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Baby Teeth Matter

Ruchi K. Sahota, DDS, CDE

What an amazing day! Everyone in the office was smiling molar to molar as our office screened more than 200 preschoolers. The children and their families lined our parking lot almost an hour before our office opened. Teachers came and joined as well. Parents came and were a part of each patient’s appointment. And almost all of them had smiles too! Of course, the preschoolers mostly high-fived and grinned looking down at the goody bags they were awarded at the end of their appointments.

We have been teaming up with the local Fremont Unified School District for more than 25 years to, in many cases, introduce 3-year-olds and their parents to the idea of a dental home. Our office has become a part of the curriculum for these preschool classes. For a few weeks before the visit to our office, the teachers review oral health education with the students. That way the concept of Dr. Nijjar and Dr. Ruchi “counting” their teeth is not foreign to the kids. But often the concept of the children visiting the dentist regularly is foreign to the parent/grandparent/guardian/caregiver who accompanies the children to our office.

Sure enough, the facts personify this as well. Over a third of the children in our state are not going to the dentist. We often estimate various reasons. Could it be because of geographic location? Is the dentist office too far from the family’s house or the child’s school? Could another reason be socioeconomic status? What role does income, education and occupation play in a parent’s decision to take or not to take their child to the dentist? Could another reason be oral health awareness? Are parents aware that the single reason most children miss school in California is tooth pain? Could insurance coverage be another reason? How many of our children have public or private dental benefits?

We checked off the urgent-care-needed (pain, infection, swelling or soft tissue lesions) box on the oral health assessment plan many times today. We asked the parents why these children had not been to the dentist. All of the children knew where a dentist office was located near their home. Many of the parents had taken their children once or twice, just not recently. Most of the children had at least one parent who was working and/or had been to college. Most of the parents admitted that their children had at one time complained about a tooth issue or toothache. And finally, all of the children had public and private dental benefits. Insurance was not the issue.

Almost all of the parents of the children who needed urgent care had not taken their children to the dentist recently. What was the most common reason? The answer from most of the parents was, “Baby teeth will eventually fall out.” Let us all release a collective … sigh.

It is 2017. Our iPhones can talk to us, listen to us and perform various functions for us. There are self-driving cars. We are growing sheep from mere cells. Yet, many of our neighbors do not realize that baby teeth are just as important to brush, floss and save as adult teeth! I know. Let us all release another collective sigh. I am preaching to the choir.

But there may be hope on the horizon. It is an exciting time. There is a new sheriff in town. Jayanth Kumar, DDS, MPH, is our state’s new dental director. It has been decades since California had a dentist as our state dental director, so in fact it is more accurate to say that we finally have a dentist-in-chief who can manage, direct and oversee administration of our state’s dental health. He has committed to help promote healthy habits, increase utilization of dental services, support prevention and early dental treatment, ensure better education for the public, dentists and those who make decisions regarding dentistry in our state, and finally survey and measure the progress of these key indicators and the dental health of our state. Dr. Kumar elaborated on these goals at this year’s CDA Leadership Conference and noted the initiatives that dentists are getting involved with throughout California.

One such program is California’s Department of Health Care Services’ Dental Transformation Initiative. The intent is to determine what will help more children to be seen by the
dentist. To do this, the federal Center for Medicare and Medicaid Services (CMS) granted $740 million over five years to California to improve its program. More caries assessments are being completed and more data is being collected. Dentists who educate, entice or convince parents to return for continuous recall visits to establish a dental home will receive bonus reimbursements. And finally, local pilot projects (i.e., innovative ventures to prevent disease and increase needed care) have been funded to help mend other impediments that could keep children at risk from needing the “urgent care needed” box marked on their oral health assessment form. In fact, my community’s own FQHC’s dental director is eager to start using the allotted funding to help alleviate the barriers that keep patients from utilizing their dental services.

The intent is to drive families to the dental office by focusing on “high-value care, improved access and utilization of performance measures to drive delivery system reform.” The program focuses on “caries assessment, prevention and enticing the critical factor of continuity of care.”

This is exactly what the doctor ordered. Will there be a day when all of our patients understand that going to the dentist is necessary and good for them? Will there be a day when all of our patients understand that going to the dentist is necessary and good for them? Will there be a day when all of our patients understand that going to the dentist is necessary and good for them? Will there be a day when all of our patients understand that going to the dentist is necessary and good for them?

As CDA dentists, we do our part. Dental societies organize Give Kids a Smile events. CDA Cares brings hundreds of dentists together to help care for the thousands that stand in line for necessary dental care. We coordinate “tooth talks” in schools. So many travel abroad to carry out dental missions. We CDA dentists give back and do as much as we can to help bring the importance of dental education and care to our communities.

In fact, screening 200 preschoolers was no easy task for the doctors in our office or for our staff colleagues. But everyone agreed it was one of the more fulfilling days that week. Our team really enjoyed giving back. Contributing to positive change and development of the community can improve staff morale and engagement. As a general note, we know that millennials prefer working for an employer who prioritizes philanthropy — sometimes so much so that they would be willing to earn less if they feel they are working for an office that truly gives back.

But maybe some of us have been involved in some of these outreach efforts at some time. With a dental director at the helm of our state’s dental plan, there will be many more opportunities to become involved. How will we know how to do so? The oral health departments will team up with the local dental societies. So reach out to your dental society. Be there. Be involved. Stay involved. That way, we can raise our hand and do something to help.

Ruchi K. Sahota, DDS, CDE, practices family dentistry in Fremont, Calif., and serves as faculty at the University of the Pacific, Arthur A. Dugoni School of Dentistry. She is also a certified dental editor, a consumer advisor for the American Dental Association, past president of the Southern Alameda County Dental Society and a fellow of the American College of Dentists, International College of Dentists and the Pierre Fauchard Academy.

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The nub:
1. Dentistry and oral health are not the same thing.
2. Opportunity without responsibility is a dangerous position to defend.
3. Larger scope necessitates decreased independence.

David W. Chambers, EdM, MBA, PhD, is a professor of dental education at the University of the Pacific, Arthur A. Dugoni School of Dentistry, San Francisco, and editor of the American College of Dentists.
Research Leads to Treatment for Rare Gum Disease

A partnership between a University of Pennsylvania School of Dental Medicine professor and a scientist at the National Institutes of Health has led to a successful new treatment for leukocyte adhesion deficiency (LAD), a rare genetic disorder that causes recurrent bacterial infections and terrible gum disease.

“This is really exciting because we see that a treatment performed in mice in our laboratory directly paved the way to a novel clinical treatment for a serious disease that was not responsive to any other treatments,” said George Hajishengallis, DDS, PhD, the Thomas W. Evans Centennial Professor in Penn Dental’s department of microbiology.

Dr. Hajishengallis has spent much of his career studying periodontitis. In the course of his research, he came across a strain of mice that had striking bone loss at a very young age. Upon further investigation, he realized that these animals had the mouse form of LAD.

Noting that the gum disease of LAD mice was likely attributable to very high levels of the signaling molecule IL-17, which leads to damaging inflammation, researchers used an antibody to block the activity of IL-17 or IL-23, a molecule required for IL-17 production, and inhibited the disease. During a scientific conference in 2012, Dr. Hajishengallis met Niki Moutsopoulos, DDS, PhD, of the National Institute of Dental and Craniofacial Research, a researcher who had made similar observations in human LAD. The two decided to become partners in research and published their first joint paper in 2014 in *Science Translational Medicine* proposing that inhibition of the IL-23/IL-17 pathway could be an effective treatment of LAD.

A recent report in *The New England Journal of Medicine*, authored by Drs. Moutsopoulos and Hajishengallis, recounts the fruits of this partnership. The authors describe treating a 19-year-old patient with LAD who had severe periodontitis and a chronic, nonhealing wound. Using a drug that blocks the activity of IL-23 and another signaling molecule, IL-12, the patient’s oral health dramatically improved along with his skin wound, which shared similar features of immune malfunction as his gums.

Prefabricated Blood Vessels May Revolutionize Root Canals

While root canals are effective in saving a tooth that has become infected or decayed, this age-old procedure may cause teeth to become brittle and susceptible to fracture over time. Now researchers at Oregon Health and Science University in Portland, Oregon, have developed a process by which they can engineer new blood vessels in teeth, creating better long-term outcomes for patients and clinicians. Their findings were published online in June in *Scientific Reports*.

More than 15 million root canals are conducted annually in the United States. The current procedure involves removing infected dental tissues and replacing them with synthetic biomaterials covered by a protective crown.

Principal investigator Luiz Bertassoni, DDS, PhD, assistant professor of restorative dentistry in the OHSU School of Dentistry and assistant professor of biomedical engineering in the OHSU School of Medicine, and colleagues used a 3-D printing-inspired process, based on their previous work fabricating artificial capillaries, to create blood vessels in the lab. They placed a fiber mold made of sugar molecules across the root canal of extracted human teeth and injected a gel-like material, similar to proteins found in the body, filled with dental pulp cells. The researchers removed the fiber to make a long microchannel in the root canal and inserted endothelial cells isolated from the interior lining of blood vessels. After seven days, dentin-producing cells proliferated near the tooth walls and artificial blood vessels formed inside the tooth.

Read more of this study at *Scientific Reports* (2017); doi: 10.1038/s41598-017-02532-3.

Credit: OHSU/Kristyna Wentz-Graff
Studies Reveal Secrets of Tooth Calcium

Two studies on calcium isotopes in teeth have provided new insights into both the extinction of marine reptiles and the weaning age in humans. The findings of these studies, conducted by National Center for Scientific Research researchers at Lyon ENS and Université Claude Bernard Lyon and published in *Current Biology* and *PNAS*, open new avenues for research in anthropology and paleontology.

A team of geochemists has developed a new high-precision method for measuring proportions of stable calcium isotopes. This method allows new scientific advances in all kinds of domains, such as estimating weaning age in humans from milk teeth or finding a new explanation for the extinction of marine reptiles.

There are six stable isotopes of calcium on Earth. These isotopes do not generate natural radioactivity but make it possible to identify chemical reactions through their specific signatures, which are formed by the fractionation of the different calcium isotopes during biological processes and are marked in bones and teeth. The method used by the researchers analyzes the degree of isotopic fractionation in these tissues.

Breast milk is the substance in which calcium isotopes are most fractionated. Thus, by analyzing milk teeth, it is possible to trace someone’s diet in the early years of their life. The more milk in the diet, the more the dental calcium contains light isotopes. By cutting into milk teeth and measuring isotopic ratios using a mass spectrometer, the researchers observed that teeth begin mineralization with very considerable isotopic differences and that these values maintain stable proportions until weaning. By knowing the speed at which tooth enamel is formed, researchers have been able to develop a way to estimate weaning age in our ancestors.

In another field, isotopic analysis of dental calcium allowed researchers to show that on the eve of the extinction of dinosaurs, large marine reptiles were at the top of the marine food chain. The study suggests that this competitive situation could be the reason for their disappearance as a result of the scarcity of their shared source of food.

Learn more about these studies at *Current Biology* (2017); doi: dx.doi.org/10.1016/j.cub.2017.04.043 and *PNAS* (2017); doi: 10.1073/pnas.1704412114.

Long-Term Breast-Feeding Can Lead to Cavities

Children who are breast-fed for two years or longer are more likely to have dental cavities, according to a study published in the July issue of *Pediatrics*.

