

The Synergistic Interplay Between Dental Sleep Medicine and General Dentistry, Should Your Practice be Concerned? Why?

Video Transcript

Eugene Santucci: Well, thank you so very much, Sarah. My goodness, I think you made half of that monologue up, I don't remember all those things. But anyway, thank you so much. I'm really pleased to be here today with everyone. And I want to thank Procter & Gamble for inviting me. And I'm sure all of you who are here want to thank them for all this free CE that they're providing, which is a fantastic, fantastic thing they're doing. As Sarah said, I'm originally, I know she mentioned, from Pennsylvania, went to school in Philadelphia Temple University. And so, I'm a Philadelphia kid, so hi guys back in Pennsylvania. And here in beautiful San Francisco Bay Area from which I am emanating, I always call my brother back there and then say, hey, the weather is 70 degrees, the sun is shining and today, I checked back in Wilkinsburg, Pennsylvania, it is 70 degrees so I can't call him today.

Those of you who have lectured or presented to groups, we always get that interaction with the people in the audience and you can see their faces, and you can repeat something if you think it hasn't gotten across. But doing these, I don't have the ability to see all your beautiful faces. So, hello to everyone. And here in San Francisco, it is 11 o'clock in the morning, and where you are, it's maybe around two o'clock or a little bit less. So I hope you're enjoying something and maybe back in the East Coast, having a little sip of wine, which I can't have here.

So let's chat a little bit about our presentation today. The Synergistic Interplay Between Dental

Sleep Medicine and General Dentistry. Should Your Practice be Concerned and Why? And in attendance, I'm sure we have dentists, and I'm sure we have tons and tons of hygienists, and welcome, you're our first line of defense out there, we love you guys. Why this title? With the COVID going on now, everybody's talking about their personal health. For your family, for your loved ones, when we get back to work, so health, health, health is a real, real big thing on our minds today.

We're going to talk about your total patient health and how it relates to you and your practices today, and maybe changing a few paradigms on how you see your patients or what you can offer them to improve their total health, and at the same time, get perhaps an improvement in their oral health. We are great at evaluating this gnathostomatic system and looking for disease and periodontal disease and caries and [inaudible] function. And we look at their medical history, [inaudible] and we recommend this, this and this. I'm hoping that we can just step back a little bit and take a little bit more interest in their total health, their total body health. That's our goal today. Should your practice be concerned? Why should it be concerned?

Well, one of the biggest reasons is that in 2017, the American Dental Association put out this resolution. It says how to treat sleep related breathing disorders, treatment in a new policy. And you can go online, you can download this, and it's about two and a half pages, but let me just summarize a little bit. They talk about

sleep disorders throughout the world now being a public health issue. And we're great at that. Remember years ago when decay was running rampant, and they came out with the fluoride, dentistry picked up the banner and ran with it and we've done a fantastic job in dealing with that.

American Dental Association says, look, this is a worldwide problem, almost a little bit like COVID. And the medical profession is totally swamped with patients. And unfortunately, we love our physicians to death, but in their medical school training, they really, really, really aren't trained well in sleep, and disturbed sleep and what that can do to the body. Those that go on can get a further degree in sleep medicine are well, well trained. I've talked about the normal physician coming out of school.

And so, they also have limited time. You go into their office, and I don't know if you're limited seven, eight, 10 minutes, whatever. And then they stick that little piece of wood in your mouth and they look in there for two nanoseconds. And they say, oh, that's fine. But let's stop and realize, this is our sandbox. We are in here every day, we know how to look for things, we see when things aren't right. So, that's one reason that we have the availability. We are dealing with things that we can see some red flags intraorally, that can set us off with, there may be some other systemic problems going on.

So, they said, what can we do without totally disrupting what we do in our offices today? We don't want this to be a big disruption. We've got things to do, we've got treatment to give, we have our systems in place. Let's not burden the average dental office with this in such a way that it affects them in what they can do for our patients. And so, the one thing they recommend is, to add to your normal medical intake exam a sleep questionnaire. And once the patient fills out that very basic sleep questionnaire, and I will show you some examples, and then do some checking in the mouth, and I'll give you a couple more parameters what to check for, if they start scoring high with this, then the resolution says,

tell your patient, refer them to their primary health physician and have a sleep study done.

And that's it. We've done our job. We have now been the gatekeepers and hopefully getting many, many of these patients, who normally would not be evaluated or even know enough to ask their physician for a sleep study, we're there, we're that first line of defense. And this should be done for not only adults but children. Critical, critical, critical that it's done in children, and we'll talk about that in a little bit.

It goes on to say that if you then want to see these patients in your office, if they score high on the sleep study and you want to treat that additional training needs to be done, and there are many areas across the country now that have what we would call a sleep mini residency. There's one at UCLA, one at Tufts. The one I'm closely familiar with is at University of the Pacific, and we have six days and it's three weekends, a Friday and a Saturday. And when you come out of that, you will have the basics of understanding what to do, how to do it and how it affects your office.

So these are the things that the American Dental Association recommends. They're not over the top but it can have great, great, great impact on the future. So this is a typical sleep study, this is called Stop Bang, and you can pull these down off the internet. And the Stop Bang, when you pull it up, there's so many different forms of it, but these questions are all the same. And they're all yes or no question, yes or no answers. I like this one particularly when you're talking about BMI, total body mass index. You don't have to get your abacus out to fill it out, they have a chart right here. So I do like this. And then it scores it for you, and it tells you if they score more than two or more than three yeses, what you would recommend. And then they sign. And this becomes part of their total office history. And you keep this with you and hey, that you have done this and you have referred the patient etc. So you essentially have done your job.

So what am I going to talk about today? What are our presentation goals in this hour and a half or so? Well, a lot of it's going to be

understanding sleep because a part of this there may be questions that are asked of the dentist, and more than likely, all you fantastic hygienists out there, what essentially is sleep? What is natural sleep? What is interrupted sleep? What are disturbances and why are they a problem? What comorbidities do we see in our patients who are undergoing and have unhealthy sleep habits, and how can we pick those up? And what is practical for your office? Again, we don't want something to take over your office day and say all we do all day long is talk about sleep, I can get my grounds done.

We're also going to talk about considering new paradigms as you look and treat your patients. Not that it's things you don't know but just maybe bringing to the forefront some of these things that perhaps you kind of gleaned over before. We're going to look at GERDs. Yesterday, Dr. Ward Noble, if you were on, did a fantastic job on Bruxings so we're not going to hit that. But that is something that you'll be looking at. Saliva and erosion. And also at the very end, periodontal disease. And is there a starting relationship between obstructive sleep apnea or sleep problems and periodontal disease? And I think that's a very, very fertile field that's just starting to gain a lot of momentum. And we'll discuss at the very end, diagnosis of what we're seeing, prevention, and perhaps what we do in our dental office to see these things early and how we treat it.

