

‘Chocolate-Based’ Toothpaste Remineralizes Enamel

By: *Caroline Helwick*

NEW ORLEANS, Louisiana — A toothpaste that contains a natural chocolate extract was more capable of remineralizing exposed dentin, which could reduce dental hypersensitivity, than fluoride-based toothpastes, including Sensodyne NuPro (GlaxoSmithKline), according to results from a randomized double-blind clinical.

The study evaluated the enamel-strengthening potential of Theodent (Theodent) toothpaste containing the patented compound Rennou (Theodent). The active ingredient of Rennou is theobromine, a compound that is prominent in chocolate; it also contains calcium and phosphate. Theodent does not contain fluoride.

"Ironically, there is something in chocolate that can build healthier teeth," said Arman Sadeghpour, PhD, chief executive officer of Theodent, who presented the study results at a press briefing held here during the American Dental Association (ADA) 2013 Annual Session.

Describing Rennou, Dr. Sadeghpour said the compound was granted generally regarded as safe status by the US Food and Drug Administration, which is the agency's highest standard for food and food additive safety. He noted that it is not harmful when swallowed; there has been rising concern that small children ingest too much fluoride from fluoride-containing toothpastes.

MECHANISM OF ACTION

Enamel is the most highly mineralized substance in the body, consisting of 96% hydroxyapatite. When the enamel wears and thins, often as a result of frequent consumption of acidic beverages, the underlying dentin is exposed, causing hypersensitivity.

Rennou is thought to help rebuild the hydroxyapatite in the enamel, according to Dr. Sadeghpour.

He said the compound catalyzes the growth of larger hydroxyapatite crystals when in the presence of calcium and phosphate ions and rebuilds enamel in sheeting layers. In normal enamel, the hydroxyapatite unit crystal is approximately a half micron in size.

When exposed to theobromine, the unit crystal quadruples in size, to approximately 2 microns, he said.

"This is the fundamental backbone of the technology and why Theodent is so effective in remineralization," Dr. Sadeghpour said.

CLINICAL TRIAL OF 80 PATIENTS

The investigators designed a double-blind, randomized clinical trial to evaluate the enamel-strengthening potential of the toothpaste by its ability to repair and remineralize exposed dentin.

The study followed an in situ dentin slab model design. In the trial, each of 80 participants wore 4 intraoral appliances bearing dentin blocks while using 1 of 4 test products twice daily for 7 days. Participants were expected to maintain their usual consumption of food and beverages, Dr. Sadeghpour said during his presentation of the results.

Participants were randomly assigned to use 1 of 4 toothpastes, Theodent Classic, Sensodyne NuPro 5000 with Novamine (a remineralization agent), Colgate (Colgate-Palmolive Company), or Theodent Classic plus fluoride (0.24%). (The addition of fluoride to Theodent Classic was experimental; the company has no plans to produce a fluoride-containing product.)



<http://www.medscape.com/viewarticle/814085>

The investigators removed the appliances successively after 1, 2, 3, and 7 days for examination by scanning electron microscope to calculate the level of tubule occlusion and the amount of smear layer deposited. The researchers obtained 4 dentin samples per patient, for a total of 320 samples.

THEODENT WAS MORE EFFECTIVE

"The Theodent toothpastes (nonfluoride and fluoride-containing) were both more effective in a shorter period of time than Sensodyne Nupro 5000 in measurements of full tubule occlusion, reduction of fully open tubules and partial tubule occlusion, and smear layer deposition," Dr. Sadeghpour reported.

The percentage of surface area covered by deposited smear layer (the material that occludes the tubules) after 14 uses of the 4 toothpastes was a key test of efficacy. At the assessment on day 1 (after only 2 product uses), Theodent had achieved 90% smear layer deposition compared with 43% with Sensodyne and about 3% with Colgate, Dr. Sadeghpour reported.

By day 3, Theodent had achieved 100% coverage, Sensodyne achieved 80%, and Colgate achieved less than 30%.

At all measurement points, percentage of deposited smear layer was similar between the Theodent Classic (without fluoride) and Theodent Classic plus fluoride toothpastes but was significantly ($P < .05$) higher in these 2 theobromine-containing toothpastes than with either Sensodyne or Colgate.

Sensodyne Nupro 5000 also demonstrated efficacy with increased usage; however, Colgate toothpaste did not. After 6 and 14 uses, the percentage of completely occluded tubules was comparable between the 2 Theodent products and Sensodyne.

Images from the scanning electron microscope appeared similar for Colgate both before and after treatment.

Dr. Sadeghpour maintained that the enamel-strengthening effect will translate into less hypersensitivity for patients. However, the current study did not assess that endpoint or any possible effect on dental caries.

CONSUMER DEMAND FOR A NATURAL PRODUCT

Diane D. Romaine, DMD, MAGD, president of the Maryland State Dental Association's Charitable and Educational Foundation and a practitioner in Frostburg, Maryland, said in an interview with Medscape Medical News, "I was really impressed with the data, to see how much better Theodent was than Sensodyne, at a lower concentration."

"As a practicing dentist in rural Appalachia, I see the effects of demineralization from soda consumption in children and young adults," she said, suggesting there is a need for effective products to neutralize this effect.

In addition, Dr. Romaine noted that the "movement for a more natural product" by consumers indicates there is a market for a non-fluoride-containing product. "The ADA has been big believer in fluoride, and it seems to have been helpful in many communities, but in the current culture, people are interested in reaching out for more natural products," she pointed out.

"What I would really like to see," she added, "is that such a toothpaste is not a 'niche, high-end product' but is available to those who really need it, where it could be even more effective."

The study was funded by a research grant from Theodent. Dr. Sadeghpour is employed by Theodent. Dr. Romaine has disclosed no relevant financial relationships.

American Dental Association (ADA) 2013 Annual Session. Presented October 31, 2013.