Researchers analyzed breast-feeding behaviors and sugar consumption for 1,129 children in Pelotas, Brazil. At age 5, the children visited a dentist and were examined for decayed, missing and filled primary tooth surfaces and severe early childhood caries. Severe early childhood caries were defined as six or more decayed, missing and filled primary tooth surfaces.

Among the children in the study, 23.9 percent had severe cavities and 48 percent had at least one tooth surface affected by a cavity. Kids who were breast-fed for two years or longer had a 2.4 times higher risk of having severe cavities, compared to kids who were breast-fed for less than a year.

“There are some reasons to explain such an association,” said Karen Peres, MDS, PhD, lead author of the study and associate professor at the University of Adelaide in Australia. “First, children who are exposed to breast-feeding beyond 24 months are usually those breast-fed on demand and at night. Second, higher frequency of breast-feeding and nocturnal breast-feeding on demand makes it very difficult to clean teeth in this specific period.”

The study also found that breast-feeding between 12 and 23 months did not bring with it a higher risk of cavities. About one-quarter of the kids were breast-fed for 24 months or longer.

Learn more about this study at *Pediatrics* (2017); doi:10.1542/peds.2016-2943.
Blocking Yeast-Bacteria Interaction May Prevent Biofilms That Cause Childhood Caries

Though most tooth decay can be blamed on bacteria, such as Streptococcus mutans, the fungus Candida albicans may be a joint culprit in early childhood caries, according to research published recently in the journal PLOS Pathogens.

In earlier research, a team from the University of Pennsylvania School of Dental Medicine found that C. albicans, a type of yeast, took advantage of an enzyme produced by S. mutans to form a particularly intractable biofilm. In a new study, the researchers have pinpointed the surface molecules on the fungus that interact with the bacterially derived protein. Blocking that interaction impaired the ability of yeast to form a biofilm with S. mutans on the tooth surface, pointing to a novel therapeutic strategy.

“Instead of just targeting bacteria to treat early childhood caries, we may also want to target the fungi,” said Hyun (Michel) Koo, DDS, PhD, senior author on the study and a professor in the Penn Dental department of orthodontics and divisions of pediatric dentistry and community oral health. “Our data provide hints that you might not need to use a broad-spectrum antimicrobial and might be able to target the enzyme or cell wall of the fungi to disrupt the plaque biofilm formation.”

The findings point to a new direction for treatment of early childhood caries, according to the study. The current standard of care, beyond the use of fluoride as a preventive approach, is to target only the bacteria with antimicrobials or to use surgical interventions if the tooth decay has become too severe.

“This disease affects 23 percent of children in the United States and even more worldwide,” Dr. Koo said. “In addition to fluoride, we desperately need an agent that can target the disease-causing biofilms and in this case not only the bacterial component but also the Candida.”

Koo and colleagues are now working on novel therapeutic approaches for targeted interventions, which can be potentially developed for clinical use.

To learn more about this study, go to PLOS Pathogens (2017); doi.org/10.1371/journal.ppat.1006407

Virtual Beach Improves Dental Patient Experience

In a study published in the journal Environment & Behavior, a team of researchers at the Universities of Plymouth, Exeter and Birmingham in England worked with a dental practice to find out whether virtual reality encounters, such as walking on a beautiful beach, could improve patient experience during routine dental procedures such as fillings and tooth extractions.

Patients who agreed to take part in the study were randomly allocated to one of three conditions: standard care (as in a normal practice); a virtual walk around a beach using a headset and handheld controller; or a walk around an anonymous virtual reality city. Results found that those who “walked” around the beach were less anxious, experienced less pain and had more positive recollections of their treatment a week later than those in the standard-care condition. These benefits were not found for those who walked around the virtual city.

The authors of the research stress that the type of virtual reality environment the patient visits is important. The fact that only patients who visited the beach and not the virtual city had better experiences than standard care is consistent with a growing body of work that shows that natural environments, and marine environments in particular, can help reduce stress and anxiety.

“Our research demonstrates that under the right conditions this technology can be used to help both patients and practitioners,” said Karin Tanja-Dijkstra, PhD, the study’s lead author. Learn more about this research at Environment & Behavior (2017); doi.org/10.1177/0013916517710077.
A common periodontal pathogen may delay conception in young women, according to a study carried out at the University of Helsinki and published in the Journal of Oral Microbiology. Previous studies have shown that periodontal diseases may be a risk for general health, but no data on the influence of periodontal bacteria on conception or becoming pregnant have been available.

The study population comprised 256 healthy nonpregnant women who had discontinued contraception in order to become pregnant. Clinical oral and gynecological examinations were performed. Detection of major periodontal pathogens in saliva and analysis of serum and saliva antibodies against major periodontal pathogens as well as a vaginal swab for the diagnosis of bacterial vaginosis at baseline were carried out. Subjects were followed-up to establish whether they did or did not become pregnant during the observation period of 12 months.

Porphyromonas gingivalis, a bacterium associated with periodontal diseases, was significantly more frequently detected in the saliva among women who did not become pregnant during the one-year follow-up period than among those who did. The levels of salivary and serum antibodies against this pathogen were also significantly higher in women who did not become pregnant.

Statistical analysis showed that the finding was independent of other risk factors contributing to conception, such as age, current smoking, socioeconomic status, bacterial vaginosis, previous deliveries or clinical periodontal disease. Women who had *P. gingivalis* in the saliva and higher salivary or serum antibody concentrations against this bacterium had a threefold hazard for not becoming pregnant compared to their counterparts. Increased hazard was nearly fourfold if more than one of these qualities and clinical signs of periodontitis were present.

“Our study does not answer the question on possible reasons for infertility, but it shows that periodontal bacteria may have a systemic effect even in lower amounts and even before clear clinical signs of gum disease can be seen,” said periodontist and researcher Susanna Paju, DDS, PhD, of the University of Helsinki. “More studies are needed to explain the mechanisms behind this association.”

Learn more about this study at the Journal of Oral Microbiology (2017); doi.org/10.1080/20002297.2017.1330644.
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Winners of the 2017 Table Clinic Competition

Dental, dental hygiene and dental assistant students and military/residents from across the state competed in the California Dental Association’s annual Table Clinic Competition at CDA Presents in Anaheim May 4-6. First-place winners from the contests were invited to submit abstracts of their work to appear in the Journal. CDA continues to collaborate with the California Dental Hygienists’ Association for the RDH portion of the competition.

Efficacy of Do-It-Yourself Whitening: Color Monitoring with Different Shade Assessment Tools

Christina Chi, Minna Chun, Arfassa Gullo, Darlene Teddy and Emily Hwang, Loma Linda University School of Dentistry

Abstract: The objective of this study was to evaluate the efficacy of natural whitening products using three shade assessment tools. Extracted human teeth were embedded in typodonts. Four experimental groups were studied: (1) negative control (NC) treated with grade 3 water; (2) brushing with activated charcoal (COAL); (3) agitating in coconut oil (OIL); and (4) positive control (HP) treated with 20% hydrogen peroxide. Color change was monitored: (1) visually with VITA Bleachedguide 3D-Master; (2) instrumentally with VITA Easyshade Compact Advance 4.0; and (3) imaging with ShadeWave software. Baseline (T1), one day post-whitening (T2) and one month post-whitening (T3) measurements were taken. The Kruskal-Wallis test indicates baseline measurements were not significantly different among the four groups (p > 0.05). At T2 and T3, there was significant difference among the four groups (p < 0.05) due to the HP group. This study confirms the whitening efficacy of hydrogen peroxide and provides valuable evidence supporting a new shade assessment method.

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Leveraging Informatics and Web-Based Technologies To Relieve Access to Oral Health Care Barriers in Disadvantaged Communities

Corey D. Stein, MS, Western University of Health Sciences, College of Dental Medicine

Abstract: Nationwide oral health disparities disproportionately hinder access to care for underserved populations. As web-based applications become ubiquitous across U.S. demographics, health policymakers and dental professionals need to explore new technological interventions to enhance health care availability and support clinical practices. The forthcoming manuscript detailed the implementation of a web-based protocol designed to facilitate meaningful communication between patients and oral health providers. Employing the application permits remote triage of patients’ dental conditions while ascertaining chief complaints prior to direct examination. By utilizing self-reported, qualitative metrics exchanged through a secure network of health care professionals, this protocol is aimed to expedite clinical processes, increase positive patient outcomes and enhance health care utility. We discussed the proposed intervention and its potential to relieve barriers that currently restrict a Southern California community from optimal oral health care.

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Clinical and Radiographic Presentations in MRONJ After Bisphosphonates vs. Denosumab

Edwin Eshaghzadeh and Chantal Hakim, University of California, Los Angeles, School of Dentistry

Abstract: Not available.

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Dental Unit Waterlines: Are Yours Safe?

Pamela Cabello, Shawnee Lopez and Erlinda Benavidez, Citrus College

In 2014, an elderly woman passed away after contracting Legionnaires disease due to unclean dental waterlines. Two years later, seven children were also hospitalized after contracting Mycobacterium from unclean waterlines during their pulpotomy procedures. Unclean dental unit water lines may potentially cause patients, especially children, the elderly and those with compromised immune systems, to acquire an infection they otherwise would have not had because of the biofilm that collects inside the water lines. Our study involved running saliva/food particles through various dental hoses. Each hose was flushed using a different type of cleaning agent. We also had one hose that was not flushed at all. Based on our results, we decided whether flushing waterlines improves the cleanliness of water and which cleaning agent works best. We also tested the water from the air water syringe of two dental offices to see if there was any bacterial growth. We predicted that flushing and disinfecting waterlines is crucial in keeping waterlines free of debris and as sterile as possible.

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Dysphagia: Under-Recognized and Life-Threatening

Tang Blanton and Jose Mendez, West Los Angeles College

Method: Evaluation of literature regarding benefits of early dysphagia detection, existing standardized screening tools and valid physiological markers of dysphagia.

Results: Standardized dysphagia screening improves patient outcomes as demonstrated by reduced hospital stay, reduction of aspiration pneumonia and lower mortality. Reduced tongue strength is strongly correlated with dysphagia. Existing assessment tools and management materials can be adapted for use by dental professionals.

Conclusion: Dental professionals can improve patient outcomes through early dysphagia detection, referral to the dysphagia team and treatment modifications for dysphagia. Adoption of hospital protocols may be appropriate for detecting dysphagic patients in dental practices. This table clinic proposed a protocol for dysphagia risk screening and management protocols based on risk categories.

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Evidence-Based Practice
Knowledge, Attitude, Access and Confidence of Students
Victoria Santiago and Melissa Cardenas, Loma Linda University

Background: Two cohorts’ knowledge, attitudes access and confidence of evidence-based practice evaluated pre- and post-required research design course.

Methods: IRB exempt status; 35-question survey distributed to students in first course session. Post survey distributed in last session. Data evaluation of knowledge with Fisher’s exact test. Friedman’s test used to evaluate attitude, access and confidence, all at \( \alpha = 0.05 \).

Results: Cohort one \( n=19 \) (100 percent); cohort two \( n=79 \) (83 percent) completed both surveys. Statistically significant increase in knowledge in both cohorts. Cohort two showed significant improvement in seven out of 10 knowledge questions \( (p<0.001) \). Cohort one showed significant improvement in three out of 10 knowledge questions \( (p=0.002) \). Significant difference in attitude, access and confidence in cohort one \( (p<0.05) \).

Conclusions: Significant improvement in knowledge for both cohorts; results suggest need to improve knowledge in study design, level of evidence and analyzing results.

