A CONTINUED INVESTIGATION INTO THE CAPACITY OF RENEW™ DENTIFRICE TO PREVENT WHITE SPOT LESIONS ASSOCIATED WITH ORTHODONTIC TREATMENT

By

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A THESIS PRESENTED TO THE GRADUATE SCHOOL
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To my amazing wife, Susan, for all her support

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CPP-ACP	Casein phosphopeptide-amorphous calcium phosphate
CRT	Caries Risk Test
DI	Decalcification Index
GI	Gingival Index
OTC	Over the counter
Oz	Ounce
PI	Plaque Index
PPM	Parts per million
WSL	White spot lesion

Abstract of Thesis Presented to the Graduate School
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White spot lesions represent a common, yet challenging, dilemma for orthodontists. Studies show incidence of white spot lesions in orthodontic patients to range from 30-50%. Fluoride has shown some benefit as a protective measure, however, this is usually insufficient in orthodontic patients. ReNew™, a prescription strength dentifrice containing 5%, by weight, NovaMin® (calcium sodium phosphosilicate bioactive glass) and 5000 ppm fluoride has been proposed to aid in prevention and reversal of white spot lesions. The primary aim of this study was to determine if the use of ReNew™ reduces formation of white spot lesions in orthodontic patients as compared to a control group. A secondary aim was to determine if the use of ReNew™ improves gingival health in orthodontic patients. Fifty patients undergoing orthodontic treatment in the graduate orthodontic clinic at the University of Florida were recruited to participate in this study. This was a prospective, double blind, randomized control trial. Patients were randomly allocated to either an active (ReNew™) or control group (Crest®) by means of block randomization. Patients were enrolled in the study for one year and seen monthly for normal orthodontic appointments. Decalcification,

gingival health and plaque was assessed and recorded at 3 month intervals. Assessment was done clinically by means of indices, decalcification was assessed on a scale of 0-4 using a modified version of the index developed by Gorelick.[1] Relative Streptococcus mutans and Lactobacillus levels were measured using the Caries Risk Test (CRT) bacteria kits at three month intervals as well. Data for 44 patients was analyzed through 6 months of enrollment. Six patients were dismissed from the study for the following reasons: possible allergic reaction, not meeting inclusion criteria, early removal of orthodontic appliances and failure to make appointments. Statistical analysis was performed using both parametric and non-parametric tests. Results showed no difference between toothpastes in regard to improvement in white spot lesions, plaque or gingival health. Results of this study show there is no difference between a fluoride containing over the counter toothpaste versus ReNew™ in their effects at improving white spot lesions in orthodontic patients.

CHAPTER 1
INTRODUCTION

White spot lesions represent a common, yet challenging, dilemma for orthodontists. The presence of white spot lesions, upon completion of orthodontic treatment, can be a major detractor from what would otherwise be a great esthetic result. A study by Maxfield et al.[2] evaluated the attitudes of patients, parents, orthodontists and general practitioners in regards to various aspects of white spot lesions. The study revealed all groups found white spot lesions to be a detractor from the final esthetic result of orthodontic treatment. Orthodontic appliances make oral hygiene more difficult and exacerbate retention of plaque; these aforementioned factors logically explain the increased incidence of white spot lesions in orthodontic patients. Management of white spot lesions varies by patient and can range from application of a fluoride varnish to restoration with composite or porcelain veneers. Both early detection and treatment of white spot lesions can prove difficult at times, making prevention a critical component of managing white spot lesions. ReNew^{TM}, a prescription strength dentifrice containing 5%, by weight, NovaMin® (calcium sodium phosphosilicate bioactive glass) and 5000 ppm fluoride has been proposed to aid in prevention and reversal of white spot lesions.