So what's going on in the country? Two thirds of the world's population exhibit disturbed sleep. Two thirds of the world's population, that is huge. A lot of the motor vehicle accidents that we see, people are falling asleep at the wheel. Have you ever done that? You're going about 65 miles an hour, all of a sudden, your eyes close just a little bit. How long does it take for you to be over into the next lane to ongoing traffic? So that's huge, that's huge. And a lot of these as it says here, the studies are showing that you combine alcohol and drug deaths motor vehicle wise, it's higher for people falling asleep at the wheel.

What's going on? We come into the room hey, Mr. Jones, how are you doing? I'm fine, but, you know, I'm really tired. Gosh, how many of my patients just say they're tired. I work here in

Silicon Valley and many of my patients are 35 year olds and they're on their high tech jobs, and they're getting maybe four hours of sleep and they're pushing, pushing, pushing and pushing. But I'm hearing the word fatigue more and more. I'm also hearing it in people who say look, I sleep, I'm in bed seven hours and I wake up and I'm fatigued. I don't know why. Again, we'll talk about why that possibly should be. So, should we be concerned? Should our practice be concerned? And again, we are the gatekeepers.

So what's sleep? So normal sleep is defined as the cyclic, temporary and physiological loss of consciousness. We actually are unconscious while we're sleeping, that is promptly and completely reversed with appropriate stimuli. Thank God. And the stimuli is what? Usually our alarm clock, pound the hell out of the alarm clock, right? Or if you're married, it's usually you're snoring and your wife kicks you in the ribs to wake you up to stop snoring. But we do respond to stimuli.

Why do we sleep? You ever think about that? Has evolution made a mistake? Through the years, people have been trying to figure out why we sleep. Francis Crick, brilliant, brilliant man, who developed the helix in DNA, so he's no slouch. Freud, of course, tried to look for some physiologic component to it. And way back in the Roman days, even Quintilian started to figure out why we sleep and what is the relationship of sleep to learning and memory.

There's a great book I recommend. It's Why We Sleep by Matthew Walker, W-A-L-K-E-R. And it's written for the layman and a little bit above, and it gives you a lot of fantastic background on sleep. Evolution doesn't make mistakes as we know through the years. So every 24 hours, what does sleep do for us? Helps us in two ways. Nurtures the brain and it nurtures the body. Nurtures the brain. It helps us to memorize facts. It helps us to re-invigorated the prefrontal cortex. The prefrontal cortex is where we make our decisions. We plan our days, we're able to plan events and our life is planned in that prefrontal cortex. So every night while we're asleep, that area gets re-embellished with good stuff.

And then dreams come in and the dreams is like this neural chemical bath that comes through and wipes away all the bad stuff and puts in a lot of good stuff. It also encourages short term memories to long term memories, which is good. I teach at the university, as I stated before, and I'll give an exam and a student will come up and, "Oh, Dr. Sactucci, I really, really, really did well, in your exam." He said, "I was up all night, I crammed all night. I didn't sleep at all." I'll say well, "Thank you. I'm glad you did well. But if I were to give you this exam that you crammed all night for three weeks from now, do you think you'd do as well in your exams today?" So what am I saying. We may cram for the short term things but if we're trying to understand and build concepts, you need sleep to convert those into what we call long term memories, and that's what sleep does for us.

And how about the body? So every 24 hours, we need to rest. When you're tired, you want to go to sleep, right? We need that sleep, the body fights off malignancies, balances insulin, controls our appetites. Positive effect on our heart. So this combination of sleep and we need to sleep, the magic number is about seven hours. It is this rebathing of the mind and the body to make us get up the next day and face the day in a very, very healthy fashion.

So what makes us sleep? Two things. Circadian rhythms and sleep pressure. Now circadian rhythms is kind of built into our genetic code, and it's hard to change. There is a little slight change, and I'll mention it later. And the other is sleep pressure. Sleep pressure is telling us go to sleep, go to sleep, go to sleep, go to sleep, go to sleep. So those two come together makes us sleep. Wouldn't it be great to have this sleep like these little babies, my god, die for something like that. So these two things, circadian rhythm and sleep pressure.

What is circadian rhythm? As I said, it is genetically set for us and it sets off our whole day. Melatonin which starts our sleep cycle usually 9, 10 o'clock is when it normally would flow. And that's when way back we had no artificial lights. The sun went down and melatonin started to flow and we started to

get sleepy. But today, how many of us get to sleep by nine o'clock? We may be in bed 11, 11:30, and then we've got the phone, we've got the computer, we've got the light on our clock. And as long as the blue light is in the room, melatonin just doesn't flow. So if you get to bed at 12 o'clock, you've been stimulated by the light and maybe one-ish before you fall asleep. And then you're fighting getting up at 5:30, six o'clock. What are we looking at? Five hours of sleep? We need seven hours of sleep.

But a lot of my patients, as I said, who are out here in Silicon Valley say, hey, I can get along in four hours of sleep. No, you can't. They said, yeah, but on Saturdays, I can sleep 12 hours. That 12 hours on Saturday does not make up for the sleep debt that you have accumulated all week. Once you're in that sleep, it takes about one or two months of a good seven, seven and a half hours of sleep to get you back where you should be. So you're kidding yourself to think that you can go on four to four and a half hours of sleep.

The other thing is sleep pressure that we talked about. And sleep pressure, there's a buildup of what we call adenosine. And adenosine says, hey, you're tired, tired, tired, tired, go to sleep. But what fights off adenosine? We're up, we got projects to do, things to do, the kids projects, we've got things at school, things at work. What do we do? We grab for some caffeine. The most widely used psychoactive stimulant in the world. And the caffeine blocks off the receptor sites for the adenosine. So the adenosine can't make you tired. So the adenosine keeps building up behind this blockage of caffeine to the point that the caffeine is done, and then crash all the adenosine hits at one time and then we're just out totally.

Ask you a question, what's the half life of caffeine? Let's say you have dinner at 6, 6:30. By the time you're done, it's 7:30, you have a cup of coffee. How long is that caffeine in your system? The half life of caffeine is about five and a half hours. So, if you're trying to go to bed at 11, 11:30, and you're finding out that you're not being able to sleep, it could be the effect of the caffeine. Years ago, when I was going to school, I think I could drink espresso

just before I closed my eyes and went to sleep. I can't do that today. Some of it is genetic built into us, but as we get older, I'm finding that I can't tolerate caffeine the way I did before. And so, I have to cut back on my caffeine say by 5:30 or so. That's about it. After that, I know it's going to affect my ability to fall asleep.