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MILITARY/RESIDENT WINNER

Can’t Breathe When Sleeping
Lt. Jabrenta Hubbard, DMD
Naval Hospital Camp Pendleton

Abstract: Imagine a deep sleep when all of a sudden you stop breathing. The involuntary cessation of breathing is what occurs with sleep apnea. The most common form of sleep apnea, obstructive sleep apnea (OSA), results from a closed or restricted upper airway. For OSA to result, an airway closure must exist, breathing cessation must occur during sleep and an anatomical anomaly in the oral pharyngeal region that hinders neurochemical and neuromuscular control of breathing must also be present. Depending on the severity of the sleep apnea, OSA can be treated medically, surgically or with nonsurgical appliances. One particular nonsurgical appliance includes the mandibular advancement device. These devices may be as effective as surgical treatment. Varying fabrications exist for the mandibular advancement devices. The method demonstrated is the oral sleep apnea appliance (OSAP).

THE AUTHOR, Lt. Jabrenta Hubbard, can be reached at jhubb8705@hotmail.com.
Thank you to the following judges for the annual Table Clinic Competition held at CDA Presents in Anaheim May 4–6.

**RDA Competition**
- Patricia Alvarez, RDA
- Izabella Ambartsumyan, RDA
- Shari Becker, RDA
- Lisa Bocanegra, RDA
- Maleah Brooks, RDA
- Melrose Nabua, RDA
- Maria Christina Ochoa, RDA
- Karen Schroeder, RDA
- Manolita Teh, RDA
- Tobi Trotta, RDA
- Georgina Vargas-Burket, RDA

**RDH Competition**
- Alan Budenz, DDS
- Howard Richmond, DDS
- Judith Strutz, DDS

**Dental Student Competitions**
- Kai Chiao Chang, DDS
- Jaymie Coria, DDS
- Marileth Coria, DDS
- Samuel Demirdji, DDS
- Ramesh Gowda, DDS
- James Lau, DDS
- Mei Lu, DDS
- Pradip Patel, DDS
- Leonard Raimondo, DDS
- Claudia Ritholz, RDA
- R. Jerry Smith, DDS
- Ann Steiner, DDS
- Zaw Thu, DDS

**Military/Resident Competition**
- Monica Bruce, DDS
- Kai Chiao Chang, DDS
- Wyeth Hoopes, DDS
- Hemant Joshi, DDS
- Madhavi Joshi, DDS
- Ann Steiner, DDS
- James Strother, DDS
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Consumption of Cannabis and Effects on Periodontal Oral Health

Suellan Go Yao, DMD, and James Burke Fine, DMD

ABSTRACT
Cannabis plays a role in the legal, medical and dental fields. With more states passing medical marijuana laws, policymakers are concerned about possible cannabis use among nonpatients. Oral health effects include periodontitis, bone loss and gingival enlargement. Its Schedule I classification makes it difficult to run randomized controlled studies on its effects. However, further medical study will allow for better policy concerning marijuana that may affect the population as a whole.

Cannabis, which is more commonly known as marijuana, is derived from the plant Cannabis sativa. “Cannabinoids” are a group of molecules that act on the cellular cannabinoid receptors. They are divided into three groups: endogenous (endocannabinoids), synthetic and phytocannabinoids (plant derived). Delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD) are in the third group.1 THC is considered the plant’s main constituent and is the most psychoactive component, while CBD is nonpsychoactive. There are three forms of cannabis: marijuana, which consists of dried leaves and flowers, hasish, which is resin from the flower heads compressed to small blocks, and hash oil, which is a thick liquid extracted from hasish. Marijuana has the least concentrated form of THC.

Administration and Function
There are three main routes of administration: inhalation to the lungs by smoking the vaporized plant, ingestion to the gut of lipophilic, alcoholic or supercritical fluidic extracts of the plant and topical application to the skin of the plant extract.3 Smoking marijuana is the most common route because of its ease of use and rapid effects. Hasish can be baked and eaten in foods or mixed with tobacco. Hash oil is commonly spread on the tip of a cigarette and smoked.2 Other routes are oromuscosal, rectal, intravenous and cannabidiol adsorption.4

The endocannabinoid system consists of receptors, their ligands and ancillary proteins. The endogenous receptors are CB1 and CB2. The CB1 receptors are found in the cerebral cortex, limbic areas, basal ganglia, cerebellum and thalamic areas, whereas the CB2 receptors are found in the cells in the immune system, mostly the macrophages.2 These areas in the brain...
where the CB1 receptors are found are involved in cognition, memory, reward, pain perception and motor coordination. The CB1 receptor is 10 times more prevalent in the central nervous system than the other studied receptor involved in pain, the μ-opioid receptor.

**Adverse Effects**

Acute adverse effects can include anxiety, panic reactions and psychotic symptoms, which are most commonly reported by beginner users. However, because there is a low expression of the receptor in the brainstem, cannabinoids have minimal toxicity and have an absence of fatal overdose or respiratory depression. Withdrawal symptoms can include restlessness, irritability, mild agitation, insomnia, nausea and cramping. There have been reviews and studies of the adverse effects (1,8,9,10) (table 1).

Tobacco smoking has been considered a cause of lung cancer. Cannabis smoke contains many of the same carcinogens as tobacco smoke. The International Lung Cancer Consortium (ILCCO) is a group of lung cancer researchers established in 2004 who share compatible data of ongoing and completed lung cancer case control and cohort studies from different geographical areas and ethnicities. One of its key goals is to evaluate potential lung cancer risk factors that are difficult to evaluate in individual studies. Zhang et al. did a pooled analysis based on the individual level data from the participating ILCCO studies. They found little or no association between the intensity, duration, cumulative consumption or age of start of cannabis smoke and the risk of lung cancer in never smokers. However, there was a suggestive association between high intensity and cumulative cannabis smoking on adenocarcinoma lung cancer.

**Medical Use Origin**

The use of cannabis as a medicine dates back to approximately 2737 BC in China, where it was used for rheumatic pain, intestinal constipation, disorders of the female reproductive system and malaria. In the 20th century, the medical indications of cannabis were summarized in Sajou’s Analytic Cyclopedia of Practical Medicine (1924) in three areas: sedative or hypnotic, analgesic and other uses. But in the early 1900s, the medical use of cannabis started to decline because of increasing availability of synthetic pharmaceuticals, potency variability and unreliable supply sources that made it difficult to get replicable effects. And lastly, also because of legal restrictions. In 1937, the Marijuana Tax Act imposed a tax on use of the plant. Then in 1941, cannabis was removed from the U.S. pharmacopeia. The 1960s saw a boom in the recreational use of cannabis in the younger population in the Western world, and this boost of consumption along with better scientific knowledge about the plant contributed to an increased scientific interest in cannabis. This interest was renewed in the 1990s when the receptors and the endogenous cannabinoid system in the brains were described. This interest has been increasing since.

**Legal Status**

Cannabis is classified as a Schedule I substance by the U.S. Food and Drug Administration (FDA). Schedule I drugs, substances or chemicals are defined as drugs with no currently accepted medical use and a high potential for abuse. Schedule I drugs are the most dangerous drugs of all the drug schedules with potentially severe psychological or physical dependence. Two categories of cannabinoid medicines are currently used in North America. The first is cannabis-derived pharmaceuticals, which include dronabinol, nabilone and nabiximols. Dronabinol is a schedule II drug and nabilone is a schedule III drug. Both were approved in 1985 for the treatment of nausea and vomiting associated with cancer chemotherapy in patients who have not responded to other conventional antiemetic therapy. Dronabinol was also approved for the treatment of anorexia-associated weight loss in AIDS patients in 1992. The second category is phytocannabinoid-dense botanicals or medical cannabis. On Nov. 5, 1996, California became the first state to legalize medical cannabis. Twenty-five states and the District of Columbia have legalized medical use of cannabis (table 2). In November 2012, Colorado and Washington also passed legislation for the legal production, sale and use of recreational cannabis. In Alaska, Oregon and the District of Columbia, marijuana is legalized also for recreational use. After the November 2016 election, medical marijuana laws recently passed in Arkansas, Florida and North Dakota but still have yet

**Table 1**

<table>
<thead>
<tr>
<th>Study</th>
<th>Summary</th>
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<tr>
<td>Wang et al., 2008*</td>
<td>The most common nonserious adverse effects were dizziness, somnolence events, muscle spasm events, other gastrointestinal tract disorder, pain events, dry mouth events and bladder disorder. The rate of these nonserious events was almost two times higher in the cannabinoids group than the control.</td>
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<tr>
<td>Lynch and Campbell, 2011*</td>
<td>No serious adverse events were found, but the most frequent nonserious adverse events reported were sedation, dizziness, dry mouth, nausea and disturbance in concentration.</td>
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<tr>
<td>Aggarwal, 2013*</td>
<td>Smoking both tobacco and cannabis synergistically increase the risk of respiratory symptoms and chronic obstructive pulmonary disease, but smoking only cannabis was not associated with this increased risk.</td>
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to be effective. California, Massachusetts and Nevada all passed measures for legalizing recreational use of marijuana. Laws for recreational use in Massachusetts and Nevada have not yet been implemented.17 Louisiana has changed its law concerning medical marijuana from “prescribed to recommended.” In January 2014 in New York, the governor issued a directive that allowed 20 hospitals to dispense medical cannabis to patients who have been certified by a doctor to have certain conditions, such as cancer. It also created a limited research program for New York’s health department to establish guidelines and make decisions as to which hospitals can participate in the program. These hospitals would decide which patients would qualify for the medical cannabis use and receive the cannabis from the federal government.19

Pain Management and Prescribing

In 1999, the Institute of Medicine released its first report indicating that cannabinoids may have a role in the treatment of pain, movement and memory, but that there are risks associated with the use. It made six major recommendations to the medical community to better establish the safety and efficacy of cannabis. These include the evaluation of the physiologic and psychological effects, individual health risks, various delivery systems and short-term clinical trials to determine effectiveness for targeted medical conditions.15

Pain is the No. 1 reason that cannabis is prescribed to patients. In reference to pain, cannabis has been best researched clinically for its role in the management of neuropathic pain and malignant pain. Other chronic pain syndromes, especially those that involve hyperalgesia and allodynia and acute pain, have also been described. A 2011 systematic review of cannabinoids for treatment of chronic noncancer pain looked at studies of neuropathic pain, fibromyalgia, rheumatoid arthritis and mixed chronic pain syndromes. It concluded that “overall there is evidence that cannabinoids are safe and modestly effective in neuropathic pain with preliminary evidence of efficacy in fibromyalgia and rheumatoid arthritis.” It also mentioned that smoked cannabinoid botanicals demonstrated a significant analgesic effect in HIV neuropathy.3,9

In February 2013, the clinical decisions interactive at nejm.org presented a case vignette concerning a cancer patient asking her doctor for the possibility of using marijuana to alleviate the pain, nausea and fatigue. It posed two recommendations: recommending or not recommending medicinal use of marijuana with a defense for both options by experts (J. Michael Bostwick, MD, Gary M. Reisfield, MD and Robert L. DuPont, MD) in the field.20 The polling results showed 76 percent of all votes in favor of the use of marijuana for medicinal purposes. Most of the votes came from the U.S., Canada and Mexico. In North America, 76 percent of votes supported medical marijuana; outside North America, 78 percent of votes supported medical marijuana. It is often debated whether the answer of the question belongs to the physician or to the patient (if legalized). While a majority of clinicians recommend the use of medical marijuana in certain situations, many from both sides believe in the need for more research for a stronger basis of evidence.21

Nonlegal, Nonmedical Use

As more states pass medical marijuana laws, policymakers are concerned with the possible increase of cannabis use among nonpatients. Looking at marijuana possession arrests in cities from 1988 to 2008, Chu16 found that these laws increase marijuana arrests among adult males by approximately 15–20 percent. Based on data on treatment admissions to rehabilitation facilities, he found that marijuana treatments among adult males increased by 10–20 percent after the passage of these laws. This suggests a positive legalization effect on illegal marijuana use. Limitations of the study are that bias may be introduced by the potential endogenous responses of police, rehabilitation facilities and treatment patients; the arrest and treatment data do not answer whether these medical marijuana laws increase initiation of heavy marijuana use. Limitations of the study are that bias may be introduced by the potential endogenous responses of police, rehabilitation facilities and treatment patients; the arrest and treatment data do not answer whether these medical marijuana laws increase initiation rates among general populations and the study assumes homogeneity in medical marijuana laws across the states. However, Chu concludes that the study presents evidence that some indicators of heavy marijuana use do respond to these medical marijuana laws.