White spot lesions are the earliest macroscopic evidence of enamel caries[3]. Increased plaque retention leads to an increased microbial load which produces acid that lowers the pH. Subsequently, there is an increase in the porosity of the enamel allowing penetration of microorganisms to the subsurface layer that is hindered in its ability to remineralize. The majority of demineralization leading to white spot lesions occurs in the subsurface region of enamel.[4] The outer 10 to 30 microns of enamel

surface are believed to stay intact due to the supersaturation of fluoroapatite[5]. Calcium and phosphate ions have difficulty reaching the subsurface enamel layer to help remineralize[6]. Further, salivary proteins known to inhibit demineralization, such as proline-rich proteins and statherin, are not able to pass through the enamel pores to protect this sublayer13. This subsurface demineralization changes the refractive index of the enamel[7] and manifests clinically as a milky white opacity[8], or white spot lesion. Development of white spot lesions can occur rapidly. Studies by both O'Reilly et al.[9] and Ogaard et al.[10] both show development of clinically visible white spot lesions in orthodontic patients that occurred in four weeks, or less. This approximates a minimal time interval between consecutive orthodontic appointments.

Clinical detection of white spot lesions is typically done by visual inspection. Russell[11] discusses differentiating fluorosis and white spot lesions. Fluorosis typically presents as white/yellowish lesions that blend with adjacent teeth structure and are therefore not well defined. Another key to identifying fluorosis is bilateral symmetry. White spot lesions in orthodontic patients are typically found near the bracket base and usually have a crescent shape. White spot lesions will also typically be detected under loose bands or as linear defects near the margin of the band [8]. Other possible means of detection include fluorescence based technology to identify tooth decalcification. Quantitative light-induced fluoroscopy (QLF) and DIAGNOdent are two such technologies that were compared in a study by Aljejani et al. [12] Findings from this study reports that QLF had a higher correlation than DIAGNOdent in detecting early decalcification of enamel. However, this study was done in vitro and translation to clinical use may not prove as beneficial.

Gorelick et al.[1] studied the incidence of white spot lesions in orthodontic patients. Results of this study showed almost 50% of orthodontic patients developed at least one white spot lesion during the course of treatment. Maxillary lateral incisors showed the highest incidence of white spot lesions, possibly attributed to the small surface area of tooth structure between the bracket base and gingival margin. Mandibular canines and first premolars were also particularly susceptible to development of white spot lesions. Lovrov et al.[13] showed that one third of orthodontic patients developed at least one white spot lesion during orthodontic treatment. Lucheese et al.[14]calculated the incidence to be 43%, with 40% occurring within six months of commencing orthodontic treatment with fixed appliances. This study concluded that mandibular first molars closely followed by maxillary lateral incisors showed the highest incidence of white spot lesions.

A study by Ogaard [15] revealed white spot lesions still represented an esthetic concern five years after completion of orthodontic treatment. Treatment of white spot lesions ranges from conservative initial treatment to more invasive restorative options. The following treatments represent the spectrum of treatment from least to most invasive: fluoride mouthwash or varnish, bleaching, microabrasion, composite restorations or porcelain veneers. The appropriate treatment of these lesions will be dependent on number of different factors including severity of the lesion and patient input[8]. More recently, resin infiltration has been shown to effectively and non-invasively mask white spot lesions. [16, 17]

NovaMin® is the trade name for calcium sodium phosphosilicate bioactive glass. NovaMin®'s origins date back to the creation of Bioglass in 1969 when a University of

Florida researcher created a combination of calcium, sodium, silica and phosphorous to mend and accelerate bone growth. In the mid 1990's Bioglass was adapted for treatment of dentinal hypersensitivity and this new formulation was called NovaMin®. Later, it was realized that the mechanism of action to occlude dentinal tubules in the treatment of sensitivity could prove beneficial in the prevention and remineralization of incipient caries[18]. When immersed in an aqueous environment Na+ particles from the NovaMin® begin to exchange with H+ ions. This allows for the release of calcium and phosphate from the calcium sodium phosphosilicate particles. The reaction of sodium ions with the hydrogen cations causes transient increase in pH that facilitates precipitation of calcium and phosphate from both the NovaMin® and saliva to form a calcium phosphate layer on the tooth surface. These reactions and depositions continue until the depositions eventually crystallize into hydroxycarbonate apatite. Hydroxycarbonate apatite is structurally and chemically similar to biological (hydroxy-) apatite.[19]

