OF THE CALIFORNIA DENTAL ASSOCIATION

Journal

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DEPARTMENTS

FEATURES

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Marketing Can Serve Dentistry's Noble Goals

To the Editor:

I am offended by so many aspects of the editorial "The Business of Dentistry" (July 2008, Page 473) that I almost don't know where to start.

I'm glad the editor is not responsible for guiding the hotel, pharmacy, hospital, airline, grocery, restaurant, entertainment, or any other service-oriented industry.

Seeking to grow a big business is "appalling" and "repugnant" because it focuses on making money over quality of care? I don't know what big businesses the editor has in mind, but most of those I can think of got big because they were better, not worse, than alternatives available to the consumer. Microsoft, Disney, Hilton, Delta, FedEx, Patterson, Schein, Ivoclar, Dentrix, and Kerr all come to mind as "big businesses" that provide a pretty solid product and service, without which our society and profession would be much the worse. Profit is the applause we get when we take good care of our patients (customers). It is to be encouraged, not denigrated.

If our profession is serious about making a real difference in the oral health of our communities, we would be well-served to learn the ways of marketing and advertising, and harness their powers to achieve our most noble goals.

What have established models of dental practice given us? Nice cars, nice houses, and an occasional boat or airplane, for sure. But fully one-third of the population we are tasked to serve will still lose all of their teeth — an impressive record of failure that compares favorably only with lead balloons and stone canoes.

Is this track record something for us to be proud of? Can we reasonably assert that our "ethical" resistance to advertising and marketing has in any way served the public better than it has served our own selfish interests?

If my life depended on improving the oral health of my community, I would advertise like the dickens. The only reason our stodgy and ossified profession resists these efforts is because we really care more about our own egos than we care about the oral health of our neighbors.

NEIL MILLIKIN, DDS
Proudly practicing under the fictitious business name of Apollonia Dental Center
Bakersfield, Calif.

Goal Is Health, Not 'Production'

To the Editor:

I would like to comment on your recent editorial, "The Business of Dentistry." You certainly are the outspoken one! (That is a good thing.) I think you are right on! Some of the problems I have seen with my referring dentists (I am a specialist) include back dating insurance claims, performing all the restorative work first (or until the insurance ran out) then referring them to me as a specialist, and a significant amount of overtreatment.

The practice of dentistry is changing. Many of the changes are good, especially with the advent of implants and other technological advances. I have changed some of my practices. What is quite shocking is that some dentists won't perform basic, restorative dentistry on teeth that need several procedures, e.g., build-ups, etc. Instead, these teeth are extracted and replaced with implants in the name of expediency.

Even more saddening is the *Extreme Makeover* mentality that makes everyone's anterior teeth "perfect" with irreversible procedures. I'd like to ask these "cosmetic" dentists if this is the same dentistry they would perform on THEIR 21-year-old daughters or THEIR mothers! Probably not.

One of my friends sent his 79-year-old mother to me for an exam after she was diagnosed with $22,000 worth of dentistry, including replacement of ALL amalgam fillings, several crowns, veneers, this after quadrant scaling. I saw her at her request, and she needed perio maintenance (not four quads of periodontal surgery). I referred her to a friend, and she needed one filling replaced. I just interviewed a woman for a position in my office who bragged, yes bragged, about the "upgrades" she learned how to bill as the insurance person in a local GP's office. This included adding "desensitizers" under composite fillings, "irrigation" per quad for cleaning and placement of Arestin per site — all done at the insurance billing level, not treatment diagnosed by the dentist.

When I started my practice, I went in knowing that all I had to do was be honest, treat people fairly and kindly, and I would make a living. When I took a partner, it was sealed with a handshake, because our word meant something. We have practiced together for 27 years ethically, honestly and without having to resort to the latest fads or gimmicks.

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But then again, I am probably unusual in that, I live well within my means, I don't gauge my success by comparing myself to others, and my practice is only a part of who I am.

The handwriting is on the wall. It costs so much to get the education that it is tempting to cheat as needed. This is not a justification, but seems to be the reasoning. More significantly, though, is that "production" is the end-all target — just ask our consultants. More and more, people will have to beware of what they get from dentists because they appear to be driven primarily by money and production, not the needs of the patients.

Thanks for saying what many of us believe. Someone needs to say this — someone needs to tell it like it is.

NAME WITHHELD BY REQUEST

Struggling to Make Ends Meet

To the Editor:

I would like to start off by thanking you for a great editorial on the business of dentistry. I have felt this way about dentistry since I graduated from dental school in 2002. I have read the majority of your editorial pieces from the *CDA Journal*, but this article really hit home. My vision and aspiration of my profession has changed dramatically since I graduated from dental school. I grew up in a small rural town where general dentistry was still practiced as general dentistry. When I chose this profession, I chose it because I wanted to be a dentist, not a salesman. Dental school taught me to be ethical and ideal in my diagnosis and treatment planning. However, when I entered the real working world, dentistry isn't just that simple. I worked for a larger "dental company" where my schedule was filled with 20+ patients for an eight-hour schedule and I had to meet daily quotas. Another practice informed me that I'm not providing proper patient care because my number-of-crowns-to-patient ratio is too low and that I'm not recommending enough Arestin. I became tired of working for other doctors and decided to start up my own practice. I wanted to provide ideal dental treatment to the best of my capabilities and be compensated fairly for my service. I did the traditional things and just hung my name up on the door. I placed ads in the local newspaper and sent out letters to the neighborhood to let them know I was available if they need our service. It has been two years, and I am still struggling with making ends meet. I read advertisements of local dentists and see the competitive offerings that you mentioned. Patients come and shop around for competitive pricing. Since when has dentistry become a retail store? When is enough enough? I attended a marketing class and was told that dentistry has entered into the marketing realm and that you have to beat your competitor's offerings. Is this my future in dentistry? Are the CDA or ADA doing anything to address these concerning issues?