Pacula et al.22 also examined the impact of medical marijuana laws on marijuana use in the general population and among youth. They found that while simple dichotomous indicators of medical marijuana laws are not positively associated with marijuana use or abuse, such measures hide the positive influence legal dispensaries have on adult and youth use.
use, particularly heavy use. It is clear that not all the laws are equal. They found that in general medical marijuana law polices have no impact on recreational marijuana use or are associated with reduced marijuana consumption depending on the population and behavior assessed. However, because of the heterogeneous effects of specific underlying policy dimensions, they influence users differently based on the user’s age and use. They found that states that allow dispensaries face a greater risk of increased recreational use and related negative consequences relative to other medical marijuana law policy frameworks. With the changing of medical marijuana laws, it is important to understand the possible heterogeneous effects of these policies.

There is also fear that marijuana will follow the path of tobacco, in terms of advertising, addictiveness and use. The tobacco industry increased due to product development, marketing and lobbying. The marijuana industry can become similar and deny addiction potential, downplay the adverse health effects, create a large market as quickly as possible and protect this market via lobbying, campaign contributions and advocacy efforts. As seen with tobacco, this private industry of marijuana may not safeguard the public health.23

### Oral Health Effects

Smoking tobacco is a recognized behavioral risk factor for periodontal disease. However, smoking cannabis may also contribute to the etiology of periodontal disease. Studies have found that some oral effects can include periodontitis at an earlier age, gingival enlargement similar to Dilantin-induced enlargement in long-term chronic cases and bone loss. Several studies used the Dunedin Multidisciplinary Health and Development study (DMHDS). It is a longitudinal study of a complete birth cohort at the Queen Mary Hospital in Dunedin, New Zealand, from April 1, 1972 to March 31, 1973. Perinatal data was obtained and the cohort was assessed within a month of their third birthdays and then every two years starting at ages 5 to 15 and then at ages 18, 21, 26, 32 and 38. More than 90 percent of the cohort self-identify as European24,25,26,27 (TABLE 3).

Thomson et al.24 looked at the independent contributions of cannabis and tobacco smoking to periodontal disease using the DMHDS. They found that regular exposure to cannabis smoke was strongly associated with the prevalence and incidence of periodontal attachment loss by age 32. Limitations of the study were the self-reported smoking exposure data and that periodontal attachment loss was measured at three sites as opposed to six sites. However, strengths included the high follow-up rates, prospective determination of smoking exposure and use of data on periodontal incidence and prevalence. Cannabis use in New Zealand does not typically involve mixing with tobacco. Periodontal epidemiological research should determine if the association exists in other populations. David Balayssac,
Only use of cannabis. Their findings did not support the association of cannabis use and destructive periodontal disease. A limitation of the study was that some animals may have died from respiratory difficulties and may not be comparable to doses inhaled by human marijuana users. The results of this study may differ from another study by Napimoga et al. who demonstrated that the administration of cannabidiol from marijuana significantly inhibited bone loss in experimental periodontitis in rats. However, that study looked at one compound of marijuana smoke, which was administered via intraperitoneal injections, while this study evaluated the marijuana smoke as a whole, which was inhaled. The current study results demonstrate that cannabis smoke might alter bone pathophysiologic patterns and might be related to impaired immune function during the process of bone loss or activation of specific receptors that might increase bone loss because the results were found in the ligated sites. However, more studies are needed to determine if marijuana smoke is a threat to periodontal outcome for periodontal treatment.

Rawal et al.32 presented two cases of marijuana-associated gingival enlargement. The association between chronic cannabis use and gingival enlargement was reported by Layman31 and then Baddour et al.34 The cases presented in this paper showed gingival enlargement that can be compared to gingival enlargement occurring with phenytoin use. Due to the similarities, there may be common pathogenic mechanisms that need to be further explored.

Thomson et al.25 conducted another study using the DMHDS to describe changes in the occurrence of periodontal attachment loss and evaluate risk factors for unfavorable attachment loss progression through ages 26, 32 and 38. They found that the prevalence and extent of attachment loss increased with age with greater changes between the ages of 32 and 38 as compared to the ages 26 and 32 and more new attachment loss than progression. There was a doubling of proportion of sites showing attachment loss, especially among the anterior teeth in the mid to late 30s. Those who were longer-term smokers and those of low socioeconomic status (SES) were more likely to be in the groups with the least favorable trajectory of periodontitis experience.

Those who were longer-term smokers and those of low socioeconomic status (SES) were more likely to be in the groups with the least favorable trajectory of periodontitis experience.

Nogueira-Filho et al. conducted a study that evaluated the possible effect of marijuana smoke inhalation on bone loss during the induction of periodontitis in rats. They found that marijuana smoke inhalation increased bone loss in the furcation area with induced periodontitis rats but there was no effect in periodontally healthy sites. A limitation of the study was that some animals may have died from respiratory difficulties and may not be comparable to doses inhaled by human marijuana users. The results of this study may differ from another study by Napimoga et al. who demonstrated that the administration of cannabidiol from marijuana significantly inhibited bone loss in experimental periodontitis in rats. However, that study looked at one
were more likely to be in the groups with the least favorable trajectory of periodontitis experience. Limitations of the study were that there were some SES differences in those who were periodontally examined, the use of partial recording protocols for the periodontal exams and the inability to determine whether any participant had periodontal surgery by age 38. This study implies that the eradication of smoking can result in the greatest population gains in periodontal health.

With the use of illicit drugs as a problem worldwide and the lack of epidemiological research regarding periodontal health of people addicted to drugs, Kayal et al.35 conducted a study to determine the periodontal health status and oral hygiene in people addicted to drugs in Jeddah, Kingdom of Saudi Arabia. It was a cross-sectional study conducted at Al-Amal Hospital, a drug rehabilitation center, from October to December 2012 with 57 male inpatients who were recovering from drug addiction. Cannabis was the drug of choice of most participants. This study population was of low education level and socioeconomic status. They found that illicit drug use, especially heroin and cocaine, was associated with more severe forms of periodontal disease.

Zeng et al.26 also used the DMHDS to reexamine the periodontal effects of smoking and the impact of other putative risk factors through early to middle adulthood cross-sectionally using a more informative approach. A generalized linear mixed model with a quasi-binomial approach was used as an extension of the traditional multilevel modeling method for data analysis. Cannabis smoking was determined at ages 18, 21, 26, 32 and 38 by asking the participants how many times they had used cannabis in the previous year. This study confirmed the importance of chronic smoking (tobacco or cannabis) as a risk factor for periodontal attachment loss. At age 32, smoking cannabis weekly or daily was associated with higher attachment loss. The impacts of all covariates continued to increase with age. A commentary by Brett Duane, BDS, MPH, PHD, in Evidence-Based Dentistry16 reviewed the study.

Another study using DMHDS was by Meier et al.27 to test whether cannabis use from ages 18 to 38 was associated with health at age 38 and whether cannabis use at those ages was associated with individual health decline using the same measure of health at both ages. As comparison, they also tested associations between tobacco use and physical health. Their findings showed that cannabis use over 20 years was unrelated to health problems in early midlife. However, the sole exception was that cannabis use was associated with periodontal disease. Cannabis use for up to 20 years was not associated with net metabolic benefits. Their results should be interpreted in the context of prior research showing that cannabis use is associated with other health problems. Limitations of this study were that cannabis joint years were based on self-reports, it was difficult to separate cannabis and tobacco use, findings were based on a single New Zealand cohort, the conclusions were limited to a specific set of health problems assessed in early midlife, findings for cannabis were compared against findings for tobacco, and the study could not comment on the health effects of cannabis use in older adults or the safety of medical marijuana use in patients who were already unwell.

A recent study by Shariff et al.17 examined the relationship between frequent recreational cannabis use and periodontitis prevalence in the U.S. They analyzed data from the National Health and Nutrition Examination Survey (NHANES 2011–12) and found that frequent recreational cannabis use was associated with deeper probing depths, more clinical attachment loss and higher odds of having severe periodontitis. Their data are in agreement with other existing studies. Limitations of the study are a possible selection bias due to the exclusions of individuals with incomplete cannabis use or other covariates and because the cross-sectional nature of the study precludes any inferences on a causal relationship between cannabis use and periodontitis. This study supports the idea that dental professionals should be aware of cannabis use as a possible risk factor for periodontitis.

Conclusion

Marijuana has a long history in medicine. Its Schedule I classification makes it difficult to run randomized controlled studies on its effects. The need for more study of its effect as a medicine is clearly recognized as well as the need for the evolving policies concerning marijuana use. Periodontal disease is only one health condition among many that can be affected by marijuana in terms of incidence, prevalence and manifestation. Further medical study will allow for better policy in regards to marijuana that may affect the population as a whole.
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Oral Lichen Planus Flares Triggered by Cow’s Milk in a Patient With Elevated IgE Antibodies to Milk

Nita Chainani-Wu, DMD, MS, PhD; Anuradha Nayudu, BDS; and Daniel Prunell, BA, MPH

ABSTRACT A female patient with painful oral lichen planus that required daily topical corticosteroids completely eliminated cow’s milk/milk products (CMP) from her diet. Her oral discomfort improved about two months later and had mostly resolved by eight months. Blood tests showed an elevation of total immunoglobulin E (IgE) and CMP-specific IgE antibody titers. Over the next seven years, she was largely asymptomatic when continuing to avoid CMP, with the occasional inadvertent ingestion that resulted in flares.

Oral lichen planus (OLP) is a chronic, immunologically mediated, mucocutaneous disease. The clinical presentation includes white reticular striations on the oral mucosa that may be accompanied by erythema and erosions. In most patients with lichen planus, a cause is never identified. Some medications such as ACE-inhibitors or NSAIDS can trigger lichenoid drug reactions, which may have similar clinical features as lichen planus. These reactions usually occur soon after these medications are started, although in some cases they can occur after the patient has been on the medication for months or years. Confirmation of a lichenoid reaction to a given medication is done clinically and in retrospect, if discontinuation of the medication results in resolution of clinical signs and symptoms.