Fluoride alone has been proven to be beneficial in prevention and remineralization of incipient lesions. A study by Diamanti et al.[20] showed high fluoride concentration dentifrices (greater than 2500 ppm) promoted remineralization and prevented demineralization more effectively than did lower fluoride concentration toothpastes or one containing calcium sodium phosphosilicate. However, according to Bishara et al.[8], treatment of white spot lesions solely with a high fluoride concentration may be undesirable. The reasoning behind this statement is that application of the high fluoride concentration may mineralize the superficial layer, leaving the underlying demineralized structure of the subsurface layer relatively unaffected. They recommend

lower fluoride concentrations which would allow for slower penetration of fluoride and calcium. This proposed treatment should allow for more favorable resolution of white spot lesions. It has been proposed that a combination of fluoride and NovaMin® is beneficial and synergistic in remineralization efforts. This is due to the ability of NovaMin® to provide calcium and phosphorous ions in the production of fluorapatite.[6, 18] The availability of these ions is normally the limiting factor in fluoride treatment. Additionally, the transient increase in pH created by NovaMin® can help resist demineralization.

NovaMin® has also been shown to be beneficial in reducing gingivitis. A study by Tai et al.[21] showed improvement in gingival health, as measured by gingival bleeding and plaque indices, over a six week period with use of dentifrice containing NovaMin®. The exact mechanism of NovaMin®'s antibacterial property remains unclear, it is proposed that the sodium and calcium content of NovaMin® effects bacterial liquid balance[22].

The primary aim of this study was to determine if the use of ReNew™ reduces formation of white spot lesions in orthodontic patients as compared to a control group. A secondary aim was to determine if the use of ReNew™ improves gingival health in orthodontic patients.

CHAPTER 2
MATERIALS AND METHODS

The study protocol was reviewed and approved by the Institutional Review Board at the University of Florida, study 329-2011.

Fifty patients receiving routine orthodontic care in the graduate orthodontic clinic at the University of Florida were enrolled in this study. This prospective, double blind, randomized clinical trial follows up on an initial investigation by Drew Clark, DMD, MS. Dr. Clark enrolled and collected data on the first twenty subjects of this sample. Inclusion criterion for participation in the study were patients (1) between the ages of 12 and 25 with moderate or poor oral hygiene (as determined by a mean plaque index for anterior teeth of 2.5 or greater), (2) with a medical history that would not preclude dental treatment, (3) at least 6 months of orthodontic treatment remaining, (4) fixed orthodontic appliances present on all maxillary and mandibular anterior teeth and (5) currently under the care of a general dentist. Informed consent was obtained from the patient, or parent/legal guardian if under the age of 18, before participation in the study. Patients with (1) excellent oral hygiene, (2) active dental caries, (3) positive pregnancy test or (4) active periodontal disease were excluded from the study.

After clinical exam and review of medical history to ensure potential subjects met enrollment criteria, informed consent was reviewed and given to patient and/or parent. An appointment for the baseline, or initial, study appointment was made at this time. At the initial appointment a salivary sample was obtained in order evaluate relative concentrations (high or low) of Streptococcus mutans and Lactobacillus via CRT bacteria test. Next, the patient's plaque index was assessed and recorded for all anterior teeth after the patient disclosed with plaque disclosing solution. Three intraoral

photographs were captured and stored in Dolphin Imaging to document the plaque index of the patient. A dental cleaning was given to the patient using a Prophy-Jet and scalers then polished with prophy cups and paste. Decalcification and gingival indices were assessed and recorded after teeth were thoroughly dried. Three more intraoral photographs were taken to document any white spot lesions present and gingival conditions. Subjects were randomly assigned to the treatment or control group by means of block randomization. The control group received a tube of Crest® over the counter toothpaste, while the study group received a tube of ReNew™. All toothpaste was covered with blinding labels and weighed before being dispensed to subjects. Subjects were instructed to bring the old tube of toothpaste to each appointment. At the conclusion of the baseline appointment toothpaste, floss, toothbrush and study instructions were dispensed then oral hygiene instructions were reviewed. The patient was seen monthly at which time old toothpaste was collected, new toothpaste was dispensed and oral hygiene instructions were reviewed. Toothpaste was also weighed after collection as a means to measure patient compliance. Three month, six month and nine month appointments were the same as the initial appointment with the exception that no cleaning was given and old toothpaste was collected. The final appointment was similar to the nine month appointment except that no toothpaste was dispensed and the patient was dismissed from the study.