VU DINH, DDS
Huntington Beach, Calif

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Matt Mullin

Hole-y Mouth Jewelry! Piercings Could Lead to Anterior Tooth Loss

BY PATTY REYES, CDE

According to a just-released study from Tel Aviv University, you'd have to have a hole in your head to get a tongue or lip piercing. But some young people do and are often unaware they are at risk for dental complications.

"There are short-term complications to piercings in low percentages of teens, and, in rare cases, a piercing to the oral cavity can cause death," said Liran Levin, DMD, Department of Oral Rehabilitation, School of Dental Medicine at Tel Aviv University. "Swelling and inflammation of the area can cause edema, which disturbs the respiratory tract."

Levin said the most common concerns are tooth fracture and periodontal complications, which can be long term.

CONTINUES ON 655

AGD Urges Senators to Co-sponsor Oral Health Care Measure

The Academy of General Dentistry is praising the recent introduction of the "Oral Health Initiative Act of 2008" by Senators Benjamin Cardin (D-Md) and Susan Collins (R-Maine) that proposes establishing a multifaceted approach to oral health care through the creation of an expert oral health working group to assess existing federal oral health programs and recommend improvements.

"Dental disease presents a very serious problem for our children, particularly those from lower-income families," said Vincent Mayher, DMD, MAGD, AGD president. "This working group should look closely at all federal oral health care programs and make recommendations for improvement to ensure that no child is without dental care."

The working group would also develop programs to improve the oral health of and prevent dental disease in children, Medicaid-eligible adults, and other vulnerable populations who are among those Americans at highest risk of dental disease.

"Considering that the National Institutes of Health found that dental decay is the most common chronic childhood disease among children in the United States, preventive measures stopping dental disease before it worsens are essential to the future well-being of our nation's children," said Myron Bromberg, DDS, chairman of the AGD Legislative and Governmental Affairs Council.

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Safe for Pregnant Women to Receive Essential Dental Treatment

While obstetricians have typically considered dental care safe for pregnant women, supporting clinical trial evidence has been lacking. Until now.

In the June issue of the *Journal of the American Dental Association*, expectant women can safely undergo essential dental treatment and receive topical and local anesthetics at 13 to 21 weeks gestation.

Researchers compared safety outcomes from the Obstetrics and Periodontal Therapy Trial in which pregnant women received root planing and scaling, as well as essential dental treatment of moderate-to-severe cavities or fractured or abscessed teeth.

Eight hundred and twenty-three pregnant women with periodontitis were randomly selected to receive scaling and root planing either at 13 to 21 weeks gestation or up to three months postdelivery. (Pregnant women, experts recommended, should defer elective care before eight weeks gestation and during late pregnancy.) Researchers determined that 483 of these women also needed essential dental treatment; 351 completed all recommended treatment.

The research team was led by Bryan Michalowicz, DDS, MS, professor of periodontics, University of Minnesota School of Dentistry, Minneapolis.

Obstetric nurses reviewed medical records throughout the trial to monitor the subjects for serious adverse events, as defined by the authors as pregnancies that ended in a nonlive birth and other adverse events, including hospitalizations for more than 24 hours because of labor pains, hospitalizations for any other reason, fetal or congenital anomalies, and neonatal deaths, according to the study.

Vitamin D Levels in Pregnancy May Affect Baby's Teeth

Researchers are looking at low maternal vitamin D levels during pregnancy that could affect primary tooth calcification, thus leading to enamel defects, a risk factor for early childhood tooth decay.

Investigators from the University of Manitoba (Winnipeg and Victoria) recently presented a study conducted to determine the vitamin D status of pregnant women; the incidence of enamel defects; and early childhood tooth decay among their newborns; and the relationship with prenatal vitamin D levels.

Of the 206 pregnant women in their second trimester, only 21 women (10.5 percent) were found to have adequate vitamin D levels. The vitamin concentrations were related to the frequency of prenatal vitamin and milk consumption.

One hundred thirty-five newborns, 55.6 percent of them male, at 16.1 ± 7.4 months of age were studied, and researchers found that 21.6 percent of them had enamel defects while 33.6 percent had early childhood tooth decay. Mothers of children with enamel defects had lower, but not significantly different, mean vitamin D concentrations during pregnancy than those of children without defects, according to the study. Meanwhile, mothers of children with early childhood tooth decay had significantly lower vitamin D levels than those whose children were cavity-free. Newborns with enamel defects were significantly more likely to have early childhood tooth decay.

This is the first study to show that maternal vitamin D levels may have an influence on primary teeth and the development of early childhood tooth decay.

Diabetic Kids Get Permanent Teeth Sooner

Gum disease seems to come to mind whenever oral health and diabetes is mentioned. While it is true diabetics are at an increased risk of chronic periodontitis, there is another possible oral manifestation: Diabetic children who lose their deciduous teeth seem to get their permanent teeth sooner than their counterparts.

This little-investigated observation is worth further study because aberrations in tooth eruption can lead to a series of complications, such as malocclusion, crowding, and therefore difficulty in maintaining good oral hygiene and increased risk of decay and gum disease, said authors in the May issue of *Pediatrics*. At the same time, more definitive data might help doctors diagnose childhood diabetes.

In a study of nearly 600 children from age 18 down to 6, the NIDCR grantees found those with diabetes had accelerated tooth eruption in the late mixed dentition period, which occurs between the ages of 6 and 14. There were no differences during the early stages of tooth eruption in the two groups, scientists noted.

However, they did observe an accelerated eruption of clinically visible tooth crowns in diabetic children. Focusing on the still poorly defined biology of tooth eruption, the scientists said, "These findings suggest a dual complement of mechanisms influencing the intra- and extra-alveolar phases of eruption, the latter being modified in diabetes."

'Bridges to Nowhere'

The American Academy of Implant Dentistry is recommending aging dental bridges be replaced with permanent dental implants.