So this is a hypnogram. This is what if you went and have your sleep study done, this is what the doctors look at. And what we're looking at here is we have what we call a non REM sleep, and that goes down three or four stages. We then come up, come up, and we hit the REM sleep, which is our dream sleep. And then we go through several of these cycles a night. And as we go further along, you could see these cycles are getting closer and shorter and shorter, and the dream cycles are getting closer and closer and closer. So, REM cycle is when we dream, of course, right? So we have the non REM sleep and we're going down, we're getting a little deeper, deeper, deeper. But what about here, we get up and go to the bathroom? We go to the bathroom when we come back, do we start here? No, we have to go back to the top. And we start going down this cycle again.

And let's say we go way down here, we're deep, deep, deep sleep, then we have an apneic episode where we stop breathing, and we wake up for 10, 15, 20 seconds. Do we go and start continuing? No, we go back to the top. That's why this interruption, the disruption of the sleep cycle is critical because even though we may be in bed seven hours, if we have not completed totally four or five or six of these complete cycles, even though we've been in bed seven hours, we're going to wake up and we're tired.

So this is the disruptive pattern of what interferes with our sleep and why we may even be in bed for seven or eight hours and still be tired when we wake up the next day. As I said, as we go down, our dreams come closer and closer and closer, and aren't the best dreams in the world right here just before you wake up. And you [inaudible 00:20:07], I don't want to wake up, I was having the best dream ever. So this is what is done when you have a sleep study done and this is what the physician will look at.

So the scoring of this is what's called an Apnea Hypopnea Index or an AHI. And how many times during the period of time did you stop breathing? How many times were you hypoxic, which means that you are snoring? So you're snoring snoring, snoring, snoring, snoring, snoring, and then you take a big deep breath. That's an apneic episode. So let's say you have 20 apneas, 20 hypopneas. You add those together, that's 40. And let's say that was done over two hours so you divide that by two, so your score is 20. So you're down in here, you're down in this middle moderate range of apnea hypopnea. Now they look at many more things, but most of the time they will mention your AHI index.

So, what does all this mean? What are the comorbidities that we see coming from these breathing disorders? Some of these we know. Headaches, snoring, difficulty in sleeping, jaw, ear pain, neck pain. Patients waking up and saying, in the morning, my jaw really, really hurts, these muscles are tight. We'll talk about that. Sugar cravings. How does it affect sugar cravings? How does it affect obesity and diabetes? We'll discuss that. Push on cardiovascular disease. Difficulty with mentally focusing low energy, and you just wake up feeling refreshed. And these are just some of the list of comorbidities that we see in our patients just because they are not having effective sleep.

I like this. We put this in my hygiene room, and this is from C2C Sleep Solutions, see Charlie to Charlie Sleep Solutions. And it has how your body affects, how sleep affects your whole body, talks about the risks and what is impaired. And if you just have that in the room, patients will start the conversation and they'll say, oh my God, Julie, or John, whoever the hygienist is, what's that all about? Well, when you came in and we gave you that little sleep questionnaire, and that's recommended by the American Dental Association, and we want to keep up with their standards. But this is one of the things if you score high that may have been affected, and we just want to be sure that if you need additional help, that we can pick that up. And so, that starts the conversation.

Bless you hygienists, you're in there for 45 minutes or an hour with uninterrupted time

with your patients. You know yourself, they tell you things they're not going to tell me. So this is very fertile ground I'm sure for you all. But look at this chart over here. Diseases that are associated with obstructive sleep apnea. 35% of people with hypertension have obstructive sleep apnea, like diabetes 72% of diabetics have obstructive sleep apnea. This is scary. Night time heart attacks, 91%. The highest incidence of heart attacks, stroke in young men are those with unobserved, undiagnosed, untreated sleep apnea. That's a scary, scary figure. So this is why we get concerned. This is the area where we can help our patients dramatically.

So, how does it affect the immune system? We know that sleep fights off infection. When you really want to go to sleep, a little study says that it may even affect why your flu vaccine wasn't as effective as it should have been. But here's the one, here's the one here, cancer killer. These activated T cells, they're the ones that attack cancer and kill off the malignancies. If we're not sleeping well, there is a decrease in both the number and the viability of these cells fighting off cancer. That is huge. A study done in Denmark said these shift workers, they sleep night and then they sleep day and they sleep night and they sleep day, high, high incidence of cancer breast, prostate and colon cancer. So this is how it affects the immune system.

How about your genes? This is a study that showed where they limited people to six hours of sleep. They took blood samples prior to the investigation, and then they did the blood study again after keeping them on this for one week, limited sleep. 711 distorted genes that they didn't see before were now visible with the change in their sleep habits. The other thing with the DNA, it involves the strands of your helix formation. And at the very end, you have these gatekeepers which are called telomeres. When we're young and when we're healthy, these guys are very strong. They keep that cell vital. We don't get our wrinkles, the skin is perfect, our muscles are strong, etc, etc, etc. But as we get older, this starts to change normally, but it's accelerated due to not sleeping appropriately. So again, it brings on the aging process faster, and the total

body says, hey, they may find a 10 to 15 year change in the quality of your lifestyle if you have undiagnosed, untreated sleep problems.

Reproductive system. Men's testosterone level as we get older seems to fall unfortunately. It's great when we're 20, 25, we can do everything, climb every mountain, swim every stream. As you get older, you may take cam up to the top and you may take a boat across the string, but that's another story. Look at this, 29% lower sperm count with increased deformities if you're not getting adequate, undisturbed sleep. Testosterone is also responsible for bone density, muscle and strength. And as you get older, that does change. But if you were not sleeping properly, that is greatly, greatly increased.

Ladies, I'm sorry, you're not going to get away with it. If you're not sleeping appropriately, 20% drop in your follicular releasing hormone, which is required for conception. Let's stop and think about it. I live in an area, as I said, in Silicon Valley, we have many times husband and wife, they're 35 year olds, go, go, go, they're sleeping four, four and a half hours, spending thousands and thousands and thousands of dollars on IBF fertility testing. Has anyone ever mentioned to them that perhaps they're just not sleeping enough or effectively to take care of the conception. They're spending all this money but they're throwing it away because it may never happen because of sleep disturbances. Something to think about. It's easier for all of you hygienists to talk to you about your patients a little bit more than I, but you get to know them, as I said, so much better.