The decalcification index used in the study was a modified version of the white spot lesion index developed by Gorelick et al.[1] The modified decalcification index scores individual teeth as follows (0) no white spot lesion present, (1) visible white spots without surface interruption (mild decalcification), (2) visible white spot lesion

having a roughened surface but not requiring a restoration (moderate decalcification), (3) visible white spot lesion with surface interruption (severe decalcification) and (4) cavitation. The modified gingival index used ranks gingival inflammation on a scale of 0-4. The scoring for the modified gingival index, defined by Lobene et al., is (0) normal (no inflammation), (1) mild inflammation (slight change in color, little change in texture) of any portion of the gingival unit, (2) mild inflammation of the entire gingival unit, (3) moderate inflammation (moderate glazing, redness, edema and/or hypertrophy) of the entire gingival unit, (4) severe inflammation (marked redness and edema/hypertrophy, spontaneous bleeding or ulceration) of the gingival unit. The plaque index used in this study was the Turesky modification of the Quigley-Hein index. Scoring used for this index is on a 0-5 scale and is defined as (0) no plaque, (1) separate flecks or discontinuous bands of plaque at the gingival margin, (2) thin (up to 1mm), continuous band of plaque at the gingival margin, (3) band of plaque wider than 1mm but less than 1/3 of the tooth surface, (4) plaque covering between 1/3 and 2/3 of the tooth surface, (5) plaque covering more than 2/3 of the tooth surface. Teeth scored in this study were the maxillary and mandibular permanent anterior dentition (upper and lower 3-3).

Inter-examiner reliability was assessed between two investigators (Drew Clark and Derek Hoffman) by the author scoring the indices of five randomly selected patients and time points from the initial study sample (n=20). Five additional patients and time points were selected where the author just scored DI. Scoring of the indices by use of photographs stored in Dolphin Imaging was compared to the actual data collected. Inter-examiner reliability was assessed as moderate due to difference between scoring clinically and retrospectively. Dr. Clark the scored the same photographs in Dolphin

Imaging and reliability scores improved. Additionally, comparison of baseline scores between the two investigators showed no statistically significant difference.

CHAPTER 3
STATISTICAL ANALYSIS

Data was initially analyzed using parametric tests, as data for the initial twenty subjects of the sample appeared normally distributed. Paired t-tests were used to compare differences for each index between the two groups (ReNew™ and placebo) between time points. Paired t-tests were also used to compare data collected between the two different investigators. A significance level of $p=0.05$ was set as the threshold for the t-tests. Wilcoxon rank sum test, a non-parametric test, was also used to evaluate any differences between the two groups. While we expected outcome variables to be normally distributed, differences between parametric and non-parametric testing would alert us to cases where this may not be true.

Chi-square tests, Fisher exact test, two sample t-tests and Wilcoxon rank sum tests were used to analyze any significant differences in regards to sex, race, age and time in treatment between the ReNew™ and placebo groups. The same tests were also used to look at the same differences between subjects enrolled by each investigator.

Both Spearman and Pearson correlation tests were used to determine correlation between age, time in treatment and DI score.

CHAPTER 4
RESULTS

Statistical analysis showed the ReNew™ and placebo groups were similar regarding a number of variables at the initial time point. DI, GI and PI scores were all similar; as was age, gender, race and time in treatment (Tables 4-1, 4-2, 4-3).

No statistically significant differences were found between ReNew™ and Crest® OTC dentifrices in regards to white spot lesions, plaque index or gingival health (Figure 4-1, 4-2, 4-3 and Tables 4-4, 4-5, 4-6). Therefore, we failed to reject the null hypothesis. There was a trend toward improvement in white spot lesions found in subjects using Crest® at the 3 month time point (This reached statistical significance using parametric testing p=0.0403). Likewise, the ReNew™ group showed a trend toward improvement in gingival health at the three month time point. None of these improvements were realized at the six month time point. There was no statistically significant difference between the control and treatment groups at the six month time point for all three indices. Data after six months was not included due to the small sample size.