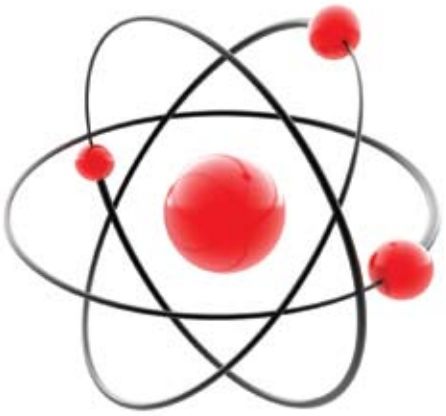
"Many of us have had the same bridges in our mouths for 20 years or more. They were put in at a time when bridgework was considered to be the norm for replacing missing or compromised teeth," said Olivia Palmer, DMD, of Charleston, S.C., an associate fellow of AAID and a diplomate of the American Board of Oral Implantology.

Computer-guided dental implant surgery today has made the procedure quicker, highly predicable, long-lasting, and 97 percent successful, far superior to outcomes with bridges. Palmer, therefore, advised anyone with one or more missing teeth who might consider having a first bridge inserted or replacing an old one to ponder the benefits of implants before getting treatment.

"An old bridge is basically worthless for preserving good dental health. In essence, it's a bridge to nowhere. So why keep a bridge to nowhere? For most patients, implants are a much better treatment alternative because they preserve the bone of the jaw, can be flossed easily, do not decay, and function just like natural teeth," she said, adding, "Also, to get implants you don't have to sacrifice healthy teeth, which is required with bridgework."

Bridges generally fail after five to 10 years as patients have trouble flossing them, said Palmer. "Because these bridges link missing tooth spaces to adjacent teeth, many patients find it very difficult to floss the bridge. Therefore, root surfaces below and around bridgework often decay, if not kept meticulously clean by flossing. It is impossible to repair this marginal decay, so the entire bridge must be replaced," she said.

"With an estimated two of three Americans having at least one missing tooth, implants are becoming the preferred tooth-replacement option. Implant surgery is one of the safest, most precise and predictable procedures in dentistry," said Palmer.



Dental Health Coordinator Program Proposed

A proposal that would implement the position of Community Dental Health Coordinator comes courtesy of the state of Michigan.

If the bill passes, a four-year demonstration program would authorize the practice of CDHCs to work in designated underserved areas under a dentist's supervision. CDHCs could provide limited dental care, including tooth scaling and placing temporary restorations. During the demonstration project, CDHCs must complete a curriculum developed by the ADA.

Additionally, the bill would create an advisory committee to study the issue, and to recommend to the state's director of community health whether CDHCs shall continue to practice past the expiration date of the pilot program.

New Molecule May Have Diagnostic, Therapeutic Applications

Using a plethora of plant viruses, National Institute of Standards and Technology materials researchers have identified a small biomolecule that binds to one of the key crystal structures of the body, the calcium compound that is the basic building block of bone and teeth. And, with more fine tuning, the molecule can be a highly discriminating probe for a huge range of therapeutic and diagnostic applications related to teeth and bones.

While there are different mechanical properties, hydroxyapatite, a crystalline compound of calcium phosphate, is the major structural component of bones and teeth. Accounting for the differences are the slight variations in the manner the crystal forms.

Of significant importance is monitoring and identifying the formation of this particular crystal. Researchers are working on a number of problems including the remineralization of teeth to repair decay damage, the integration of prosthetic joints and tissue-engineered bone materials for joint and bone replacement, and cell-based therapies to regrow bone tissue.

Currently, there is no one practical way to spot the formation of hydroxyapatite in living systems or tissue samples. Materials scientists can identify the crystal structure with high reliability by the pattern it makes scattering X-rays, but it's a complex procedure, requires fairly pure samples, and certainly can't be used on living systems, according to authors.

UPCOMING MEETINGS

2008	
Sept. 6-9	94th annual meeting, American Academy of Periodontology, Seattle, Wash., perio.org/meetings.
Sept. 12-14	CDA Fall Scientific Session, San Francisco, 800-CDA-SMILE (232-7645), cda.org.
Sept. 24-27	FDI Annual World Dental Congress, Stockholm, congress@fdiworldental.org.
Oct. 16-19	American Dental Association 149th Annual Session, San Antonio, Texas, ada.org.
Oct. 25-29	American Public Health Association Oral Health Section's annual meeting and exposition, San Diego, www.apha.org/meetings.
Nov. 2-8	United States Dental Tennis Association Fall meeting, Palm Desert, dentaltennis.org.
2009	
May 14-17	CDA Spring Scientific Session, Anaheim, 800-CDA-SMILE (232-7645), cda.org.
Sept. 12-13	CDA Fall Scientific Session, San Francisco, 800-CDA-SMILE (232-7645), cda.org.
Oct. 1-4	American Dental Association 150th Annual Session, Honolulu, Hawaii, ada.org.
Nov. 8-14	United States Dental Tennis Association Fall meeting, Scottsdale, Ariz., dentaltennis.org.

To have an event included on this list of nonprofit association continuing education meetings, please send the information to Upcoming Meetings, CDA Journal, 1201 K St., 16th Floor, Sacramento, CA 95814 or fax the information to 916-554-5962.

Honor

Sheldon Baumrind, DDS, Berkeley, Calif., professor and director of the Craniofacial Research Instrumentation Laboratory at University of the Pacific Arthur A. Dugoni School of Dentistry, was honored with the International Association for Dental Research 2008 Craniofacial Biology Research Award.

Sheldon Baumrind, DDS

PIERCINGS, CONTINUED FROM 651

"There is a repeated trauma to the area of the gum," he said in a previous interview. "You can see these young men and women playing with the piercing on their tongue or lip. This act prolongs the trauma to the mouth, and, in many cases, is a precursor to anterior tooth loss."

Levin, who conducted the study with Yehuda Zadik, DMD, and Tal Becker, DMD, both in the Israeli Army, found that close to 15 to 20 percent of teens with oral piercings are at high risk for both gum disease and tooth fractures.

The high number of fractures from piercings are not found in other age demographics, and cases of severe periodontal damage in the young who do not have oral piercings are rare, researchers said.