Diabetes is huge. Do you have patients who say, hey, I'm taking my medication, I'm kind of watching my diet, I'm doing a little bit of exercising, but I'm not getting these numbers down. What happens is that, if you're not sleeping well, there's an increase in the hormone, which is Ghrelin, which says you're hungry, hungry, hungry, hungry, hungry. You're never well satiated. So what happens is with the increase of food, we get an increase in blood sugar and the insulin just cannot handle it. So if you are pre-diabetic, you may move to type two diabetes just because of not sleeping properly.

Just think of telling your patients, Mrs. Jones, I know you're on medications this, this, this and this. Has anyone suggested a sleep study? We gave you this little questionnaire at the beginning, I would strongly recommend you ask your primary care physician to have a sleep study done. That may be the missing link to getting their diabetes under control. Again, do you think patients appreciate this? You're darn right they do. You've done all this and the patient says yes, I'm going to ask my primary care physician to get a sleep study done, they get a sleep study done. And the only way you can get a diagnosis, a true diagnosis is what we call a polysomnogram. And this is either done in a sleep hospital setting or in a sleep practice run by physicians, or more and more popular are the HST where the home study testings. With that, you get a diagnosis, and the diagnosis is that AHI which I mentioned before. And the severity then, the sleep physician who reads it will tell you the severity and what they recommend.

Normally, physicians will recommend a CPAP, which is constant air pressure. You've seen those masks and you're sleeping with it and the air pressure coming in from the room, it's blowing back and it's opening up the clogged pharyngeal airway space back there, and it's making that larger so that we don't snore and we don't become apneic. The CPAP is the standard of care. The CPAP is in the high 90s as far as efficiency. But compliance by our patients is only about 35%. So we have something, high efficiency but kind of mediocre compliance. These patients then come to sleep doctors, where their doctors become trained in your office for what's called an MAD, a mandibular advancement device. And what it does, it just brings their jaw forward and keeps it forward while they're asleep. And it prevents the jaw from going back and clogging the oral pharyngeal airway spaces.

Now, these appliances are a little bit less effective than the CPAP, but the compliance is way up there in the 80, 85%. So you have high, high efficiency, low compliance, a little bit less efficiency, but much, much higher compliance. And that's why more and more patients are

being seen on these mandibular advancement appliances.

So, we talked about sleep but how does this affect our general dentistry practice? We have a dental office. All this is great, it's fun to know, it's fun to talk to our patients about, but what is the real value in our practice? Well, let's get practical. And we were trying to run an office, and we have staff and we have things to do, we have treatment to do. What do we have to do to keep up with the standard of care suggested by the ADA? And all we really have to do is get that questionnaire going, and if that alone with looking at their comorbidities refer if appropriate for a sleep study. And that's it, that should not be a huge interference with your daily practice.

And again, if you want to then treat, then looking at sleep mini residency programs. And if you want, we can always give you information on, I'm part of it at the University of Pacific. But with that, you then get not only training for you, what's involved, what the appliances are like. But also, many of them like we do at Pacific, we bring in the staff to give them background. And one of the most important things is billing because this does, just good and bad, this does not take away from their dental annual amounts. It's all medical. But you have to know medical CPT codes and build it appropriately to get paid.

And so, that's why the staff are brought in to say this is how it's done and this is how you're trained to do this. So, again, if you don't want to go into these residency programs, do the questionnaire, look at the comorbidities, and then refer, and you're doing your patient a great favor.

So, a little bit of understanding these comorbidities I chatted about. So how do we maybe, we've done the exam and they've done the questionnaire and we've talked to them about it. Now we're looking and we're saying, what should we look at intraorally that maybe just slightly different than what we saw before. We do fantastic intraoral extraoral exams. We're great with caries and periodontal disease. We're great with looking at this

gnathostomatic system, looking for a lack of function, looking for aesthetics. The area that maybe we just don't look at enough is what we call the upper airway. Are these patients breathing properly? What should we look at?

Here's a few things. Is there an airway crowding, where we see a very narrow high vaulted palate? And these are for children also. Enlarged tonsils. A restricted lingual frenum, and we'll talk about that. Mallampati index, and I'll show you what that looks like. And a scalloped tongue. These are things that will add to what we've already seen in the survey and looking at the comorbidities.

So, primary clinical finding. When you see this, these are primary adenoids hypertrophy of the tissues. This patient cannot breathe through the oral esophageal area. And especially when they lie back and the mandible slides back, the genioglossus muscle comes back with the tongue, this is even obturated even more. Removing these, we're looking at 50 to 80% improvement in people with disturbed sleep. This 1% to 2% reducible rate of post-op hemorrhage, that's because, years ago when I was a kid, we got our tonsils out, right? And they said, hey, you get your tonsils out, you get ice cream. Well, they never told us we wouldn't be able to swallow for four or five days. But anyway, they had some children where the bleeding was not stopped and the children died fortunately. But techniques have changed, everything has changed dramatically, and more and more and more children are getting their tonsils removed.

Secondary clinical findings, are they mouth breathers, is there an obstruction in the nasal airway? Do we have these allergic shiners or little darkness underneath the eyes? Heavy allergies, we'll talk about GERDs a little bit. Tooth wear. Is there a high vaulted palette and why? And this adenoidal face shape with this long, slender face, which makes little room for the tongue.

Now, this is that Mallampati index I was talking to you about. And we're looking back with [inaudible 00:35:14], put the patient back, have them open their mouth, stick out their tongue and say hey, do I see stuff back there? Can this

patient breathe back there? again, especially when they're asleep and the jaw and the tongue goes back. Once we start seeing a class three or a class four, you know that these patients are not sleeping, and that's a red flag that more than likely they snore or they may have severe apneic episodes. For this Mallampati index, you can go online and pull this down and put it in your chart or somewhere, just put mallampati Index one, two, three or four.

Scalloped tongue. Why do we have a scalloped tongue? Years ago, it's okay. You clench and grind your teeth. The tongue goes laterally and in doing so, you form these groups on the side of your tongue. True, but what makes the tongue go laterally? Why does that happen? Why do we clench and grind our teeth? The new concept is that it's related to sleep. And follow us on this. You're sleeping, sleeping, sleeping, sleeping, sleeping, and you become apneic.

During that period of time, the brain says, I don't want to die, I don't want to die. So it sends a message to the heart, you better start beating faster. Sends a message to the lungs, you better start pumping faster. Sends a message to the trigeminal nerve down to the masseter, better start grinding, you start grinding, grinding grinding. You open your mouth, you take a big deep breath. Tongue comes forward, pushes against all the teeth. And you do this enough to form all these grooves on the side of your tongue. So, again, looking at this, another what we would call a red flag as to patients more than likely having disturbed sleep problems.