No difference was found between groups in regards to compliance (Table 4-7). 41.7% of subjects in each group were non-compliant with usage of dispensed toothpaste.

Relative bacteria counts of Streptococcus mutans and Lactobacillus (high or low) were assessed between the ReNew™ and Crest® groups and no statistically significant difference was found.

Analysis showed a negative correlation with age and change in DI over time, i.e. older subjects showed a smaller change in DI score (Figure 4-4). There was also a positive correlation between years in treatment and initial DI score (Figure 4-5).

Table 4-1. Baseline Comparison Measures

	ReNew™	Crest®	P-Value (t-test, WRST)*
Mean DI Score	0.333	0.33	(0.27, 0.45)
Mean GI Score	2.142	2.153	(0.95, 0.65)
Mean PI Score	3.035	3.413	(0.27, 0.45)
Mean Age	15.6	15.3	(0.63, 0.85)
Tx Time*	1.5	1.2	(0.23, 0.44)

P-value was set at 0.05, no significant difference between groups at initial timepoint. *Tests used were two sample t-test and Wilcoxon Rank Sum Test

Table 4-2. Gender by Group

	ReNew™	Crest®
Females	7 (29.2%)	9 (37.5%)
Males	17 (70.8%)	15 (62.5%)

p=0.54. No significant difference between groups

Table 4-3. Race by Group

	ReNew™	Crest®
Non-White	4 (16.7%)	6 (25.0%)
Caucasian	20 (83.3%)	18 (75.0%)

p=0.72. No significant difference between groups.

Table 4-4. Decalcification Index (DI)

	N	*Mean*	*Median*	*St Dev*	*Min*	*Max*	*p-value (t-test, WRST)*
Baseline ReNew	24	0.333	0.208	0.335	0	1.167	
Baseline Crest	24	0.33	0.25	0.399	0	1.333	0.97, 0.66
3 Month ReNew	24	0.476	0.333	0.439	0	1.417	
3 Month Crest	23	0.239	0.167	0.302	0	1.25	0.0403*, 0.05
6 Month ReNew	23	0.471	0.417	0.371	0	1.583	
6 Month Crest	21	0.44	0.25	0.47	0	2.083	0.81, 0.5

P-Value was set at 0.05 *There was a significant difference between groups at 3 months, although it was not realized at 6 months.

Table 4-5. Plaque Index (PI)

	N	*Mean*	*Median*	*St Dev*	*Min*	*Max*	*p-value (t-test, WRST)*
Baseline ReNew	24	3.035	3.25	1.331	0	4.917	
Baseline Crest	26	3.391	3.625	0.934	1.583	5	0.27, 0.45
3 Month ReNew	24	3.222	3.417	1.155	1.167	5	
3 Month Crest	23	3.475	3.333	0.895	1.75	4.833	0.41, 0.61
6 Month ReNew	23	3.529	3.417	1.093	1.917	5	
6 Month Crest	21	3.861	4.087	1.072	1	5	0.32, 0.32

P-Value was set at 0.05 There was no significant difference between groups

Table 4-6. Gingival Index (GI)

	N	*Mean*	*Median*	*St Dev*	*Min*	*Max*	*p-value (t-test, WRST)*
Baseline ReNew	24	2.142	2.125	0.612	1.417	3.833	
Baseline Crest	24	2.153	2.25	0.467	1.25	3	0.95, 0.65
3 Month ReNew	24	2.149	2.042	0.521	1.167	3	
3 Month Crest	22	2.348	2.25	0.426	1.667	3.167	0.17, 0.15
6 Month ReNew	23	2.424	2.333	0.56	1.333	3.417	
6 Month Crest	21	2.496	2.417	0.626	1.333	4	0.69, 0.92

P-Value was set at 0.05 There was no significant difference between groups.