Their first study, published in 2005 in the peer-reviewed *Dental Traumatology*, was conducted on 400 individuals between the ages of 18 and 19. Using research from throughout the globe, this new review, published in late 2007 in *American Dental Journal*, is the biggest and first of its type to document the complications and risks from oral piercings. For example, 20 percent of Israel's teens and 10 percent of their counterparts in New York have some type of oral piercing compared to 3.4 percent of the Finnish.

In the Israel-based study, participants were asked questions about their knowledge of the risk factors associated with oral piercings; their piercing history; and their oral health. These questions were posed to those who had piercings and to those without prior to the start of clinical oral exams.

Levin noted that those with piercings were body-image conscious but oblivious about the potential risks of their mouth jewelry in the later years.

Levin advised teens to refrain from getting oral piercings, but if they are insistent, they should ensure the piercing tools are disposable, and, to help reduce infection, that related equipment be cleaned in an on-site autoclave.

Furthermore, Levin said, the area should be rinsed regularly with a chloroxidine-based mouthwash for two weeks, they should avoid toying with the piercing, and to clean it regularly. Calculus deposits over time may form on the piercing and should be removed by the dentist. Regular checkups are highly recommended.

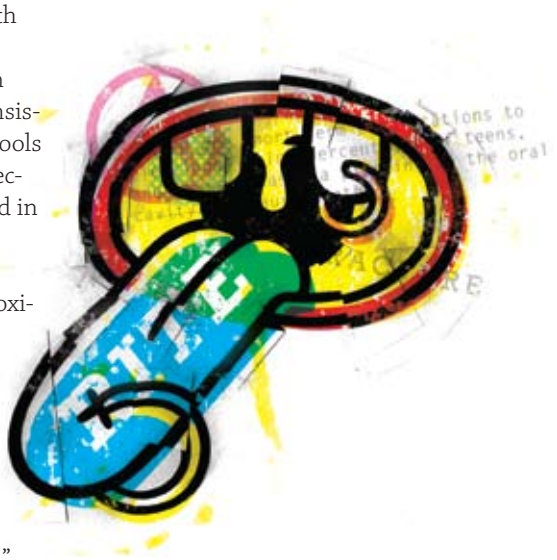
"Teenagers are not easy to manage," Levin said, offering further advice to parents, "Try, where possible, to dissuade your teen from getting a piercing. They will thank you when they are older."

Good Flossing Habits Start in Childhood

Inspiring a cycle of good oral care, Dr. Fresh has created colorful, single-use Flossers that are easy to use and are perfectly sized for a child's small mouth. Each FireFly Kids Flosser is preloaded with nylon-waxed floss and the handle's shape makes it easy to reach difficult spots in the mouth. A 36-count pack comes in four assorted colors — green, pink, blue, and orange, retails for $1.49, and is appropriate for children ages 4-12. For more information, go to www.drfresh.com.

Oxford Handbook of Clinical Dentistry

The new edition of this essential pocket guide, Oxford Handbook of Clinical Dentistry, covers the whole of clinical dentistry in a concise format. Authors have distilled the key elements of clinical practice into a readily accessible book, with blank pages provided for readers to add their own notes. Included in this edition is an extensive revision of cavity classification, caries diagnosis, resin composites and light curing, endodontics, and bleaching and implants; new material on caries risk assessment and new preparation techniques. To order online, go to http://www.researchandmarkets.com/product/8de763/oxford_handbook_of_clinical_dentistry_fourth.



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College Students Create Conduit to Dental Careers

A mentor program that steers students in middle and high school toward careers in health and science has been developed by students themselves at the New York University College of Dentistry.

"Operation Dental Success" is a curriculum for Brothers and Sisters in Science, a component of NYU's Programs for Preparatory Education in Science and Medicine, through which youths are encouraged to pursue higher education.

"Our aim is to encourage traditionally underrepresented racial, ethnic and socioeconomic groups toward pursuing careers in the health and science fields, and provide some of the tools and knowledge necessary to succeed," said Marcus D. Johnson, a senior dental student at NYU, and Marcus Michael Villacarlos, DMD, a 2007 NYU graduate, who launched the program.

Brothers and Sisters in Science was created by NYU medical students but didn't have a dental element until 2004 when Johnson received a grant from the American Medical Student Association. In the program, the university students volunteer to tutor, teach and mentor middle and high schoolers in New York via various activities ranging from providing hands-on experiences in health professions and information on dentistry as a career; offering a six-week program in the summer that allows participants to job shadow researchers and clinicians; as well as introducing middle school students at the Salk School of Science to scientific concepts that support their annual "Exploratorium" project.

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Derma Fillers in Dentistry: Is It Within Scope?

BY TDIC RISK MANAGEMENT DEPARTMENT

Once a quarter, the *Journal* features a TDIC risk management case study, which provides analysis and practical advice on a variety of issues related to liability risks.

Authored by TDIC risk management analysts, each article presents a case overview and real-life outcome, and reviews learning points and tips that everyone can apply to their practice. All names have been changed for privacy considerations.

A general dentist administers derma filler to correct a patient's lip deficit resulting in necrosis of the lip.

In April 2006, Sharon Lockard presented to Dr. Sean Cole, a general dentist, for consultation about her previous dental treatment. Ms. Lockard complained about her lower lip deficit and that her crowns caused severe headaches. Dr. Cole noted the existing crowns lacked adequate occlusal contact. After taking photographs and impressions and making radiographs of her existing dentition, he diagnosed Ms. Lockard with a temporomandibular joint disorder. Dr. Cole recommended replacing the crowns on her mandibular arch to provide proper occlusion and placing veneers on teeth Nos. 22-27 to improve esthetics. Ms. Lockard agreed to start treatment and asked whether he could fix the deficit of her lower lip. Dr. Cole said he could inject derma filler over a series of appointments to augment the area. With an agreed-upon treatment plan in place, Ms. Lockard authorized initiating treatment.

