



MATERIALS AND METHODS (Cont.)

Protocol

Enamel Substrate Preparation

- Bovine enamel sectioned and mounted in methacrylate
- Polishing to gamma alumina finish



Baseline Measurements



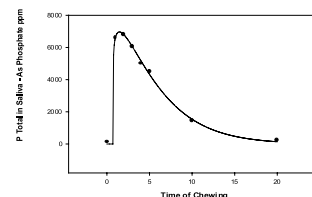
Treatment cycle

- Pellicle formation in pooled human saliva (wax chewing)
- Development of 'Chewing Gum Expectored Saliva'
 - 5' 5' 10' protocol
 - Chew gum for 5 minutes collecting all saliva
 - Chew gum additional 5 minutes collect all saliva
 - Chew gum final 10 minutes collect all saliva

Treatments with CGES

- Single Treatments (one 5/5/10) = 1x
- Single Day Simulation (5 – 5/5/10) = 5x
- Up to 4 Hours Application (12 5/5/10) = 12x

Hexametaphosphate Release Into Saliva With Chewing

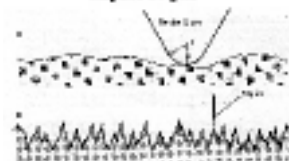


Post Treatment Measurements

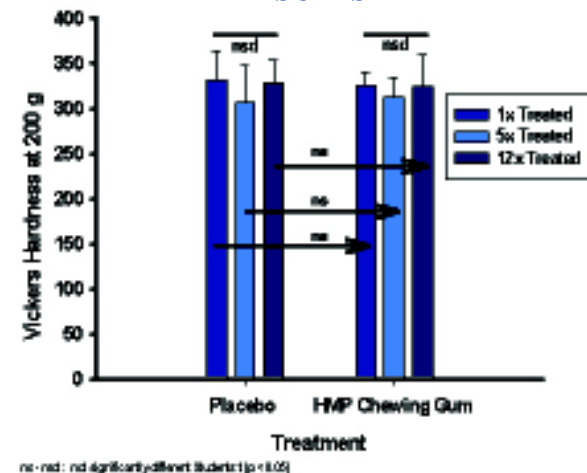
Microhardness Indentation



Surface Profile



RESULTS



ns - nsd: not significantly different (Student's t) $p < 0.05$

Average Surface Roughness

Treatment	R _a Initial	S/NS	R _a Final
Single	0.016	ns	0.016
5x	0.016	ns	0.016
12x	0.018	ns	0.019

CONCLUSION

- ❖ HMP chewing gum treatment did not soften dental enamel with single or multiple treatments.
- ❖ Profilometry assessment of surface roughness confirmed no etching.
- ❖ Wrigley's® Orbit™ White Chewing Gum with Crest® Dual Action Whitening™ was demonstrated safe for enamel.