Doctors and hygienists, kids are the very basics of nipping this in the bud. What we do for children at an early age can change their entire life. I showed you before that Stop Bang is one of the surveys where the adults. For the children, that is called the BEARS Evaluation, and another one is Pediatric Sleep Questionnaire. And you can get these online. I like BEARS because it's age appropriate, so you ask questions of the child, and also of the parent, and you come up with a score saying, hey, is there a potential sleep problem.

So, the child goes in to see the hygienist, they're getting their teeth cleaned, fluoride, whatever. And say, Mrs. Jones, well, Johnny's in there, do

you mind looking at this survey. We're very, very concerned, the Dental Association is very concerned about children. Are they sleeping well? Does it interfere with their normal growth? Parents love this. I've never come across parents, don't worry about this stuff, he's fine, fine, fine. They love the additional attention that you're giving to their children. They truly, truly do. So, this is fantastic to do. And again, you can pull these down online.

This is a study done in 2009. It shows the prevalence of a lot of these things over a period of time with children. And I'm sure now these numbers are higher. They're higher because we're now more involved, we see these things more. We understand what's going on with children who are not sleeping well. So I'm sure that even these numbers are high. Children grinding their teeth and snoring is not cute. It's not cute, I'm sorry. Will they grow out of it? Maybe. But what happens during that time that they're growing out of it? At age three, three and a half, 85% of the size of the brain is already formed. By age five, five and a half, 100% of the brain is formed. And the rest is putting all the synapses together over a period of time.

But what is happening during those developmental years where a lack of oxygen or lack of sleep maybe affecting the child's growth and development? So this is huge. How does lack of sleep interfere with the child's development? They don't do really well in school. They're bed wetters. They don't thrive, they don't like doing sports. They need special training. Many of them are obese. And the biggest, biggest thing here is attention deficit hyperactivity disorder. The same part of the brain is affected by attention deficit hyperactivity disorder as it is in children who aren't sleeping effectively. It affects what we call the prefrontal cortex, the prefrontal cortex, the gray matter there, we make all our executive decisions, it's called the executive part of the brain.

If this is being pushed down or covered or not being as effective as it should be, children don't thrive. You can put 50 children in a room and half of them have attention deficit

hyperactivity disorder, and the other half are just not sleeping well and have severe allergies. Psychologists will not be able to tell the difference in their behavior or how they respond to questions. They're exactly the same.

Now, wouldn't it be great that these children that may be in your practice, they're on Ritalin or Adderall because they're classified attention deficit hyperactivity disorder? What if they're not sleeping well or they have severe allergies? And what if they have a sleep study done that shows that? And that you can take these kids off these amphetamines for the rest of their lives, they don't have to be on the Ritalin, they have to be on Adderall the rest of their lives. That not only affects the child, that affects the entire family. They will be forever grateful for what you've done for their child.

A little girl, she's at her party. She's got her tiara on. She's got a beautiful dress and she's asleep. Well, if you look in her mouth, this is why. She's not sleeping well at night. Again, this could be greatly corrective, greatly improving this child's life. And if she's like this at six or seven, it's just going to get worse as time goes on.

I was talking about restricted lingual frenum, and we should look at this in both adults and children. What happens with the restricted lingual frenum is that when you swallow, normally your tongue will go up to the roof of your mouth. If you have a restricted lingual frenum, that does not occur. So why is that bad? Well, as you're developing as a child and you swallow and you're developing the maxilla and the premaxilla, what happens is the buccinator muscles are putting this inward pressure. Every time you swallow and the tongue goes up to the roof of the mouth, that pressure is now neutralized. And what happens, the result is a nice domed palate. If the tongue doesn't get up there, we now get a high vaulted palate and there isn't room for the tongue.

This is so involved that in Brazil, they passed the law that at the time of birth, these children are evaluated. And if in fact, they have a restricted lingual frenum, they snip it at birth. That's how strongly they feel about this, that

this is restricting future growth of the maxilla and premaxilla, and they do it at birth. So we can look in our kid's mouth, hey, can you put your tongue up on the roof of your mouth? Do that with adults also.

Thank God for orthodontists and stage one treatment. When we see these high vaulted palates, all forms of arch expanders that not only expand here, expand the front. So people will go up and separate the nasal septum to get more expansion up here. But stage one should be done as soon as you see these things at a young, young age, you're doing them a fantastic job because you're hopefully, hopefully, hopefully preventing them from many, many future problems and severe orthodontics as they get older. But you can also start nipping in the bud some potential sleep disorders.

Interesting study. This was done in Edina, Minnesota. And remember, I mentioned the circadian rhythm clock and it's pretty much genetically as it is, it doesn't change much at all. But they did find that with children, middle school and high school children, that starting clock goes back a little bit. So they go to bed and they're not tired, they're awake longer, they've got the computer in front of them. And then these children were having to get up to get to a 7:30 class. A lot of these kids had to get up at 6:30, maybe even earlier, they haven't had sufficient sleep. They passed the law with the starting time at 8:30. And here in California, we passed Senate Bill 328. The governor passed it. And it goes from community to community or county to county and school board to pass it or not.

But what happened? From that, grades went up. Truancy problems were decreased because the kids had enough sleep. SAT scores went up. Teen auto accidents, these kids were driving to school in the morning and falling asleep. A huge amount of accidents with children falling asleep on their way to school. So, I don't know how it is where you folks are throughout the country. It may be part of coming from the governor signing the bill and then going to the intermediate or all the other communities to pass. But this is great. Just that extra hour

time going from 7:30 to 8:30 made a huge, huge, huge difference in the children's ability to improve in all these areas.

Now, I see the study, this is, and all the studies that are done with kids, how many out of 100 kids so and so did this? This is a study coming from a house in India. And this gentleman owns this entire house. And he has 36 wives and 100 children. So the under children were a basis for putting this out, so, I don't know how he deals with 36 wives. Anyway, another story. So, out of 100 children, statistically, three should have obstructive sleep apnea, 17 should be obese, 12 should have snoring problems, two autistic, seven attention deficit disorders, seven asthmatic. You add those together, 48 out of his 100 children should have some problems related to sleep disturbances. That stands pretty much throughout the statistics. How he [inaudible] 36 wives and 100 children, I have absolutely no idea.