In June, Dr. Cole began the cosmetic aspect of Ms. Lockard's treatment. He injected derma filler under local anesthesia in the vestibule of the mandibular mucosa to correct the asymmetry of her lower lip. Dr. Cole explained that derma fillers generally last a few months and she would require several treatments to restore her deficit fully. She understood and agreed to the treatment timeline.

Ms. Lockard appointed in August and September to start and complete her crown placement. She also received additional derma filler injections, all without incident. Shortly before Christmas, Dr. Cole began the veneer treatment on teeth Nos. 22-27. During the veneer preparation, and while Ms. Lockard was still numb, Dr. Cole placed a small amount of a different derma filler in the lower right area of the lip to fill the deficit.

Three days later, Ms. Lockard presented, without an appointment, complaining of severe pain, swelling, and discoloration on the right side of her lower lip. When she asked why Dr. Cole did not return her three telephone calls, he stated he only received one message, not three, and had planned to call her that afternoon. During the exam, Dr. Cole noted what appeared to be blisters on her lip and prescribed Tylenol No. 3 and Abreva, as he sus-

pected the blisters were herpes lesions.

Ms. Lockard believed the condition on her lip was more serious than a cold sore and sought a second opinion from a dermatologist. She returned to Dr. Cole's office and explained that the dermatologist prescribed ointment and gauze, and referred her to a plastic surgeon as well. The dermatologist believed only a plastic surgeon should address the issues that Ms. Lockard was experiencing. Dr. Cole recommended she continue to use Abreva as he indicated previously. Two days later, Ms. Lockard called to report she was taking Keflex as prescribed by the plastic surgeon.

Throughout January, Ms. Lockard appointed several times to both the dermatologist and plastic surgeon, who eventually diagnosed necrosis in her lip. After realizing the pain would never subside and that she would need plastic surgery to look normal again, she filed a professional negligence claim against Dr. Cole.

During Discovery

During his deposition, Dr. Cole stated he injected the first derma filler after injecting two carpules of lidocaine, into the vestibule of the mandibular mucosa in June, August, and September, without incident.

Dr. Cole also stated he prepped teeth Nos. 22-27 for veneers in December. He noted in the chart, that he injected four carpules of lidocaine for buccal infiltration to anesthetize the mandibular anterior teeth. Since Ms. Lockard was already numb, he injected "a little" of the second derma filler into the lower lip. He noted "a little" because he used so little compared to prior injections. Dr. Cole did not inject any derma filler at the commissure of the mouth. His area of delivery of the derma filler was approximately 1 centimeter from the commissure. He switched to a different derma filler for the fourth injection because Ms. Lockard was not happy coming back every few months for a derma filler injection. Since the company representative stated this filler would last longer, he decided to use it instead.

Neither plaintiff nor the defense experts could conclude whether the necrosis was caused by the injections of derma filler or anesthetic.

Dr. Cole said that when he saw Ms. Lockard, she complained of pain, swelling, and discoloration. He diagnosed herpes lesions or blisters and recommended Abreva. He did not feel that he dismissed Ms. Lockard's concerns. He thought it was premature to refer Ms. Lockard to a dermatologist until she used the Abreva for two to three weeks. Since the derma filler material was administered on three previous occasions without reaction, Dr. Cole did not believe her symptoms were a result of the derma filler.

Dr. Cole disclosed that he received training on injecting derma fillers at a hands-on class taught by a registered nurse. He also disclosed that he had used both derma fillers on his wife and other family members several times without incident. Thus, he believed Ms. Lockard's treatment with both drugs would be successful.

During Ms. Lockard's deposition, she stated she first went to Dr. Cole to fix the symmetry of her lower lip. Dr. Cole recommended using a derma filler because the deficit was not that significant. Ms. Lockard appointed to Dr. Cole for several months to have the derma filler injections. At the December appointment, Ms. Lockard remembered Dr. Cole administering approximately a dozen injections, while prepping for her veneers. However, Dr. Cole did not record any of these injections in her chart.

Ms. Lockard alleged she called Dr. Lockard's office several times the night of the procedure and the next day. After no response from Dr. Cole for three days, she went to his office with complaints of severe pain, swelling, and discoloration. Neither the visit nor her multiple phone calls were documented in her chart. Ms. Lockard did not feel that Dr. Cole properly addressed her complaints.

Ms. Lockard was a national trainer for the sales representatives of a large health care group. After her treatment with Dr. Cole, she had to change careers. She can no longer speak for long periods because she tires easily and her lip swells. Accountants projected she would make $20,000 less a year in her new career. Ms. Lockard cannot pucker her lips to kiss, which has affected her relationship with her husband. She has difficulty speaking clearly because of the lip defect and has to pinch or hold her bottom lip together with her fingers to be understood.

Plaintiff's counsel suggested that Dr. Cole injected excessive amounts of anesthetic solution containing epinephrine in the lower lip causing constriction of the blood vessels resulting in necrosis of the tissue. However, neither plaintiff nor the defense experts could conclude whether the necrosis was caused by the injections of derma filler or anesthetic. The expert witness for the defense indicated that necrosis of the lip would not occur from the vasoconstrictor contained within the anesthetic solution alone. Further, the package insert for the second derma filler, which is FDA-approved, stated that the safety and efficacy of the product "for use in the lips has not been established."

Given this information, the defense attorney urged the dentist to settle the case before it went to trial. He believed given the inconclusive findings of the ex-

perts and Dr. Cole's poor documentation, a jury would decide Dr. Cole was practicing outside the scope of his license and award Ms. Lockard a substantial amount. Ms. Lockard is now undergoing reconstructive surgery of her lip with a plastic surgeon. Her original demand was more than $400,000 for past and future medical costs and loss of earnings. The case settled for an undisclosed amount prior to trial.

Lessons Learned

What lessons can we learn from reviewing this case?

Scope of Practice

With such a high demand for cosmetic procedures, many dentists are trying to determine what services they can or should provide. Even though dentists are educated to treat symptoms of the head and neck, as well as the oral cavity, they must remember to follow the statutes and regulations that govern the practice of dentistry in their states.

