

Treating the Caries



Dis

An Interview with Dr. Brian Nový, Loma Linda University

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Dr. Brian Nový

Caries is a transmissible bacterial infection that can lead to cavitation, also called a cavity or tooth decay. Shifting focus from the “cavity” to the “caries disease process” is Dr. Brian Nový’s goal in teaching the Caries Course at Loma Linda University (LLU) in Loma Linda, California.

Prevention is taught in dental school, but many dentists are anxious to begin the real work of dentists – drilling and filling – so prevention rarely holds their attention for too long. Besides, prevention fits into the responsibilities of the dental hygienist, not the dentist. Or so the past has played out. Things are changing and what better place to start than dental school education.

Dr. Nový also presents this information in continuing education courses. I attended Dr. Nový’s lecture at the Yankee Dental Meeting in January 2009, and found it educational, entertaining and inspiring. Dr. Nový has a passion for prevention that rivals Dr. Bob Barkley, from several decades past. His presentation provided new scientific information about the disease of caries, gave participants the opportunity to test caries susceptibility in their own mouths and sent them back to their dental practices with a new perspective and the knowledge and tools to make a difference with their patients.

When I had the opportunity to talk with Dr. Nový, I asked him about his interest in prevention – specifically about demineralization – and what happens before the first cavity occurs. We know that someone with a cavity is now at risk for more decay, but how do we prevent the very first cavity?

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Dr. Nový, how did you get interested in prevention?

Nový: It wasn't during dental school. I was bored by prevention in dental school and wanted to get to the real dentistry – drilling and filling. After I graduated, got out into the clinical practice and was faced with real problems, I realized there were lots of patients whose dentists had given up hope. It was simply assumed that these patients would never take responsibility for their oral hygiene and that they were doomed to a life of repairing the damage. These patients often did everything they could with brushing and flossing but still had disease every six months.

What did you do for these patients?

Nový: I remembered a few things from my education at Loma Linda University, like the use of chlorhexidine rinsing and fluoride trays. So I started recommending chlorhexidine and began fabricating fluoride trays.

Why wasn't brushing and flossing working for these patients?

Nový: Brushing and flossing will change the biofilm, but not the oral environment. If the oral environment is acidic, caries will continue.

How did you move beyond the basic approaches to prevention?

Nový: I wasn't able to solve the caries problem for these patients with only brushing, flossing, chlorhexidine and fluoride, so I explored a little deeper and found fringe dentists who were having success with prevention, doing unconventional things. I continued to study, read, take courses and investigate different products. The more I got into it, the more I enjoyed the search and the more I learned about the complexities of saliva. Because of the knowledge and experience I'd gained in my search for answers to the caries problem, I was asked to teach the caries course at LLU, which I've been doing now for two years.

What are you doing with your students to make prevention more interesting than it was when you were a student?

Nový: Dental students learn about caries as a bacterial infection and they learn to treat medically. They have access to pharmacists who will compound formulas for them for therapeutic interventions to treat the disease of caries. Determining their own caries risk is a powerful teaching tool. They devise a treatment plan and carry it out. Treating each other, they realize how difficult it is to control someone else's behavior. When

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they treat themselves, they take ownership and this teaches them about the disease of caries, but also what it takes to comply with the recommended treatment. I have them write up their experiences treating a classmate, which is quite entertaining (for an example of this, view the sidebar at the bottom of the page).

Are these students taking this new understanding of caries and prevention to the clinic?

Nový: When they go to the clinic floor, they have two options. First, they can forget everything they were taught about therapeutic interventions and focus on drilling and filling or they can combine the two approaches. To reinforce the caries instructions, students get points for treating caries disease, not just repairing the damage from the disease. So many of the changes in prevention are just now evolving, it will be interesting to see what happens as these dentists begin practice in the real world and how much emphasis they put on prevention.

How has your perspective on restorative dentistry changed as a result of your quest to solve the caries problem?

Nový: I came out of dental school ready to do my part to drill and fill and repair all the anticipated damage from caries.

Now, the first filing a person gets is a sad day for me. If the caries disease isn't stopped and repair continues, that tooth is very likely to end up a root canal or ultimately be replaced by an implant.

Can you give me a snap shot of your perspective on caries?

Nový: Caries is considered a bacterial infection, but it really is a pH disease. The demineralization of teeth is all about the pH of saliva. Acidic saliva encourages the growth of bacteria that like living in an acidic environment, and invites other bacteria to join the biofilm. These bacteria make more acid, keeping the oral pH low and demineralizing the enamel. The goal of treating caries is to reestablish and maintain a healthy pH in the mouth. When that's accomplished, repair of the teeth can begin. Repairing the teeth without addressing the pH level of the mouth is a recipe for disaster. Demineralization will continue and each time the patient returns there will be new cavities.

What are some of the diagnostics that help clinicians understand what's happening in the mouth and happening to the pH level of the saliva?

Nový: Testing pH can be as simple as using pH test strips to measure the acid level in the saliva. GC America has a

Caries Susceptibility Test (excerpt from a student paper)

Matthew Wasemiller

April 7, 2008, was a very harsh day for I realized that my cavity-free, pearl-esque teeth were flirting with danger. Always one to use a toothpick after meals, and a three-times-a-day brusher, I slowly eased myself into thinking my oral flora had no room for *Mutans Streptococci (MS)* and the arsenal of ill that went along with them. Boy, was I wrong.