So how does this affect your practice when you start doing this stuff, and it's even minimal? What makes your practice grow? How great are fliers? I've tried them, they don't work for me. Webs? To some degree, but you have to keep up with them, they get pretty expensive. Radio and TV spots are really expensive. I don't know if we still have yellow pages or not. Regardless of all that, it's word of mouth. Word of mouth referrals are fantastic for your practice. I know in my practice over the years, I asked a patient we'd done a lot of work on. "Mrs. Jones, you have been a fantastic patient. I just want to ask one favor of you." And they'll usually go, "Oh, Dr. Santucci, what is it?" I say, "I want you to recommend to my practice just one patient who is as fantastic a person and patient like you are."

Do you think they're going to send someone who is mediocre? No, their reputation is on the line, right? They're going to send someone who is as good as they are. That I found is the hugest practice builder I've ever seen. What makes them do that? What sets that up? If you start asking about sleep, if you do the sleep questionnaire, if you look at the comorbidities, and you send them to their primary care physician, and they have a problem, do you

think they appreciate that? What if it's a child that you've taken out of addicting Ritalin or Adderall and it changed their total lifestyle? Do you think that parent is going to tell other parents? Do you think that patient is going to tell her friends, "Hey, my doctor did this, this, this and this? Does your doctor do that?" "No, they don't do that. I wonder why."

The difference that people are looking at today is what is the quality of your service? Do you go in your office above the normal expectancy of what you do for your patients? This is one area that they really, really, really appreciate. And as the bottom line says, what's the possibility of changing a child's life? What if in your practice, you got Johnny Joe and now he's no longer on Ritalin and he's doing well at school. He wants to play sports, he's losing weight. Even if they don't tell other people, the practice is really thrilling by having these people change their lifestyle or that you're improving their lifestyles.

I teach at the dental school and I give some of these presentations starting their second year some on basic sleep. We're a three year school, so by the second year, they're starting to go to the clinic. And this one day, this student of mine was running up and he was just starting in a second year clinic and he's in the pediatric clinic. And he came up and he's waving this, looked like a card of some sort. And I saw that he was almost, not crying, but he had little tears in his eyes. And I said, "What's the problem?" He said, "I just got this." And what he had done is, he recommended and saw some of the things we talked about in the child, recommended to their physician to have a sleep study done. And sleep study was done and the little girl had a severe sleep problem that they've now changed with ortho, allergy testing, etc, etc, etc.

And the note says, dear Dr. So and so, you have done things for my daughter. No other service, no other physician had ever come up with this concept. I want to thank you for saving her life. Oh my god. Talk about being emotional. [inaudible] I started getting teary eyed too. That's the effect we can have, that's the positive effect we can have.

If you saw Dr. Noble's survey yesterday or presentation, a fantastic presentation on sleep bruxism, he and I electrolyte together, so there may be one or two slides that are similar. But he showed this [inaudible 00:50:09], this is the triangle that was started by Dr. Jeff Rouse, a prosthodontist in Dallas, and this was a study in 2010. And he found that many, many of asleep patients and TMD patients were sharing sleep bruxism, sleep apnea and GERD problems. So he started to say, this triangle goes round and round, they have this and this or this and this or this, and it just goes back and forth one across the other. They're all interactive.

Dr. Ward Noble and I looked at this and although I think Jeff mentioned it, but we thought, hey, saliva and saliva pH has a lot to do with this. The effect on this is erosive tooth, and recently, studies are coming out and [inaudible] small because we're just starting to get a lot of studies on this periodontal disease. What is the possible effect of disruptive sleep on periodontal disease? And this is huge, especially if your hygienists are in there, and you're seeing these perio patients and you're in there, you're doing follow up care every three months or so. The patient's doing pretty good home care but you're not getting results, you're still getting bleeding. What's that all about? So we'll see that towards the end of my presentation, how we can deal with this.

Here's a term, I don't know if you've seen it before, it's called wear-tribology. And it comes from physics, and essentially means, you have two surfaces rubbing together at various speeds, and there's a lubricant in between. And how does this fit in dentistry? Well, we have crowns against crowns and crowns against normal teeth and there's saliva in between there. How does one affect the other and what does the saliva do? Is it an effective lubrication or not? So, the wear-tribology, you may see it, but I think it's a fantastic term for dentistry.

So, I think Dr. Ward mentioned a little bit about GERDs the other day but I'll mention it again. GERD, Gastric Esophageal Reflux Disease. Essentially, something is going on with

the sphincter, which is allowing the stomach acid to come up through the stomach of the esophagus into the mouth and up into the sinuses per se, causing irritation along that entire track. The problem is this stomach acid is hydrochloric acid. The pH is 1.2. That's very, very, very highly acidic. It burns everything on the way up.

Now, what causes this to come up and what is the relationship to sleep? When you go into your apneic episode and you've stopped that breathing, there's a huge increase, negative thoracic pressure, that pushes the diaphragm upward pushing against the stomach forcing the hydrochloric acid of the esophageal track into the mouth and sinuses. And this goes on while you're laying back even more so because you now have the supine position encouraging this even more. So, this acid is intrinsic, as I said, and it comes from GERDs, bulimia, anorexia, or several combinations of this. And as I said, this hydrochloric acid, Ph 1.2, the old Southern words will say, hey, that'll take the rust off a trailer hitch. This is destructive stuff. What do we see in the mouth potentially? We see where or dissolution of enamel and dentin in areas where the teeth don't touch.

So the old theory that all of this is bruxism, bruxism is not a diagnosis. The wear that we see is a combination of acid, which is weakening the structures, with the parafunctional habits now bringing across wear. But again, this is intrinsic, this comes from in the mouth.

The other one that's very destructive in gaining more is extrinsic acids. What are we putting in our mouth? It comes from fruits and juices and soft drinks. Sports drinks are huge. Sports drinks, hey, be like Mike. That's why all these young kids are on these Gatorades and all these sports drinks, they want to be like their heroes. Sucking down vitamin C tablets because that's ascorbic acid. Industrial waste. Patients are working in an outside yard where they're making a lot of chemicals, all of that acid is in the environment, it's in the air and they're sucking this in. How about chlorinated water? I don't have any patients that I can recall, but if you have patients who are great

swimmers in high school or competitive high school and college, are we seeing some pitting of these anterior teeth because they've been in this chlorinated environment for a long period of time? Excuse me.

Here's a study done and I think [inaudible] other day. They had extracted teeth and they placed them in these various solutions for two weeks. And then they noticed the difference in the amount of wear that had occurred, the amount of disillumination that occurred being in all these drinks. Now, this also shows the pH. And you'll see pH 3.2, Cola down here is 2.6. Now, one would think that cola because the acidity, excuse me, is so much higher, pardon me, that the disillumination here would be more. But this is phosphoric acid. This is acidic and malic acid and acid from the fruit, citric acid. Much more and more destructive. But it's also what's in the formulation to make these teeth in Red Bull dissolve almost 20 times greater than if they were floating just in Coca Cola themselves.