It was determined that Dr. Cole, a general dentist, was performing elective cosmetic procedures by injecting derma fillers and therefore violating the state's Dental Practice Act. Practicing outside the scope of a dental license is a violation of dental practice statutes. A statutory violation that results in an injury to a patient is a presumption of negligent care. Ordinarily, a plaintiff must prove the defendant acted negligently. However, the burden of proof shifts from the plaintiff to the defendant when the defendant is found to be practicing outside scope of his or her license. When dentists practice outside the scope of their licenses, TDIC will not be able to defend or indemnify policyholders if a patient makes an allegation of negligence related to these procedures or treatments. In this case, TDIC provided coverage for Dr. Cole because the cause of the injury was never determined.

Complete and thorough documentation is essential for defending allegations of professional negligence.

Prior to providing cosmetic treatment, ensure it is within the scope of practice for dentists in California. In January 2000, the Dental Board of California mailed a letter to all licensees clarifying the scope of practice of a dental license. With regard to cosmetic surgery procedures, the board stated:

California law currently prohibits a dentist from performing cosmetic procedures that are not part of the treatment, by surgery or other methods, of diseased, lesions, or the correction of malpositions of the human teeth, alveolar process, gums, jaws, or associated structures. This includes unrelated cosmetic procedures.

In 2006, the passing of Senate Bill 438 further clarified the Dental Board's statement, that no one other than appropriately permitted oral and maxillofacial surgeons may perform elective facial cosmetic procedures.

Patient Complaints

Every office should have an established protocol and recordkeeping system in place for patient calls concerning pain or other issues. When Ms. Lockard called to report severe pain, swelling, and discoloration the night of the procedure, she was only able to leave a message for Dr. Cole. When she did not receive a call back, she went to the office where Dr. Cole dismissed her complaints.

When Dr. Cole finally saw Ms. Lockard, he noted she had an ulcerated lesion and recommended Abreva. Dr. Cole did not document the visit in the chart or discuss the possibility of the injury being something other than viral. Patient complaints should be taken seriously. Ms. Lockard called several times. Dr. Cole did not give her complaints much attention. The lack of attention appears as if Dr. Cole did not care. His office should have a system in place for follow-up with patients who report problems after receiving treatment. Staff should notify the treating dentist about the call. If the treating dentist is not in the office, they should notify the dentist in charge. The dentist can then decide the best course of action. Document the incident and its outcome in the patient's chart.

Documentation

Complete and thorough documentation is essential for defending allegations of professional negligence. Dr. Cole did not document how many injections he did or Ms. Lockard's phone calls to the office complaining of pain. Dentists should be especially cognizant of documenting all patient complaints and steps they took to resolve them.

A dentist's memory cannot be relied upon solely as evidence. At the heart of most lawsuits is the "he said/she said" argument. While a dentist will have many patients to remember, a typical patient only has one dentist to remember. Clear patient records should give an accurate picture of the conditions present at the initial exam as well as the diagnosis, treatment options, the proposed treatment plan, and a thorough record of treatment rendered and patient complaints, if any. In the event of an untoward result, the only proof of what happened is either what is said in the present or what was written in the past. Written records carry more evidentiary weight than memory and are more likely to convince a jury. The defense could not refute Ms. Lockard's allegations due to the insufficient recordkeeping and lack of detail in the patient's chart. ■■■■

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Providing Dental Care for the Patient With Autism

H. BARRY WALDMAN, DDS, MPH, PHD; STEVEN P. PERLMAN, DDS, MSCD, DHL; AND ALLEN WONG, DDS

ABSTRACT The increasing number of children and adults with autism spectrum disorders highlights the need to provide a full range of services, including dental care. A review of the autism spectrum, the magnitude of the problem, and approaches to providing services by dental practitioners are presented.

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"People with autism have a normal life expectancy. Some people with autism can handle a job; they do best with structured jobs that involve a degree of repetition."[1] "Autism is a national health crisis, costing the United States at least $35 billion annually."[2]

Autism spectrum disorders, ASD, are a group of developmental disorders defined by a significant impairment in social interaction and communication, and the presence of unusual behaviors and interests. Many individuals with ASD have atypical ways of learning, paying attention, or reacting to different sensations and stimuli. The assessment and learning abilities of youngsters and adults with ASD can vary from gifted to severely challenged. ASD usually are diagnosed before age 3 and last throughout a person's life. It occurs in all racial, ethnic, and socioeconomic groups, and is four times more likely to occur in boys than girls[3] (**TABLE 1**).

Is autism a new disorder? "Autism may seem like a modern disorder, but it's not." People have probably lived with what we know today as autism spectrum disorders throughout history.[5]

"What causes autism?" The causes of ASD remains unknown. Scientists think both genes and environment play a role, and there might be many causes that lead to ASD.[5] Studies of twins have shown that in identical twins, there is about a 75 percent rate of both twins having autism, while in fraternal twins this occurs about 3 percent of the time. Parents who have a child with ASD have a 2 percent to 8 percent chance of having a second child who also is affected.[5]

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TABLE 1

Prevalence of Parent-reported Autism*

	NHIS	NSCH
Gender		
Male	8.8	8.5
Female	2.4	2.3
Age (yrs)		
4-5	4.8	4.4
6-8	7.5	7.6
9-11	7.2	5.8
12-14	4.6	4.3
15-17	4.2	4.1
Race/Ethnicity		
Hispanic	2.9	3.2
White, non-Hispanic	7.0	6.2
Black, non-Hispanic	5.2	5.8
Highest level of education achieved by family member		
≤ High school grad	4.0	4.1
> High school grad	6.6	6.0
Family income		
< 200% poverty level	5.7	5.6
≥ 200% poverty level	7.1	5.6

*Prevalence of parent-reported autism among noninstitutionalized children age 4-17 years (per 1,000 children) by selected demographic characteristics (National Health Interview Survey [NHIS] and National Survey of Children's Health [NSCH]): 2003-2004[4]