Hepatitis C virus has been associated with oral lichen planus in some studies, although the causal relationship of HCV with OLP is uncertain. Symptoms of lichen planus can range from none in the milder cases to severe discomfort particularly in patients with erosive changes. These symptoms can have significant effects on oral and general health as they may interfere with oral hygiene as well as with chewing and therefore prevent intake of a healthy diet in patients with severe OLP. Sensitivity to acidic and spicy foods is often a complaint, and sometimes these foods are erroneously identified by the patient as the cause of their OLP or the cause of flare-ups of the OLP. However, it is likely by the nature of these foods that they may simply induce irritation of preexisting lesions rather than be a true causative
factor. Conversely, foods that are soft and bland such as dairy products may be identified by patients as noncontributory to the disease flares and even soothing and helpful. In a literature search, we were unable to identify any published reports of a given food as a potential causative factor in a case of oral lichen planus. This is the first report to our knowledge of a patient with oral lichen planus, where ingestion of cow’s milk was identified as a trigger for her oral flares and elimination of cow’s milk intake and any foods containing cow’s milk/milk products (CMP) was followed by significant and sustained resolution of the clinical signs and symptoms of lichen planus. Furthermore, IgE testing showed an elevation in total IgE antibody levels and cow’s milk specific IgE antibody levels, and occasional ingestion of cow’s milk containing products (oral challenges) resulted in recurrence of symptoms.

Case Report

A 49-year-old female with a chief complaint of “sensitivity in the mouth” was initially seen in November 2006. She reported oral sensitivity of three weeks’ duration. At onset, this was only when brushing; however, the sensitivity had worsened over the past week, especially when eating spicy or high-temperature foods. She reported that she had not started any new medications or toothpaste recently and stopped using mouth rinse when the symptoms started. She did not eat hard candy or chew gum. She did not have any skin or vaginal symptoms.

She reported a history of asthma and hypothyroidism. Her only medications were daily Levoxyl and albuterol inhaler as needed. She was also on calcium supplements and a multivitamin. She reported no known drug allergies. She reported no history of tobacco use and alcohol consumption consisted of one to two glasses of wine per week.

On examination, white reticular lesions on the right and left buccal mucosa as well as white reticular lesions and associated erythema on the upper and lower facial gingiva were seen (FIGURES 1A–1C). The clinical impression was oral lichen planus. A biopsy of the right buccal mucosa confirmed the clinical diagnosis of OLP. A board-certified oral pathologist read the biopsy and it was consistent with OLP.

Initial management included a swish-and-spit mouth rinse of an elixir of dexamethasone (twice per day) and application of a topical 0.025% fluocinonide paste (0.05% fluocinonide ointment mixed with equal parts Orabase-B) three times per day. At the one-month follow-up, she reported some improvement in symptoms and no adverse effects from the medication. She was continuing to refrain from spicy food.

However, over the next few months worsening of oral discomfort along with increased erythema of the oral mucosa occurred. Soft acrylic trays were fabricated in June 2007 for use with the previously prescribed topical 0.025% fluocinonide paste in order to increase contact time of the topical medication with the oral mucosa while decreasing the amount ingested. Periodic worsening of symptoms, or flare-ups, were well controlled using the topical corticosteroids in the soft acrylic trays over the next several months of follow-up, however she continued to have a chronically present low level of oral discomfort.

In November 2007 in an attempt to identify a food-based trigger for the flares, a dairy elimination diet was discussed with the patient. She was advised to refrain from cow’s milk and all milk products and foods containing milk. After two months of avoiding cow’s milk and milk products, she reported only slight improvement in oral symptoms. However, at her six-month follow-up she reported significant symptom improvement after continued avoidance of foods and beverages containing cow’s milk. After two months of avoiding cow’s milk and milk products, she reported only slight improvement in oral symptoms. However, at her six-month follow-up she reported significant symptom improvement after continued avoidance of foods and beverages containing cow’s milk.

In October 2008, a blood test to measure total immunoglobulin E (IgE) levels as well as IgE levels to foods included in a standard food panel was obtained. Two weeks
prior to the test, she was advised to consume milk and milk products. However, she reported that she was unable to ingest much milk or milk products during this time, as her OLP flared when she started to do so.

The blood draw and testing was done at Quest Diagnostics laboratory in Northern California. The total immunoglobulin E level was elevated at 795 kU/L, (normal range: < 114 kU/L). Food-specific IgE antibodies to the following common food allergens were included in the standard food panel: clams, egg whites, codfish, corn, milk, peanuts, scallops, shrimp, soybeans, walnuts, wheat and sesame seeds. The levels for all but milk and egg whites were within normal limits. Specific IgE levels to milk were elevated at 1.4 kUA/L. This is in the Class 2 range (0.7 to 3.49, moderately elevated level indicating that this food is a probable contributing factor to total allergic load-per ImmunoCAP interpretive guidelines). Specific IgE levels to egg whites were also elevated at 0.9 kUA/L, within Class 2 range.

At her follow-up examinations in 2009, she reported that she had been avoiding cow’s milk and milk products completely but had continued eating eggs. She reported significant improvement in OLP symptoms, which she attributed to this dietary change. She had also noted that on several occasions she experienced flare-ups with worsening oral symptoms when she had inadvertently consumed food containing cow’s milk. Overall, her symptoms were reduced to the point where she could eat spicy foods without pain or discomfort. Oral mucosal examination revealed significant reduction of gingival erythema and a regression of the white reticular lesions on her buccal mucosa (Figures 2A-2C). She was advised to continue using topical fluocinonide paste on an as-needed basis for flares.

As of her follow-up in October 2015, the patient’s symptoms remain under good control. She continues to refrain from consuming cow’s milk or milk products. She uses fluocinonide in case of flares. Her lichen planus lesions remain limited and stable and are confined to the gingiva with the presence of minimal erythema.

**Discussion**

Management of symptomatic oral lichen planus involves the use of anti-inflammatory medications to reduce discomfort and accelerate healing of ulcerations. These medications may include topical and systemic corticosteroids that are commonly used to control OLP symptoms. Systemic corticosteroids have significant side effects when used long term, therefore their use is limited to control of severe disease or for short-term use for control of acute flares. A common side effect of topical steroid use is oral candidiasis; therefore, compounded oral pastes containing topical corticosteroids along with antifungals such as nystatin can be used in patients with this complication who need continued use of topical corticosteroids. Other medication options include topical formulations of immunosuppressants like cyclosporine and tacrolimus. High-dose oral curcuminoids extracted from turmeric (Curcuma longa) have demonstrated efficacy in control of OLP and have a good safety profile.

In some instances where symptoms are severe and chronic, adjunctive steroid-sparing agents such as mycophenolate Mofetil or azathioprine are used in combination with corticosteroids. And more recently biologics such as etanercept have been used. Some of these medications can have significant toxicity and side effects especially when used long term.

If an environmental trigger for OLP was identified for a given patient, such that avoidance of the trigger could result in control of symptoms, this would positively affect the health of the patient by alleviation of oral discomfort, the resultant improvement of oral hygiene and nutrition and by eliminating the need for potentially toxic medications.

Identification of food triggers in oral lichen planus can be challenging, as it is an immunologically mediated condition likely involving cell mediated delayed hypersensitivity mechanisms and there may be a time lag between ingestion of the food and exacerbation of symptoms and signs.
Cow’s milk is a common food allergen and has been identified as a possible trigger for autoimmune or immunologically mediated conditions such as rheumatoid arthritis, atopic dermatitis, recurrent aphthous stomatitis, insulin dependent Type 1 diabetes, lichen planus to our knowledge have the patient’s symptoms had almost resolved over the years have consistently resulted in exacerbations of symptoms of oral lichen planus. Therefore, there was clinical evidence for the role of dairy prior to blood testing for total and food-specific IgE levels, and the history continues to indicate an ongoing role of dairy in triggering flare-ups.

Furthermore, while significant reduction in clinical manifestations occurred after avoidance of cow’s milk in this patient, mild erythematous lesions on the gingiva chronically persisted over the years. Therefore, this case doesn't fit the criteria of a lichenoid reaction where we can expect complete resolution of clinical signs and symptoms after discontinuation of the etiologic agent and after allowing sufficient time for the healing process. Rather, cow’s milk seems to exacerbate her otherwise mild, chronic OLP.

The proportion of patients with OLP where flares are triggered by cow’s milk intake is not known at this time. In addition, the accuracy of IgE testing or skin testing to determine if cow’s milk plays an etiologic role in a given patient with OLP is unclear. Future clinical studies evaluating the role of cow’s milk as an etiologic factor in OLP, and those evaluating accuracy of laboratory testing in this scenario, would be valuable both in adding to our understanding of the pathogenesis of OLP and in management of patients with OLP.

Because dairy elimination is feasible for most patients and the role of laboratory testing is unclear, at this time it is reasonable to try dairy elimination as an early step in management of patients with lichen planus, particularly those with symptoms severe enough to require medications.

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Pre-Eruptive Resorption in a Patient With DiGeorge Syndrome

Tory Silvestrin, DDS, MSD, MSHPE; Nasser Said Al Naief, DDS, MS; Dezhi Wang, MD, HTL, QIHC; and Leif K. Bakland, DDS

Abstract DiGeorge syndrome (DGS) is associated with defects of the palate, truncus arteriosus and tetralogy of Fallot, as well as cognitive defects and neuromuscular problems. Pre-eruptive resorption (PER) is a rare resorptive entity found within the dentin in the occlusal aspect of an unerupted tooth. A literature search could not identify any previous report on a patient diagnosed with both DGS and PER. This case report details a patient with concomitant DGS and PER. The importance of this study is to provide a case report showing a possible association with DGS and dental anomalies — specifically PER. Additionally, this manuscript provides a literature review of the prevalence, management and proposed etiologies of PER.

Early diagnosis and treatment of pre-eruptive resorption (PER) is important for dentists in order to prevent progression of this entity to a degree that could render a tooth unrestorable. Many general dentists acquire panoramic radiographs on growing patients, and this is the ideal medium for initial recognition of PER. This case report discusses the occurrence of PER in a patient with concurrent DiGeorge syndrome (DGS). To our knowledge, this is the first report of a patient with concomitant DGS and PER. The importance of this study is to provide a case report showing a possible association with DGS and dental anomalies — specifically PER. Additionally, this manuscript provides a literature review of the prevalence, management and proposed etiologies of PER.

Case Report

A 12-year-old girl in mixed dentition stage was found during routine radiographic examination to have a pre-eruptive occlusal radiolucency in the mandibular left second molar (tooth No. 18). She was in orthodontic treatment to correct a bilateral mandibular crossbite and her complaint was of intermittent, spontaneous, dull throbbing pain in her teeth after sugary drinks. Her dentist restored several teeth with
Carious lesions and her pain subsided. A subsequent panoramic radiograph showed the presence of a pre-eruptive coronal radiolucency in tooth No. 18 (Figure 1). A layer of bone was observed above the unerupted tooth.

The quality, coloration and hardness of the enamel on the affected tooth was clinically indistinguishable from the other teeth in the patient’s dentition. This was a contributing factor for the referral for evaluation of the patient, as no one tooth in particular clinically appeared different than any other (i.e., no pathosis or developmental disturbance was noted). The deciduous teeth presented no caries and the enamel quality was indistinguishable from a patient with otherwise intact dentition and within normal limits on all teeth.

Two options for managing the condition were presented to the patient and her guardian. One would be to surgically expose the unerupted tooth and remove the resorptive lesion. The second option would be to wait for the tooth to erupt before removing the lesion. They chose the latter option and returned one year later when the tooth had partially erupted. The crown was then further exposed surgically, but the patient delayed the return visit to have the resorptive lesion removed.