Table 4-7. Compliance by Group

	ReNew™	Crest®
Compliant	14 (58.3%)	14 (58.3%)
Non-Compliant	10 (41.7%)	10 (41.7%)
Total	24 (100%)	24 (100%)

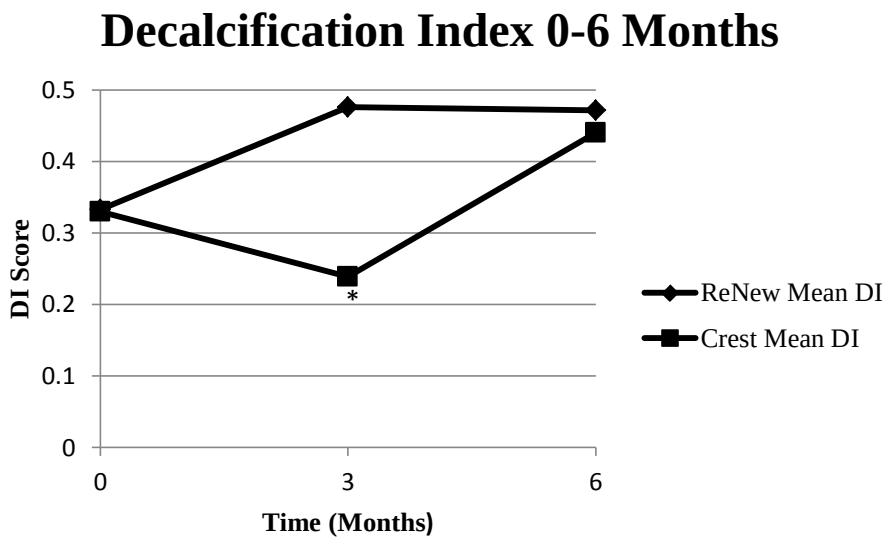

Figure 4-1. Mean DI score for each group 0-6 months. (Note:Statistically significant difference found at 3 months. This was not realized at 6 months.)

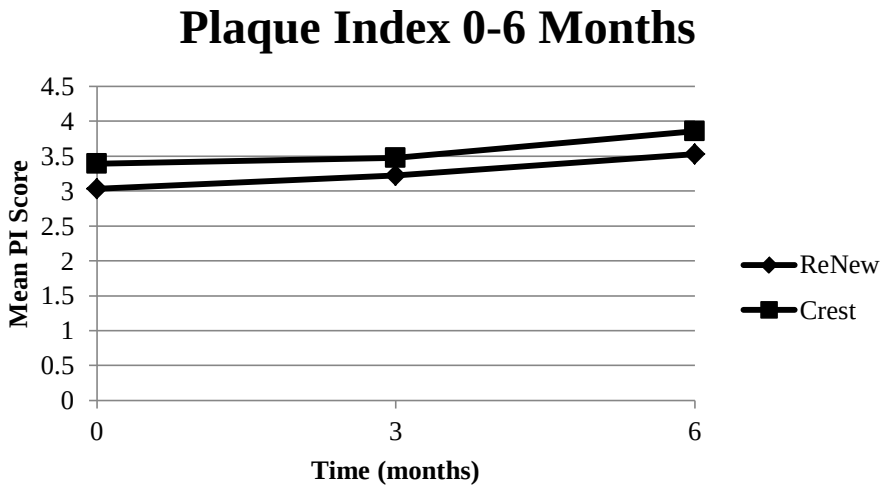

Figure 4-2. Mean PI score for each group 0-6 months. (Note: No statistically significant difference found at 6 months)