While the cause(s) of ASD in the majority of people is unknown, it tends to occur more frequently than expected among individuals who have other particular medical conditions, including Fragile X syndrome, tuberous sclerosis, congenital rubella syndrome, and untreated phenylketonuria (PKU).[6]

Is there a link between autism and vaccines? "There is no conclusive scientific evidence that any vaccine or combination of vaccines (i.e., measles-mumps-rubella, MMR) causes autism. There also is no proof that any material used to make or preserve the vaccine plays a role in causing autism."[7] "The doctor behind (the) controversial study linking children's vaccines to autism went before a (British) investigative panel probing misconduct allegations."[8] Nevertheless, the controversy regarding the combined MMR inoculation continues.[9]

Annual Economic Costs

The economic costs are primarily the additional cost of education, medical expenses, and caring for children and adults with autism. This economic cost is a huge burden to parents and society. For example, the annual cost of education for a typical child is around $10,000, while the annual cost of education of a child with autism is estimated at $40,000. Typically, a child with autism requires specialized medical treatment, which is an additional expense. Some parents report spending $65,000 per year.[10]

Autism Spectrum Disorders

ASD are a group of developmental disabilities defined by significant impairments in social interaction and communication and the presence of unusual behaviors and interests.

- Autism: Characterized by a qualitative impairment in social interaction, (e.g., failure to develop peer relationships appropriate to developmental levels), qualitative impairment in communication (e.g., repetitive use of language), and restricted repetitive and stereotyped patterns of behavior, interests and activities (e.g., persistent preoccupation with parts of objects).
- Asperger syndrome: Characterized by a qualitative impairment in social interaction (e.g., manifested by a marked impairment in the use of multiple nonverbal behavioral such as eye-to-eye gaze, facial expression, body postures and gestures to regulate social interaction), restricted repetitive and stereotype patterns of behavior, interests and activities (e.g., apparently inflexible adherence to specific, nonfunctional routines or rituals), and disturbances cause significant impairment in social, and occupational functioning. Unlike children with autism, children with Asperger syndrome retain their early language skills.[11]
- Rett syndrome: Characterized by normal early development followed by loss of purposeful use of the hands, distinctive body movements, slowed brain and head growth, gait abnormalities, seizures, and intellectual disabilities. It affects females almost exclusively.[12]
- Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS): Encompasses cases where there is marked impairment in the development of reciprocal social interaction associated with impairment in either verbal or nonverbal communication skills or with the presence of stereotyped behavior, interests, and activities. The presentations do not meet

TABLE 2

Number of ASD Children in California Schools: 1992-2003[22]

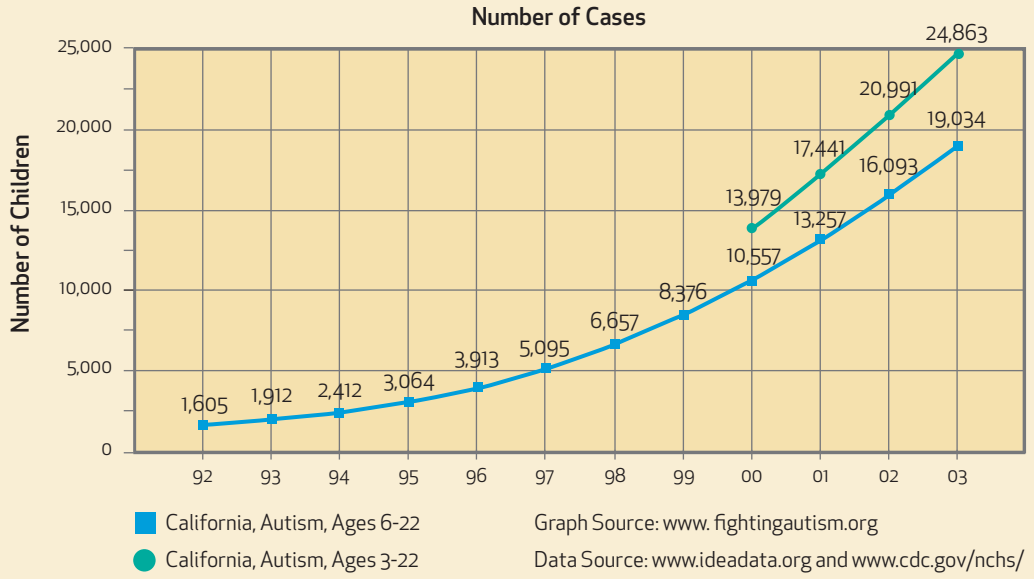
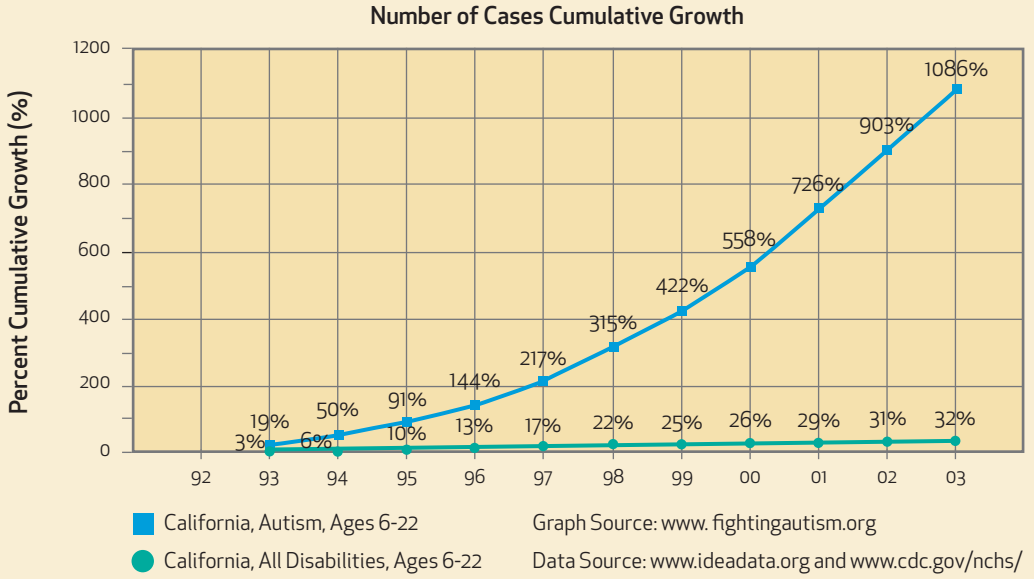