Six months after the surgical exposure of the tooth, the patient returned and was referred for endodontic consultation. An extensive medical history was obtained that included a diagnosis of DGS, which was made when she was 5 years old. DGS is an autosomal dominant syndrome and is associated with the deletion of part of chromosome 22.1 A feature of DGS is tetralogy of Fallot, a condition characterized by congenital cyanotic cardiovascular malformations,1 for which her physician had recommended premedication with amoxicillin (2 g) one hour before any dental procedure. She had also been diagnosed with asthma and had H1N1 flu three years earlier. Two years earlier, she had cardiac surgery to manage her tetralogy of Fallot. Her list of medications included furosemide (Lasix), an antihistamine (loratadine), spironolactone (Aldactone), montelukast (Singulair) and fluticasone propionate (Advair Diskus). Based on the clinical and radiographic evaluations, a treatment plan was presented and accepted for the management of the PER: Removal of the resorptive lesion to evaluate the possibility for restoring the tooth. Absent sufficient coronal tooth structure, the tooth would be extracted.

One hour prior to the dental procedure, the patient took 2 g amoxicillin as prescribed. Under nitrous oxide sedation, she received local anesthesia of 3.4 mL, 2% lidocaine with 1:100,000 epinephrine by left inferior alveolar nerve block and lingual and buccal infiltration. Tooth No. 18 was isolated with a dental dam and the overlying enamel was removed with a diamond bur under copious water spray, exposing reddish, granular resorptive tissue underneath. After unroofing the entire lesion, it was removed using spoon excavators. Along with the lesion, some of the underlying demineralized dentin was also removed resulting in exposure of the dental pulp in the mesiolingual area of the pulp chamber. The extensive resorptive defect left insufficient tooth structure for restoration, and the tooth was extracted using a Molt No. 9 periosteal elevator and a No. 151 extraction forceps. The socket was irrigated with saline and covered with sterile gauze. Hemostasis was confirmed before the patient was dismissed and postoperative instructions were provided to the patient and her guardian. Postoperative

---

**FIGURE 1.** Panoramic radiograph showing an intracoronal radiolucent lesion in the unerupted mandibular left second molar (tooth No. 18).

**FIGURE 2.** Radiographic image of extracted tooth No. 18 prior to decalcification. The extent of tooth resorption can be seen as well as the presence of osteodentin within the resorptive area (arrow). Undifferentiated pulp mesenchymal cells within the cell-rich zone terminally differentiate into odontoblast-like cells to deposit this osteodentin, which is composed of odontoblasts becoming trapped in a newly formed matrix and the tubular pattern becoming obscured and distorted causing the abnormal radiolucent appearance of this entity.
evaluation 14 days later showed good healing. Because of her young age, tooth No. 17 was expected to erupt into the vacated No. 18 position.

The extracted tooth was preserved with the guardian’s permission to be processed for histological evaluation. A radiograph taken of the extracted tooth shows the extensive resorption of the crown (FIGURE 2).

### Histological Evaluation

The tooth was placed in a 15 ml Eppendorf tube with 70% ethanol and subsequently bisected using a diamond coated blade. One of the halves was decalcified using 4.3% ethylenediaminetetraacetic acid, as described by Cho et al. and subsequently embedded in paraffin, and then two 4μm-thick sections were obtained, one of which was stained with hematoxylin and eosin and the other was stained with Giemsa stain. Both stains delineated the presence of a prominent resorptive area in the tooth crown and also the deposition of abnormal dentin and osteodentin (FIGURE 3). The other specimen half was sectioned and grinded into an about 30μm-thick section by using an EXAKT Cutting and Grinding system (EXAKT Technologies, Norderstedt, Germany) and stained with methylene blue and basic fusion stain, demonstrating the deposition of globular dentin/osteodentin within the resorptive area (FIGURE 4).

### Discussion

DGS is a very rare embryologic disorder, characterized by defects in tissues derived from the third and fourth branchial arches and pouches and accompanied by cellular immune deficiency, hypocalcemia as a result of thymic aplasia (hypoplasia) and agenesis of the parathyroid gland, respectively. Cardiovascular abnormalities are also characteristically present. Aside from several systemic and developmental abnormalities associated with this condition, patients also present with characteristic craniofacial features, including hypertelorism, lower than usual ear lobes, downward eye slanting, micrognathia, cleft palate and a broad nose. Additional craniofacial conditions of DGS include delayed tooth development and eruption of permanent teeth as well as enamel hypoplasia. Further, histomorphological examinations of patients’ dentitions often display increased calcification of the dentin and deposition of osteodentin within the pulp.

PER appears as a radiographic lesion adjacent to the dentinoenamel junction in the occlusal aspects of the crown and is often an incidental finding on radiographs of unerupted teeth. The radiographic appearance usually shows teeth with thin occlusal enamel and radiolucent areas toward the mesial aspects of the crowns, which was not the case in this report. The resorptive lesions appear to be progressive, but the progression may slow down before the tooth erupts. The unpredictable nature of PER is illustrated in a report by Holan et al. who found resorption involving the pulp before the tooth erupted, suggesting that the progression of the resorptive action may increase at the time of eruption. In most cases, however, the lesions extend no further than two-thirds of the dentin thickness.

After teeth with PER are fully erupted, it is difficult to differentiate PER from occlusal caries. In the absence of bacteria, however, occlusal carious does not occur prior to eruption. It can also be difficult to differentiate PER from external resorption. McNamara reported on a case of a molar with apparent intracoronal resorption that upon histological examination after extraction appeared to have an occlusal developmental pit communicating with the resorptive defect in the underlying dentin. Another possible differential diagnosis has been Turner’s hypoplasia, but many of the patients diagnosed with PER lesions have no history of previous infection of primary molars.
Clinically, the enamel in teeth with PER appears thin, and radiographically the undermined dentin and enamel have a shell-like appearance. Below the occlusal enamel, the lesion appears as soft red tissue with a different texture and appearance than carious dentin. Histologically, the resorptive lesion is composed of loose fibromyxoid tissue containing islands and strands of odontogenic epithelium as well as inflammatory cells (including multinucleated giant cells, osteoclasts and other chronic inflammatory cells) and resorption lacunae but with no evidence of caries or microbiota. Clinical symptoms are most often absent even if the pulp has become involved. However, Brunet-Llobet et al. presented a case of severe pain attributed to PER.

The etiology of PER has not been firmly established. One suggestion has been that damage to the reduced enamel epithelium of the developing tooth may allow invasion of cells from the periodontium leading to PER. That possibility has been questioned because of absence of observed developmental defects. Another suggestion has been that PER could be due to abnormal development of the crown follicle, though no data is available to support that. It has also been thought that the pathogenesis of this lesion is due to local pressure from eruption causing the resorptive entity, and possibly that invasion of resorptive cells through minor defects in enamel can lead to the pre-eruptive resorption.

There have been many case reports on PER in permanent teeth. The most frequently affected tooth is the permanent mandibular second molar. A recent case series showed a 5:1 ratio of the mandible versus the maxilla. Permanent maxillary second premolars are the second most frequent teeth and anterior teeth are the least frequent ones. PER predominantly involves single teeth, but a case of multiple involved teeth has been reported. The prevalence of PER has been reported to be 0.5–6 percent, but this percentage is greater when third molars are included. The presence of PER is not related to the sex or race of patients, nor to their medical status, but a recent case report of a patient with amelogenesis imperfecta and multiple PER lesions suggests that there may be a link between this systemic condition and the finding of PER in multiple teeth.

The management of teeth with PER includes observation (prior to eruption), restoration of the crowns following eruption of the teeth, surgical exposure of the crowns prior to eruption to allow restoration of the crowns and finally to extraction of unrestorable teeth. If the crown can be restored, pulpal considerations would include pulp capping or pulpotomy. Davidovich et al. presented a successful case of...
pre-eruptive resorption treated with surgical exposure of the unerupted tooth, removal of the resorptive tissue, pulpotomy and restoration with glass ionomer and amalgam. Others have suggested simply placing a sealant on the occlusal surface of the affected tooth and monitoring the site for progression of the lesion and have reported success over a period of five or more years.18,23,33

Extraction creates associated problems in a growing child that need both short- and long-term attention.

Patients with DGS have early childhood hypocalcemia, which is often associated with autism-related behaviors and may contribute to hypocalcemia of developing teeth.34 If developing teeth lack the requisite hard tissue to form correctly during odontogenesis, then potentially this could explain the concomitant finding of DGS and PER in the patient.

Dentin dysplasia is an unlikely diagnosis given that the pathosis appears to be isolated to a single tooth, rather than the most common presentation of dentin dysplasia manifesting in all teeth due to its autosomal dominant inheritance pattern.35 Given that this case presents an isolated tooth with PER in a patient with DGS, it is much more plausibly related to the patient’s existing syndrome rather than attributed to dentin dysplasia.

This report of a patient with PER concomitant with a diagnosis of DGS appears to be the first such report in the literature. Abnormalities in the dentin that have been reported in patients with DGS previously were also seen in this patient with PER. Thus, a possible link between the systemic condition of DGS and PER warrants further investigation.8,35

REFERENCES

THE CORRESPONDING AUTHOR, Tony Silvestrin, DDS, MSD, MSHPE, can be reached at ts@silvestrinllc.edu.
A common allegation in many professional liability claims is the lack of informed consent. Patients argue that had they known about the possibility of complications, they would have made a different decision regarding their dental treatment. One of the best ways dentists can protect themselves in these cases is by ensuring patients are armed with the facts needed to make informed decisions.

Informed consent requires a dentist to explain the likelihood of success of a given procedure and its risks, benefits and alternatives. A dentist, not a staff member, must lead this conversation. The amount of time spent discussing options and answering a patient’s questions depends on the level of risk. Higher risk levels and more invasive treatments are two indicators that more time and detail should be spent informing the patient about the risks, benefits and alternatives to treatment, including no treatment at all.

“Informed consent is not a form. It is a conversation,” said John Sillis, an attorney at Zaro & Sillis in Sacramento, Calif. “Whether you use consent forms for each procedure or write the information in the patient’s chart, you as the doctor must have some measure of a conversation with the patient about the risks, benefits and alternatives of the proposed treatment.”

Sillis says the discussion of risks, benefits and alternatives, or RBA, should be documented in the chart as “RBA discussed and questions answered” or “RBAQA.” To prove the discussion occurred, dentists are advised to establish a custom and a practice; that is, a habit in the way they practice. While a dentist may have trouble recalling the details of a specific case, they can convey the typical protocol that they would customarily employ for the procedure, even years later, Sillis added.

The Dentists Insurance Company reminds dentists that while informed consent discussions vary from treatment to treatment, information should always include the following:

- The nature of the recommended treatment.
- The risks, complications and benefits of the recommended treatment, including the likelihood of success.
- The alternatives to that treatment, including doing no treatment.
- An explanation of the treatment plan’s expected sequence of events.

Sillis recounts a case in which a dentist was sued for causing injury to the inferior alveolar nerve from a third molar extraction. The dentist had used a standard informed consent form that included nerve damage as a potential risk; however, the form did not include the potential for permanent injury to the nerve.

“Simply adding that term on the form would have successfully defended against that claim,” Sillis said.

In another case, a patient claimed the dentist performed root canal therapy
unnecessarily. The teeth in question had received several restorations for recurrent caries. Though the risk of pulpal involvement was possible due to the extent of the old restorations, the dentist did not use a consent form nor did he document that he had discussed this possibility with the patient. The teeth remained symptomatic and required root canal therapy and the patient filed suit.