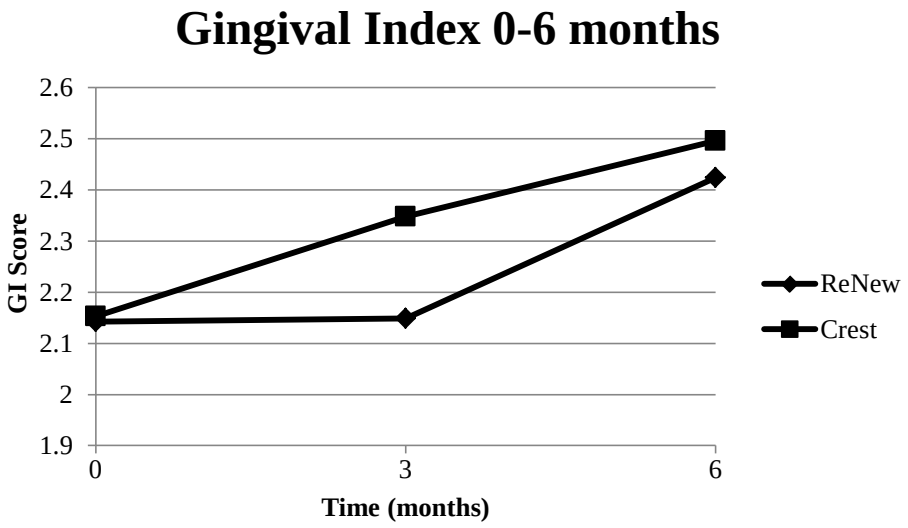

Figure 4-3. Mean GI score 0-6 months. (Note: No statistically significant difference found at 6 months)

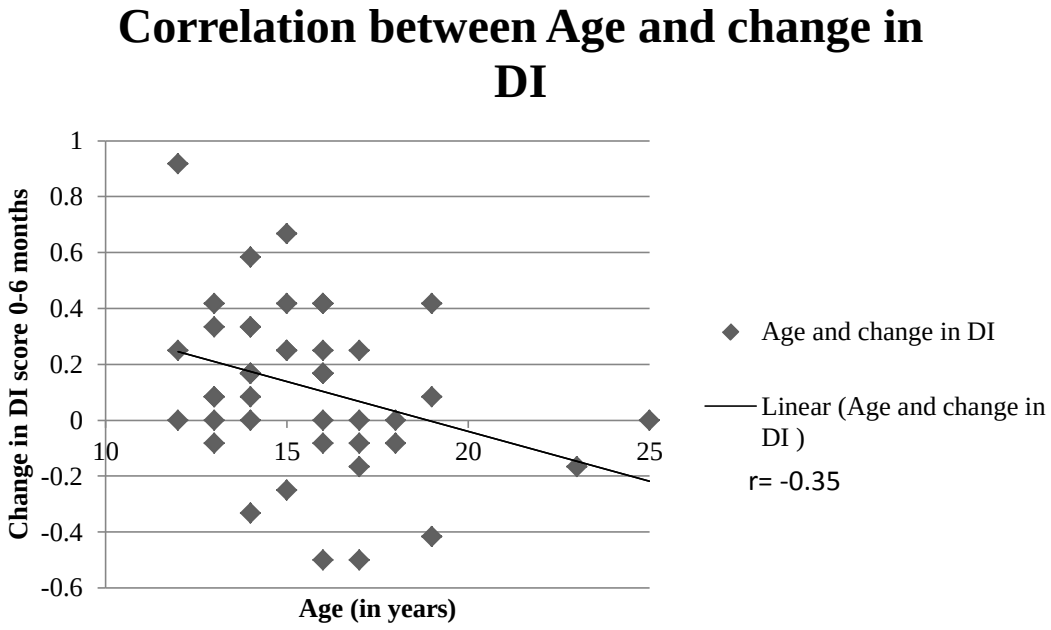

Figure 4-4. Correlation between age and Change in Decalcification Index (DI).

Figure 4-5. Correlation between Initial DI score and time in orthodontic treatment.

CHAPTER 5
DISCUSSION

Use of calcium and phosphorous to prevent and/or reverse white spot lesions shows promise in research studies[23], [24], [25]. There are many different delivery systems for calcium and phosphorous compounds. For the purpose of comparing our results with that of other research, we will consider all delivery vehicles to be equally effective. In reality this is probably not the case, as supported by a review by Walsh[26].

Results of this study are in agreement with a study by Huang et al.[27] that showed no improvement between MI Paste Plus, PreviDent mouthwash and standard homecare regarding improvement of white spot lesions over an eight week period. Results are also in agreement with the in vitro study by Ballard et al.[28] who tested Restore (which contains NovaMin®), Prevident 5000 and MI Paste Plus. Results of this study showed none of these products were more effective at esthetically resolving white spot lesions than a control.