Again, it is the type of acid along with the formulation of these drinks, a lot of these have a lot of sugar in it, very, very, very destructive, and this is what our kids are drinking. A friend of mine owns a bar and was so tired of opening up these little cans that he said, I'm going to put this on tap. So he did. And he served so much Red Bull with all the drinks that people asked for. Red Bull with this, Red Bull with that. And he put it on tap. And he found out about four months later, he had to change all the lines because they were disintegrating because of the Red Bull. That's how powerful this stuff is, and our kids are drinking it. I'll come to class for an eight o'clock class. I have 143 students, I may have two thirds of the class with their coffee in the one hand, and the rest the Red Bull on the other hand, that's the way they start the day, and they go through the day with Red Bull in hand.

So why is it important? We're seeing these sports drinks in young, young kids, they want to be like their sports heroes. And we're starting to see more breakdown on a lot of these teeth, more initial erosive processes going on. And so, with the increased consumption, with it, younger and younger

children as they're developing, this is becoming more apparent. And again, this is information we can give to parents. So what can we do? Well, I'm sure every good mother has cheese in their purse. So if your child has one of these sports drinks, give them some cheese to chew on, it changes the pH, neutralizes it a little bit more.

The thing you don't want to do is say, go brush your teeth right now. Why don't you want to do that? Well, you've softened the teeth with the acid and now you're brushing, brushing, brushing, and you're driving that acid further down into the tubules. So either wait 40, 50 minutes before they brush their teeth or have them rinse with water, dilute the acid that's in there and hopefully cut down the disruption that it has to the enamel surfaces. This is for moms.

So what goes on here? This erosive process that's going on there as we get more into the dental side of all this, we have your acquired pellicle which is protecting the tooth surface. A lot of the effectiveness here is due to the amount and the quality of the saliva. What is the pH in the mouth? Is the saliva efficient enough to both neutralize the pH and dilute it because of its quantity? Look over here. It doesn't take much for erosion to actually start. In the dentin it's only 6.2, enamel 5.5. And now we start getting this erosive process to start. This erosive process is now attacking the tooth surfaces per se, and causes erosive processes. So, it all starts with the saliva, which controls a lot of the acid and therefore controls the pH in the mouth.

So, back to our triangle. We've talked about where. A little bit, we've talked about GERDs. Let's jump to saliva very quickly. Saliva. Look at this. Only .5% of this does all this. The other 99.5% is just water. It's amazing that all of this is controlled just by .5%. My wife doesn't like this picture, I like goofy pictures. I think it's a sad dog, a little bit of saliva drooping. She thinks it's weird. I'm weird so that's okay. But anyway, it's important, .5% does all this.

The functions. Oral clearance, it takes care of the acids. It neutralizes acid, gets rid of bacteria, carbohydrates. The [inaudible] main thing is buffering of acids. How do we know that your patient's saliva is being buffered? I'll show you

a kit that I use to show the patient directly educationally. And it's super saturated calcium and phosphorus and builds up that strong, strong pellicle that we need for healthy teeth.

Saliva facts. Throughout the day, 24 hours, you build up about a liter of saliva, liter of saliva. But look at this, [inaudible] I think it's so important. At night, your flow is 10% of what you have during the day. So why is that so critical? Well, you have a 10% less flow. There you have GERDs going on, you have acid coming into the mouth. The destructiveness of the acid, there isn't enough saliva in there to really neutralize or dilute it. So the effect on the teeth and changeable tissues is magnified. Normally along with that, we just get decreased saliva as we get a little bit older, but this adds a lot to it.

What causes an increase in saliva? Anything acidic in the mouth because the body wants to neutralize it. Chewing gum, xylitol gum will help to neutralize it. Masseter muscle activity, we talked about this before what's called RMAA, repeated masseter muscle activity. And that set off by you going into apneic episode, the brain says I'm going to die, you better start chewing, you start chewing. More saliva is being produced. And if you have GERDs, the saliva wants to increase in your mouth to neutralize both the acid and the pH of the acid. So these are the things that cause an increase in acid.

What causes a decrease? We have a lot of patients, especially as you get older, with a lot of xerostomia. And you got a dry, dry mouth. What's that doing to the periodontal health? I can tell you one thing from personal experience, medication, about a year ago, my diastolic pressure has always been great, it's been under 80. But about a year ago, I started noticing that my systolic was creeping up. So I went to my doctor, he put me on medication. And I'll tell you something, I thought my mouth, I had nothing but sand in my mouth. It is so affected the saliva volume was amazing until I decreased it dramatically and changed to another.

So when you see your patients are on especially blood pressure medications and you're seeing a lot of xerostomia, you may want to have them check with your physician, to either change it, change the doses, dosage or go to something

else. This is the kit, this is by GC America and it's a self-kit, and this you do, the hygienist beautifully in your office. You see a patient, a lot of xerostomia going on or have some periodontal change, and say, hey, I wonder what the quality or the efficacy of your saliva is to buffer the acidity that you have. So here's a little saliva spittoon, you have your patient spit in that, there's paper, you measure the pH. And then you take a drop and there's a little dropper and you put in these three little wells over here. And it gives you the buffering capacity of your patient's saliva.

What I like about this is it's like a show and tell. Mrs. Jones, this is your saliva, this is what we see going on, and this is why I think we should be looking at are you sleeping well, are you having medications that should be changed, because it's definitely, definitely keeping you from good periodontal health. So all this stuff going on, all this acid erosion, what does it do? Breaks down the teeth. These are not decay, this is all from erosion. And when you start seeing this and you start seeing this, a hygienist or as your dentist, what do we do with these things? They don't hurt, they're not sensitive to the patient. How do you talk to them about doing something to fill up those potholes?

Well, as you're talking about it at this point, we're talking about enamel. We're talking about the dissolution, it doesn't take a lot to break down this enamel. We're talking about the acid that's breaking down the enamel as either coming from intrinsically or extrinsically. And we talked about extrinsically and what's happening with all the sports drinks out there. And then one way you can check your patient is with saliva testing. I like to test them by [inaudible] a couple years ago and you're looking at various types of toothpaste, and you're looking at the erosiveness, the breakdown of surface by using different toothpaste.

And here you see Pro-Health, another Crest Cavity Protection and Colgate, Sensodyne, etc. And you can see that the Crest Pro-Health area protects the surfaces from erosion. And a lot of this is because it is stannous fluoride, not sodium fluoride. And the difference is that, I'm not knocking sodium fluoride, it works great.