“The dentist could have avoided the suit by either having used a prepared consent form that included language that the treatment may not resolve the symptoms and may require additional treatment up to and including extraction or simply had the discussion orally with the patient, including that information and then noted it in the chart, 'RBA discussed,'” Sillis said.

According to TDIC, informed consent discussions are often complicated by language barriers. If a patient is hearing impaired, the dentist is obligated to provide a sign language interpreter. If the patient speaks a language not spoken by the dentist, insurance providers are required to provide a translator. The practice of allowing minor children to translate for the parents can be problematic so proceed with caution. It should also be noted that dentists cannot charge patients for a sign language interpreter and dentists who are subject to ACA 1557 must provide for language translation.

TDIC also reminds dentists that only a legal guardian can provide consent for minor patients. For divorced parents, this means only the parent with legal custody. If in doubt, TDIC recommends requesting legal documentation of custody. Emancipated minors can provide their own informed consent.

Although patients ultimately decide which treatment avenues to take, their signed forms aren’t always enough to protect a dentist from liability. Patients cannot consent to substandard care, whether or not they sign forms, nor should a dentist practice below the standard of care at patients’ requests. Conversely, a dentist should not continue to treat patients who continue to refuse recommended treatment and should consider dismissing them from care following a formal dismissal protocol.

Procedure-specific informed consent forms in multiple languages are available to TDIC policyholders. To download, visit tdicinsurance.com/risk-management/informed-consent.

Making an informed decision is the right of every patient, but it is the responsibility of dentists to ensure patients have the comprehensive information needed to exercise that right. Patients have numerous options when it comes to their oral health and only with thorough considerations of the risks, benefits and alternatives can they truly provide informed consent.

TDIC’s Risk Management Advice Line at 800.733.0633 is staffed with trained analysts who can answer informed consent and other questions related to a dental practice.
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4129 PETALUMA GP
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4169 NAPA GP
General practice in Seller owned building in a prime location. Remodeled, state-of-the-art, 2,000 square foot, beautiful office with 7 ops. Over 2,000 loyal patients. Asking $817K.

4177 SAN JOSE PROSTHO
Implant, cosmetic and prosthodontic practice, established 25+ yrs in desirable West San Jose area close to several amenities and referral sources. Ideal for the restorative general dentist inspired by cosmetic and implant dentistry, or a prosthodontist. 3 fully equipped ops in 1,600 square ft. Bright and modern treatment rooms in well established professional medical building. Lots of on-site parking, EZ freeway access. 3 yr. average GR $1.2M+ with adjusted average net of $500K+. Asking $813K.

4133 NAPA GP
Napa County GP in newly furnished, fully equipped 2 op facility with digital x-ray. 4 doctor day/week with 3 hygiene days. Monthly average revenue of $36K. Seller willing to help for a smooth transition. Asking $331K.

4185 SILICON VALLEY ORTHO
Compact, well-run practice available due to relocation. Established 23 years in convenient, high traffic location near major routes. 1,100 sq. ft. leasehold with reception, waiting room, 3 chairs, exam room, lab/sterilization area, storage area, private office + bathroom, patient bathroom. 2.5-day doctor week offers ample opportunity to expand. Asking $186K.

4171 PLEASANTON GP
Put the “pleasant” in Pleasanton. Well-established, 25 year family practice in a rapidly growing community with small town flavor. Beautifully remodeled office with 5 ops., reception area, business office, private office, staff lounge and dedicated parking. Seller transitioning to retirement, working 4 doctor days per week. 5 year average GR $509K+. Seller owned 1,700 square foot condominiumized suite for sale with practice. Asking price for practice $313K.

4127 MENLO PARK GP
GP offering 35+ yrs of goodwill, this gem on the Peninsula is truly a find. 4 ops in 950 sq. ft. 2016-2014 average GR $567K with average adj. net of $156K. 750+ active patients. 4 hygiene days a week generate 40-45% of the revenue. Asking $417K.

4108 HUMBOLDT COUNTY GP
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BRE #00777682

Mike Carroll
Pamela Carroll-Gardiner
Mary McEvoy Carroll

carroll.company dental@carrollandco.info (650) 362-7004 (650) 362-7007
A risk analysis of a dental practice’s electronic information systems combined with a risk management plan are significant and necessary elements for HIPAA compliance. What is a HIPAA risk analysis? It is a process with which a covered entity evaluates risks to the confidentiality, integrity and availability of electronic patient information (ePHI). Although it is required, a risk analysis is missing or incomplete from many covered entities’ compliance programs. A review of enforcement actions taken by the U.S. Department of Health and Human Services Office of Civil Rights (OCR) indicates many covered entities fail “to conduct an accurate and thorough risk analysis to assess the potential risks and vulnerabilities to the confidentiality, integrity and availability of ePHI and failed to plan for and implement security measures sufficient to reduce those risks and vulnerabilities.”

This article describes the steps a dental practice should take to complete the assessment. Next month, this column will review what needs to be included in a security risk management plan. The dental practice’s designated HIPAA security officer should complete both analysis and plan.

Inventory Information Assets

Begin the process by identifying and listing where and who holds the dental practice’s ePHI. Examples of where ePHI can be held include server, workstations, off-site back-ups, portable drives, laptop computers, smartphones, photocopiers, email service provider, claims clearinghouse, appointment reminders service providers and off-site bookkeepers.

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Identify and list by role (for example, hygienist, bookkeeper, software tech) who has access to ePHI and the respective level of access. Identify and list the entities with whom the practice needs to have a HIPAA business associate agreement and whether one is in place. It is a good idea to include on the list contact information and effective and termination dates or respective agreements.

List the hardware and software that store or use ePHI. Make note of the software version and the date when security patches were applied.

**Identify and Assess Threats and Vulnerabilities**

A “threat” to an information system can be a person or thing that, intentionally or not, uses a system vulnerability to compromise ePHI. A “vulnerability” is a weakness in system security procedures, design, implementation or internal controls, for example, an unsecured wireless network or unknown backdoor to the practice database. It is difficult to know every vulnerability in an information system and new vulnerabilities are discovered over time, so a covered entity is not expected to fix each and every one. A covered entity is expected to do the best it can with the resources at hand and is not required to take extraordinary measures to address a vulnerability.

Make a list of natural, human and environmental threats to information systems under the control of the dental practice. Examples are numerous and include fire, earthquake, water damage, power outage, disgruntled employee, employee error, hacker and theft (TABLE 1). Assess each threat for the likelihood of occurrence and the impact on the practice. For example, consider the likelihood of an employee mistakenly clicking on a phishing email that downloads ransomware and the impact it would have on the practice. Is the threat occurrence risk low because employees are trained to beware of phishing emails or is it a medium risk? If a practice is hit by ransomware, will the impact be low, medium or high? A dental practice’s ability to quickly restore its data and remove the malware, as opposed to stopping ransomware, makes the impact to the practice low.

This process forces the consideration of consequences and whether the practice has appropriate safeguards in place to mitigate impact. Safeguards include physical items (a lock or office wall, for example), technical solutions (encryption) and administrative policies and procedures (no sharing

<table>
<thead>
<tr>
<th>TABLE 1</th>
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<tbody>
<tr>
<td><strong>Items to Document/Assess</strong></td>
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<tr>
<td><strong>Information Assets</strong></td>
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<td>Desktop computers, on-site</td>
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<td>Back-up, on-site</td>
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<td>Back-ups, off-site/cloud</td>
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<td>Laptop computers</td>
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<td>Third-party service providers</td>
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<td>■ Appointment reminders</td>
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<th>TABLE 2</th>
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<tr>
<td><strong>Threat Occurrence/Impact on Practice</strong></td>
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<td><strong>1 Low risk</strong></td>
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<td>1 Low impact</td>
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<td>3 High impact</td>
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<td><strong>Diamond Bar</strong></td>
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<td><strong>Los Angeles Beach City</strong></td>
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<td><strong>Los Angeles - HMO</strong></td>
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<td><strong>Newport Beach's Fashion Island</strong></td>
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<td><strong>Orange County Beach City - HMO</strong></td>
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<td><strong>Pedo - Pasadena Area</strong></td>
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<td><strong>San Fernando Valley</strong></td>
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<td><strong>Torrance</strong></td>
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<td><strong>MORE OPPORTUNITIES AVAILABLE</strong></td>
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As each threat situation is considered, identify and list the safeguards already in place. This process prioritizes the security issues that should be addressed (Table 2).

**Risk Assessment Tools**

A dental practice may find a risk assessment tool useful for its initial risk analysis. A free security risk assessment tool is available from the government at HealthIT.gov. It was developed in collaboration with OCR and includes video tutorials. The Figure shows a sample question from the tool. The ADA Complete HIPAA Compliance Kit, sold by the American Dental Association, also includes a tool similar to the one from HealthIT.gov. Vendors such as IT consultants may offer an assessment tool or may simply perform the assessment for the practice.

**Next Steps**

A risk management plan must be developed. Considerations for the plan will be reviewed in next month’s column. Keep in mind that the risk analysis and risk management plan are ongoing processes. Once a risk analysis is completed, a covered entity should review it on a regular basis and update its plan as needed. “Regular basis” is not defined in the HIPAA regulations, but an annual review is typically recommended by information security consultants. More frequent reviews may be necessary if a covered entity implements a new technology.

Regulatory Compliance appears monthly and features resources about laws that impact dental practices. Visit cda.org/practicesupport for more than 600 practice support resources, including practice management, employment practices, dental benefits plans and regulatory compliance.

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**TABLE 2**

<table>
<thead>
<tr>
<th>Addressable</th>
<th>Does your practice have policies and procedures for implementing mechanisms that can encrypt and decrypt ePHI?</th>
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<tbody>
<tr>
<td>◦ Yes</td>
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<td>◦ No</td>
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<td>If no, please select from the following:</td>
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<td>◦ Cost</td>
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<td>◦ Complexity</td>
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<td>◦ Alternate Solution</td>
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</table>

Please detail your current activities:

Please include any additional notes:

Please detail your remediation plan:

Please rate the likelihood of a threat/vulnerability affecting your ePHI:

- ◦ Low
- ◦ Medium
- ◦ High

Please rate the impact of a threat/vulnerability affecting your ePHI:

- ◦ Low
- ◦ Medium
- ◦ High

Overall Security Risk:

- ◦ Low
- ◦ Medium
- ◦ High

**Related Information:**

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**FIGURE.** Sample HealthIT.gov risk assessment question.
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AC-624 SAN FRANCISCO: Wonderful patients, solid income in great stand-alone bldg $475k
AC-640 SAN FRANCISCO: On 23rd Floor of prestigious bldg, 2 ops in 700sf. Seasoned Staff. Seller Retiring $175k
AC-649 SAN FRANCISCO Facility: Richmond District, 3 ops+1 add'l, Equipment less than 5yrs old $120k
AG-645 SAN FRANCISCO: Low Overhead, compact practice ready for expansion or relocation. Retail/Commercial area. 2nd Floor $99k
AG-669 SAN FRANCISCO: RARE opportunity in the heart of the city! 2 ops LOW OVERHEAD! $88k
AN-513 REDWOOD CITY: Practice of your dreams! 900sf w/4 ops +2 add'l $350k
AN-686 SAN FRANCISCO: Office designed w/patient flow & maximum office efficiency. 1000sf w/4 ops $825k
AN-712 SAN FRANCISCO: Easy accessibility, exceptional visibility, free parking & extremely low rent! 1000sf w/2 ops +2 add'l $89.5k
BC-662 HAYWARD: "Heart of the Bay" near hospital, 3 ops in 1056sf $75k
BC-663 DANVILLE: Seller retiring from this family-oriented practice. 4 ops in 1262sf $240k
BC-681 WALNUT CREEK: Remodeled office. Semi-rural community, 1000sf w/4 ops $432k
BC-682 CONCORD: Located in desirable, bustling community w/seasoned, caring staff. 836sf w/3 ops $224k
BC-710 WALNUT CREEK: Desirable location in stand-alone, single-story bldg. 1313sf w/3 ops $150k / RE $850k
BG-724 RICHMOND: Spacious office w/enormous growth potential! 2000sf w/4 ops Practice $138k / Real Estate $700k
BG-731 LAFAYETTE: Well-educated, health conscious patient base. 1,000 sf w/3 ops 35+ years goodwill $265k