A study by Robertson et al.[23] in 2011, revealed a statistically significant improvement in white spot lesions using MI Paste Plus, as compared to a control, Tom's of Maine toothpaste. In this study fifty patients were followed for three months. Results showed a 53.5% decrease in decalcification index scores in the MI Paste Plus group, while the placebo group showed a 91.1% increase. Possible reasons for the difference in this study may be due to the scoring system used which measured decalcification on a 0-3 scale based on size and did not take into account surface roughness. This scoring system also divided the facial surface of the tooth into quadrants (mesial, distal, incisal and gingival) increasing the amount of data points available, thereby making any

difference easier to detect. Scoring was also assessed by means of photographs which may not be as clinically accurate and could possibly induce bias.

The role of fluoride in prevention of tooth decalcification is well documented. [9, 20, 29, 30] However, there is debate regarding the amount of fluoride that should be prescribed when re-mineralization of subsurface enamel is desired[8, 26]. A limiting factor in gaining re-mineralization, or reversal, of white spot lesions during this study may have been the relatively high concentration of fluoride in the ReNew™. High concentrations of fluoride will lead to re-mineralization of the surface layer with fluorapatite, which may inhibit remineralization of subsurface layers.[8] This reasoning may help explain the improvement seen in the Crest group at the three month mark. Low levels of fluoride working in conjunction with calcium and phosphorous found in saliva may have led to a temporary improvement in white spot lesions. This transient improvement was eventually overcome by the acidic attack from increasing plaque levels. This group may have also shown a transient improvement in hygiene, and hence white spot lesions, for 1-2 months simply because they knew they were enrolled in a study evaluating oral hygiene.

One vehicle which may be beneficial in providing the calcium and phosphorous limiting re-mineralization is by encouraging patients to chew gum with casein phosphopeptide – amorphous calcium phosphate (CPP-ACP). This in combination with fluoride levels found in OTC toothpastes may encourage reversal of white spot lesions in orthodontic patients. Another means to possibly reverse white spot lesions with CPP-ACP would be application of GI Paste Plus, after application of phosphoric acid on the WSL for 30 seconds. Application of phosphoric acid has proven beneficial in removing

surface proteins and fluorapatite for resin infiltration procedures. Further research is warranted to elucidate clinically predictable methods to prevent or reverse white spot lesions, particularly in orthodontic patients.

Limitations of this study include plaque and gingival hyperplasia preventing a completely accurate assessment of white spot lesions. After rinsing with disclosing agent, patients were instructed to brush until all plaque was removed. However, some plaque typically remained especially in hard to reach areas. A scaler was used to remove any remaining plaque, although given clinical time restraints this was difficult sometimes. Patient compliance is another limitation of this study. Compliance, as measured by the weight of returned toothpaste appears equal between both groups. However, if a patient did return old tubes of toothpaste at monthly visits the patient was considered non-compliant, when in reality they may have been compliant. A final limitation of this study may have been the decalcification index used. This index is slightly subjective and rated white spot lesions on a 0-4 scale where patients rarely reached a score of 2 or higher. These patients typically showed white spot lesions on only a couple anterior teeth. This may have made detecting a true difference more difficult. Future studies may consider using fluorescence technology.

As a final remark, Sultan Healthcare the manufacturers of ReNew™ have ceased production of this product for business reasons.

CHAPTER 6
CONCLUSIONS

Results of this study show there is no difference between an over the counter fluoride containing toothpaste versus ReNew™ dentifrice in their effects at improving white spot lesions in orthodontic patients. The results of this study also show there is no difference between ReNew™ and an over the counter toothpaste in regards to improvement in gingival health in orthodontic patients.

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BIOGRAPHICAL SKETCH

Derek Hoffman was born and raised in Ocala, Florida. He completed his undergraduate studies at the University of Florida in 2002, graduating with a B.S. in Business Administration. He then worked in retail management for over four years. He enrolled at the College of Charleston in 2006 to fulfill prerequisites for dental school. He attended dental school at the Medical University of South Carolina, graduating in 2012. He completed his orthodontic residency at the University of Florida graduating in May 2015.

Derek and his wife have been married since 2004. Together, they have two children, Ellie who is 4 and Miles who is 2. They are expecting their third child very soon. When Derek is not treating patients, reading ABO articles, tracing cephs or thumbing through the AJO-DO, he enjoys spending time with his family. He also enjoys golf and surfing.

Derek works in private practice in Orange Park, Florida.