But when you get an acidic environment, the sodium fluoride does not hold up the way stannous does in protecting and remineralizing the tooth structure.

And so that is critical, critical, critical thinking for you hygienists as you're talking to your patients as to the type of dentifrice you're going to recommend. The difference there is in the stannous fluoride, it actually blocks out the tubules, it obturates the tubules and prevents erosive breakdown much more than the sodium fluoride which is a totally different type of interaction.

And this just sees what happens before and after the acid attack. And the acid takes away all the hard stuff, leaving the soft organic matrix. And if you go in there and clench and bruxism grind, you're going to break down tooth structure.

Let's talk a little bit about, and I think Dr. Ward talked about this a little bit yesterday. When I went to school, when we saw all these NCLs, these non-surgical carriers lesions, we all do [inaudible] say this was all occlusion. And as the teeth rubbed against each other, it was flexing here at the CEJ and little pieces of tubule, a little piece of enamel flicked away. Abrasion did some studies, and he said, I can duplicate in the laboratory. I've got these extracted teeth, I can run these brushes against it and I can cause the same type of lesions. And he said it wasn't so much the bristles of the brush, a stiffer bristle brush will cause in the mouth more breakdown and recession of the gingival tissue, but it doesn't affect the wear of the teeth. What affected the wear was the dentifrice that was being used.

What I didn't like about these studies is the fact that this was done in-vitro. So there was no saliva, there's no pellicle, it doesn't totally duplicate what's happening in the mouth. Now do I think both of these things, yes. I think some of it has to do with occlusion, some has to do with the dentifrice being used, some has to do with how you're brushing.

So, the dentifrices, as you check them, you can go online and check anyone, and they have

their REA and RDA standards. The relative enamel abrasiveness and dental abrasive. And if you look in the ADA sets a standard that that listing should be 250 or less. So you can check and most of the dentifrices are there. Some of them with the extra whitening where they're extra abrasive, maybe higher than the 250, so that's something to check out.

What's the difference in caries and erosion? Well, caries functions where your bacteria are alive and well. But once the acid in the mouth gets down to about 4.5, bacteria don't survive. So you see a mouth full of a lot of abrasive wear but it's not carious because bacteria cannot live here. So this is the difference between where it splits off between your sodium fluoride and your stannous fluoride. Down in this area, your stannous fluoride is the king because it's able to survive in this environment much more than the sodium fluoride.

To my patients, this is what I use, MI Paste, this is one brand, each company has their own brand. So I'll have them brush with them, stannous fluoride, rinse, spit it out at night, and do it in the morning and night. But at night also, then rub on MI Paste. Just rub it on with your fingers, the teeth and the gums, and just spit it out but don't rinse, let it stay there all night. And I find the combination of an MI Paste along with a stannous fluoride is the best that I can do for my patients at this time.

So, what do we do treatment wise? We're looking at diagnosing, we talked about that, we observe and wait. Fluoride treatments help because they seal off the tubules. We modify behaviors. How do we tell our patients, hey, it's getting late at night, don't go in there and start having a lot of acidic drinks before you go to bed. Early prevention intervention, those little potholes I showed you, do we fill them up or just let them be? Do restorative care, appliances, occlusal appliances to help to break down. And unfortunately, we don't want to go to rehabilitation.

So, as we looked here, we saw GERDs, we saw saliva, erosive tooth wear. And how do all these things come together? As I said, you can't talk about one without talking about

the other. What about our friend periodontal disease? This is an article, and the title of the article says What a Periodontist Should Know. I think it should also be what a general dentist should know, what a hygienist should know. Periodontitis and obstructive sleep apneas are a common cascade of inflammatory responses and seem to share them synergistically. Does this open up a whole new paradigm for thinking about periodontal disease?

Another study. Numerous studies are reporting the association of periodontal disease and sleep disturbances by an assay of the salivary cytokines. There is a relationship between all these cytokines, of interleukin, pentraxin. And the serum level of these patients that have periodontal disease and sleep disturbances. The study concluded a prevalence of periodontal disease in patients with obstructive sleep apnea. And there's some type of a common inflammatory pathway.

Study with 687 patients. 17 had periodontal disease by themselves. 46% had obstructive sleep apnea. But look, 60% had both. The problem we're looking at now is that is there some bio-directional causality effect between periodontal disease and obstructive sleep apnea?

So, what are the outcomes and what treatment are they finding seems to work? Studies run by Cannon and some also done by Procter & Gamble, which showed that stannous fluoride reduces inflammation and the number of bleeding sites after four weeks of brushing as compared to a baseline even in healthier cohorts. So they're saying that it's stannous, because it's availability and remilitarization protection ability at the lower acidic levels seems to be doing the job.

Here's the secret. They estimate the effect of brushing with a bioavailable gluconate chelated stannous fluoride dentifrice on gingival bleeding. What is the difference here? The difference is that would any stannous fluoride do? And what they're finding out is that the combination of the stannous has to be constructed with a magic sauce in it to make it work effectively is this gluconate, chelated

stannous fluoride dentifrice. The difference is, you can have stannous that goes to the gingival tissues, but if it's bound up and it's not bioavailable, it is not going to do what it's supposed to do.

So, this gluconated chelated stannous fluoride seems to do the job. It goes to the gingival tissues and it's appropriately released. This has been the secret of Procter & Gamble for years in their crest, and then finally came out in one of the periodontal journals and now everybody understands what this is all about. But how many patients do you have with bleeding sites that you're just not taking care of? Maybe changing them to this type of a stannous formation will help.

So we talked about management very quickly here, we're running out of time. When you see these little potholes, fill them up. Fill them up so they don't get worn and more involved, you can use sealants. Flowable composite seems to stay in there. The acid doesn't break these down as readily as they do just a

natural open wound of an erosive situation. And unfortunately, sometimes you have to go to full mouth reconstruction, which is like we've lost the battle.

So, what is this concern? Why are we concerned about all this? Well, along with their total biologic health, which is huge, and they all appreciate us talking about it, we don't want to see this. This is a failure. Where could this have been seen years ago to stop all of this break down. This is not a collusion, this is not parafunction, you don't function out here. This is acid wear over the years that before we never really paid close attention to.

So, I hope at this point, we know that prevention is much more preferable than treatment, and maybe what we talked about opened some new ideas, some new paradigms for us. When you look at your patients, the periodontal patients are those with wear, you have some more ideas, some more concepts to talk to your patients about. And I want to thank you all for the opportunity to be here with you today.