My Biofilm ATP activity was 6,936 RLUs (healthy is 1,500). This number came as a shock to me as I had no carious lesions or previous cavitations. Both of my bacterial cultures for *MS* and *Lactobacillus* were greater than 105 colony-forming units. First was denial, and then came anger. I knew I had to do something about this.

My clinical partner and I decided that the best treatment for me would be to start a xylitol chewing gum regimen. Xylitol gum has been shown to have devastating effects on *MS*, thus leading to positive benefits for oral health. The xylitol chewing gum had a pleasant spearmint flavor and a nice chew, making this treatment plan a joy. Xylitol gum was chewed after every meal and two to four pieces were chewed between meals. Oral hygiene was kept at the same incredibly high standard as before.

Retesting on May 21, showed positive results as my biofilm ATP score was 1,295 RLUs. This showed me that the xylitol gum has a positive effect on my oral health as *MS* levels were decreased in my biofilm. *MS* culture counts were still high, but I believe these *MS* are defective in glucan-synthesis. According to the research I read, the free-floating *MS* are less prone to making carious lesions than those in biofilm.

Overall, I was thrilled to find my biofilm ATP score lowered to a very acceptable level. I have no hesitation recommending xylitol gum to my patients looking to reduce their levels of *MS*. I feel that this treatment plan was a success and gave me greater insight, in that white and beautiful looking teeth can have lurking problems, but solutions and treatments are available.

Saliva-Check Buffer Kit that tests not only pH of saliva, but also salivary consistency, stimulated saliva flow and saliva buffering capacity. Bacterial analysis can be done with culturing or with DNA testing. We can even measure ATP levels of the bacteria within the biofilm. CariFree makes a testing system for this. A swab of the biofilm is put into a tube with a bioluminescence reagent. The reaction produces bioluminescence that can be read by the handheld CariScreen meter. The higher the ATP production, the more bacteria there are, eating and producing acid.

If a patient has a low pH, what can be done to elevate that pH to a neutral level?

Nový: Acid pH can be elevated by altering nutrition. By reducing the ingestion of foods and beverages that are high in sugar, nutrition for the bacteria that produce acids is altered. Xylitol used throughout the day can also reduce the acid producing bacterial population. Licorice might also have antibacterial effects when incorporated into a lollipop. Water and baking soda will also increase the pH. When the pH goes up, the acid producing bacteria leave and with a neutral or healthy pH level, good bacteria grow.

I don't recall learning very much in dental hygiene school about the salivary glands and I haven't run across much in the research. Why is that?

Nový: The lack of science in this area is surprising. Maybe we need more dental physiologists. Salivary glands are the least understood endocrine glands. We know more about the thymus gland, which disappears with puberty, than we do about the salivary glands, that are so very important through life. If we understood more about salivary glands, we might find a very simple answer to the caries problem.

It's clear that a lowered salivary flow due to disease or medications will present problems for the oral cavity, but are there systemic conditions you've seen in patients that influence the salivary pH?

Nový: One example that hygienists and dentists might have experience with is end-stage renal failure. The kidneys are not filtering out the urea so the urea

is excreted through the salivary glands. Alkaline saliva gives the patient a weird, soapy taste and to combat this altered taste, they crave sugars. They develop high levels of calculus, but despite this high sugar intake, there's no decay. Why?

From what I've learned from you, it's the pH. In these renal failure cases, the oral pH is too high for acid producing bacteria to live, so despite the high sugar intake, the pH remains high. You've obviously read and studied this area extensively and taken your ideas beyond the basic sugar/bacteria/tooth diagram we all learned in school. I'm curious, what research question would you like to see answered now?

Nový: Science hasn't yet provided us with a good model for oral health. It would be interesting to look at 100 people who have no caries or periodontal disease and see what they have that those with disease are lacking. Or find something that the healthy ones don't have that those with disease do have. When we better understand oral health, we will more effectively treat the caries disease.

The way you present caries information is quite positive and hopeful, despite the fact that caries is now the number-one childhood disease.

Nový: We know more now and preventing caries is more involved than simply brushing and flossing. That part is important, but despite good brushing and flossing, some patients still have disease. The message these patients heard in the past was, "It's your fault, you can't even take care of yourself!" They need to know they have a disease, they got it from someone and there are steps to get rid of it. If you know how you got the disease, you can get rid of it. It's not hopeless. ■

Interviewee's Bio

Dr. Brian Nový is an assistant professor of restorative dentistry at Loma Linda University, where he teaches caries management and restorative dentistry. He maintains a private practice in Valencia, California, that is focused on minimally invasive and maximum intervention treatment. He also acts as clinical director for three nonprofit dental clinics in Southern California, and is the vice president of the Foundation for Worldwide Health (an international non profit organization dedicated to improving healthcare and healthcare education in the developing third world). Dr. Nový lectures internationally on dental materials as well as advances in caries diagnosis and emerging treatment modalities. The California Dental Association Foundation recently awarded Dr. Nový the Dugoni Award for excellence in dental education.