BAY AREA CONTINUED

BN-504 RICHMOND: Established Practice & Real Estate! 1450sf w/2 ops +2 add'l $100k / RE $700k
BN-736 BERKELEY: Step into this quality practice and you’ll know you belong here! 906sf w/3 ops. $495k
BG-734 ANTILOCH: Chance to own your own condo unit with this one! 1,323 sf w/4 ops. $315 / RE: TBD
CC-632 SAN RAFAEL: Small town life in vibrant, growing city. 3 ops in 800sf office. Beautiful bldg $145k
CC-661 SAN RAFAEL: Starter practice in beautiful location w/like-new equipment. 3 ops, 900sf $190k
CC-719 SAN RAFAEL: Panoramic views of Mt. Tamalpais from each operatory window, 4 ops, 1800sf $260k
DC-480 SILICON VALLEY: Multi-Specialty practice. 14+ ops in 7500sf. Owner financing available $1,075M
DC-671 SAN JOSE: Starter practice. Desirable area. 6 npts/imo, 3 ops in 900sf $150k
DC-692 DUBLIN Facility: Modern digital office. 5 ops 1800sf $210k w/Cone Beam Unit or $165k without
DG-635 CASTRO VALLEY: Excellent location & stellar reputation! Solo Group Practice $650k
DG-726 SAN JOSE: Busy, Vibrant Practice. Collections over $1.1M on a relaxed 4 day work week. ~2850sf w/7 ops $885k
DN-665 SANTA CRUZ AREA: Loyal, stable, multi-generational patient base. FFS. 1460sf w/4 ops $540k
DN-688 MONTEREY: State-of-the-art equipment & latest technology! 1900 w/5 ops $1.4mil/RE $795k

800.641.4179  WPS@SUCCEED.NET
**BAY AREA CONTINUED**

**DN-693 SAN JOSE Facility**: Attractive & spacious! Faces one of the city’s major thoroughfares. 1080sf w/ 4 ops $150k

**DN-713 CASTRO VALLEY Lease**: Well maintained, attractive, “Move-In Ready” dental office. 1500sf w/ 5 ops. Call for details!

**DG-723 SAN JOSE**: The practice exceeds $1.2mil in collections annually! 1,450 sf w/ 5 ops. $850k

**NORTHERN CALIFORNIA**

**EC-531 GREATER SACRAMENTO**: Beautiful! 1750sf w/ 4 ops + 1 add’l office $800k for Practice & Real Estate

**EG-685 LINCOLN/ROCKLIN**: Perfect location in amazing community! Retail Shopping Center w/ 4 ops: $570k

**EG-716 ELK GROVE**: Remarkable potential for growth w/ attention to marketing & increased office hours! 1200sf w/ 3 ops $270k

**EG-722 ROSEVILLE**: This WILL sell quickly! PRIME LOCATION in most desirable retail center in town! 1919sf w/ 1 office $1.15M

**EG-727 SACRAMENTO**: Steady Income from HMO. Increase office hours & begin advertising to watch the collections skyrocket! 1100sf w/ 3 ops $275k

**EN-625 SACRAMENTO**: Looking for an HMO practice in a great Location? 2500sf w/ 5 ops $450k

**EN-626 CARMICHAEL**: Lifestyle you just can’t be beat! HMO 1250sf w/ 3 ops $300k

**EN-627 CARMICHAEL**: Remarkable HMO opp. awaits your talent & skill! 1200sf w/ 3 ops + 1 add’l $268k

**EN-628 ORANGEVALE**: Great place to work, play & live. HMO 1310sf w/ 4 ops + 1 add’l $375k

**EN-654 CITRUS HEIGHTS**: Well established & loaded with 30+ years of goodwill! 1300sf, 3 ops + 2 add’l $150k

**EN-660 ROSEVILLE**: Highly-esteemed, well-respected, fee-for-service practice w/ loyal patient base. 2950sf w/ 5 ops $995k

**EN-664 SACRAMENTO Facility**: Great corner location, excellent visibility & easy access! 2300sf w/ 4 ops $55k

**EN-689 MIDTOWN SACRAMENTO Facility**: Bring your talent, hang your sign & make it your own! 2000sf w/ 4 ops $99k

**EN-702 SACRAMENTO**: Long-established practice w/ emphasis on preventative vs reactive dentistry! 1600sf w 4 ops + 1 add’l $495k

**EN-708 SACRAMENTO**: Family-oriented practice with appreciative & loyal patient base. 1600sf w/ 4 ops + 1 add’l $150k

**FC-650 FORT BRAGG**: Family-oriented practice. 5 ops in 2000sf, 6 npts/mo $350k for the Practice & $400k for the Real Estate

**FC-677 FORT BRAGG**: Beautiful, FFS Practice, 4 ops +1 add’l, in 2375sf, Gross $1M+/yr $500k

**NORTHERN CALIFORNIA CONTINUED**

**GC-472 ORLAND**: Live & practice in charming small town community. 1000sf w/ 2 ops. Seller Retiring $160k

**GG-453 CHICO**: 5000sf w/ 7 ops. Perfect for 1 or more dentists! $200k

**GG-454 PARADISE**: 2550sf w/ 9 ops. 40yrs goodwill! Amazing Opportunity! $525k

**GN-606 BUTTE COUNTY**: Hesitate & you’ll miss out on this one-of-a-kind opportunity! 1700sf w/ 4 ops $125k

**GN-656 NO. TEHAMA CO**: Great Location! Ideal place to work, live & raise a family! 2468sf w/ 5 ops $275k

**GN-667 OROVILLE**: Great place to work & play! Constant growth attracting an influx of residents! 1000sf w/ 3 ops $295k

**GN-668 BUTTE COUNTY**: Remodeled in 2010! Well-maintained, long-established professional complex. 1200sf w/ 2 ops $95k

**GN-717 YUBA CITY**: Seller Retiring. All reasonable offers considered. Building available for purchase! 2400sf w/ 5 ops $475k

**HN-213 ALTURAS**: Well managed w/consistent revenues! Collected ~$760 in 2016! 2200sf w/ 3 ops + 1 add’l. $195k

**HN-280 NORTHEAST CA**: Only Practice in Town! 900sf w/ 2 ops $60k

**HN-618 SIERRA FOOTHILLS**: Seller Retiring! Huge opportunity for growth by increasing office hours! 750sf w/ 2 ops $95k

**CENTRAL VALLEY**

**IC-468 SAN JOAQUIN VALLEY**: High-end restorative practice! 6 ops in 2500+sf office. Call for Details! $425k

**IC-715 TRACY**: 30+ npts/mo. 1600sf, 5 ops +1 add’l. Seller starting new career $435k

**IG-687 TURLOCK**: Established quality practice - remarkable opportunity! 2000sf w/ 5 ops $298k

**IN-690 LINDSAY**: Stable, multi-generational, loyal & appreciative patient base. 1700sf w/ 3 ops Practice $150k/Real Estate $150k

**SOUTHERN CALIFORNIA**

**KC-678 LOMPOC & SANTA MARIA**: Live & practice along the central coast. Plenty of room for growth, Call for Details! $240k

**SPECIALTY PRACTICES**

**BC-709 HAYWARD Ortho**: Provide personalized care to wonderful patient base. 5-8 npt exams/mo, 4 chairs/bay, 1948sf $215k

**IC-543 CENTRAL VALLEY Ortho**: 1650sf w/ 5 chairs in open bay & plumbed for 2 add’l. Strong referrals and PT base $125k

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“Ask the Broker” can now be found at [WWW.WESTERNPRACTICESALES.COM](http://WWW.WESTERNPRACTICESALES.COM)
A look into the latest dental and general technology on the market

Seeing AI: Talking Camera for the Blind
(Free, Microsoft Corp.)

Technology continually evolves to enhance the lives of those with sensory impairment. Powerful mobile devices coupled with the vast array of data from the internet has fueled this evolution to create even more useful applications than ever before. Seeing AI for iOS is one of these applications that gives people with low vision an ability to see things from another perspective. It combines the use of the camera and speakers on mobile devices to translate sight to sound with immediate feedback.

Seeing AI has several modes specifically designed to assist the visually impaired with common tasks while using the camera in the background. In Short Text mode, the user simply points the mobile device camera to any text and the app will read aloud any words or sentences that it can detect continuously. With Document mode, the app will search for the borders of a document, snap a picture automatically when it finds one and immediately process the photo for words that the user can then subsequently use VoiceOver to read aloud. Product mode scans for barcodes and identifies products for the user with audio feedback. Person mode allows the user to snap a picture of a person and receive back an audio description of that individual, which includes gender, age and the type of emotion displayed. Users can train the app with a few pictures to recognize specific people so that Person Mode can report back actual names of individuals. In Scene mode, users can snap a picture of what is around them and receive back an audio description of their surroundings along with any objects that it recognizes. Audio feedback is built-in for every feature in the app. In low-light conditions, the app automatically utilizes the camera flash to increase visibility. All modes are accessible with a swipe and tap at the bottom of the screen. While the app does its best to be accurate, complex typography and nonstandard word alignment have difficulty being recognized. Additional modes are under development and will be made available with app updates.

Leveraging the power of mobile technologies and the internet, Seeing AI is a welcome assistant to those with low vision. Although not entirely accurate, it offers a wide array of amazing features that help augment the other dominant senses in a simple and consistent manner. Seeing from another perspective has now become clearer.

— Hubert Chan, DDS

Study Says Facebook Connects the World More Than Any Other Internet Resource

When it comes to social media and the internet, many resources are largely used to connect people around the world. A new study by System1 Research has discovered that Facebook is the best at doing that. The consumers surveyed for the study mentioned Facebook two times more than they mentioned Google and 10 times more than Twitter. Internet usage is also ruled by Facebook, according to the study. Around 81 percent of those surveyed said they used Facebook regularly, compared to 79 percent for Google.

— Blake Ellington, Tech Trends editor

Generation Z Purchasing Habits Reveal Differences From Millennials

Move over millennials, there is a new generation beginning to enter the marketplace. Generation Z is the generation born after 1995, and a new study says social media is an even bigger influence on their purchasing habits. The study, conducted by Kantar Millward Brown, found that Snapchat impacts the purchase decisions of 21 percent of Generation Z, which is double the percentage of millennials. As a whole, social media sways 80 percent of Generation Z when it comes to purchases, compared to 74 percent of millennials. Instagram is also a big influencer of Generation Z at 44 percent.

— Blake Ellington, Tech Trends editor

Would you like to write about technology?
Dentists interested in contributing to this section should contact Andrea LaMattina, CDE, at andrea.lamattina@cda.org.
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