TABLE 3

Cumulative Growth in the Number of ASD Children in California Schools: 1992-2003[22]



the criteria for autistic disorders because of late age of onset, atypical symptomatology, or subthreshold symptomatology.[13]

- Childhood Disintegrative Disorder: A rare condition that resembles autism but only after a relatively prolonged period (usually two to four years) of clearly normal development. Typically, language, interest in the social environment, and often toileting, and self-care abilities are lost, and there may be a general loss of interest in the environment.[14]

Prevalence

Nationwide

"If 4 million children are born in the Untied States every year, approximately 24,000 of these children will eventually be diagnosed with ASD."[15]

The Centers for Disease Control and Prevention conducts two nationally representative surveys in which parents are asked whether their child has ever received a diagnosis of autism. Estimates from these studies suggest that as of 2003-2004, autism had been diagnosed in at least 300,000 children aged 4-17 years.[6] "CDC ... released data in 2007 that found about one in 150 8-year-old children in multiple areas of the United States had an ASD."[5]

Based upon these national studies and other CDC local studies, it is estimated that up to 500,000 individuals between the ages of newborn to 21 years have an autism spectrum disorder.[16,17] A CDC study found that the rate among young children (age 3 to 10) was lower than the rate for intellectual disabilities, but higher than the rates for cerebral palsy, hearing loss, and vision impairment. In 2003, approximately 141,000 children were served under the "autism" classification for special education services. Not all children, however, with an autism spectrum disorder receive special education services under this classification. It is the sixth most commonly classified disability for children in the special education programs.[15]

More children are being classified as having an ASD, but it is unclear how much of this increase is due to changes in how one identifies and classifies people with ASD or whether it is a true increase in prevalence. By current standards, "the ASD are the second most common serious developmental disability after mental retardation/intellectual impairment."[18]

State Level

By number: The total number of children (age 3 to 22) with ASD in a state is, to a great extent, a reflection of the variation in state populations. As of 2003, there were almost 25,000 youngsters with ASD in California; almost 12,000 in Texas; and approximately 9,500 in New York. In addition, there were between 5,000 and more than 7,000 children with ASD in nine states, plus between 1,000 and more than 4,000 children with ASD in 21 states.[19]

MORE CHILDREN ARE being classified as having an ASD, but it is unclear how much of this increase is due to changes in how one identifies and classifies people with ASD.

In the 2000-2001 academic year, almost 11,000 California schoolchildren between 3 and 11 years old were enrolled under the Individuals with Disabilities Education Act. However, there were additional children with ASD who were classified in other disability categories under IDEA.[20] The number of individuals receiving services for ASD increased approximately 300 percent during 1987-1998, and approximately 100 percent during 1998-2002. After adjusting for changes in population, the proportion of persons receiving services for ASD during 1987-1994 more than doubled[21](**TABLES 2 AND 3**).

Whether because of 1) better diagnosis; 2) a broader definition of autism; 3) a marked enlargement in the population of a particular state (e.g., Nevada); and 4) an actual increase in the numbers of individuals with ASD, nationally, between 1992 and 2003, there has been about an 2,560 percent increase in reported cases. These increases range from 23,300 percent in Ohio; 17,700 percent in Nevada; 16,200 percent in Wisconsin; 12,500 percent in Maryland; and 11,600 percent in New Hampshire, to between 1,000 percent and 5,000 percent in 21 states, and less than 500 percent in eight states. There was a 1,086 percent increase in California (**TABLE 4**).

By proportion, the number of children age 3 to 22 with ASD per 10,000 population in Oregon and Minnesota is about four to five times greater than the proportions in West Virginia, Montana, Oklahoma, Mississippi, New Mexico, and Colorado (as well as the Northern Mariana Islands, Puerto Rico, the U.S. Virgin Islands, and American Samoa).[19]

In California, individuals with ASD, intellectual disabilities, cerebral palsy, epilepsy, and other neurological conditions are eligible to receive services through the Department of Developmental Services. Services are provided through a system of 21 locally based regional centers. A study of children born between 1987 and 1994 and enrolled with DDS reported a prevalence of 11 individuals with ASD per 10,000 births. During the study period, the prevalence rate increased from 5.8 to 14.9 cases of ASD per 10,000 births. Based upon data comparisons with other developmental disorders, it was "suggest(ed) that improvements in detection and changes in diagnosis account for the observed increase in autism."[21]

But there is the contrasting report that indicates that "Several national media have erroneously concluded that a set of data from California 'confirms the autism epidemic'... However, no sound scientific

TABLE 4

Cumulative Growth of Autism Cases in Children (Ages 6 to 22 Years By State: 1992-2003.[19]

Percent increase			
	Ohio	23,291%	
	Nevada	17,720	
	Wisconsin	16,195	
	Maryland	12,529	
	New Hampshire	11,600	
Between 1,000% and 5,000% increase (In decreasing order)			
(high)			(low)
Colorado	Arkansas	Minnesota	Illinois
Mississippi	Vermont	Nebraska	Montana
Kentucky	New Mexico	Idaho	Connecticut
Rhode Island	Alaska	Georgia	California
Oklahoma	Iowa	North Dakota	
Guam	Maine	Kansas	
Between 500% and 980% increase (In decreasing order)			
Wyoming	New Jersey	Utah	South Dakota
Arizona	Pennsylvania	Missouri	Texas
Alabama	South Carolina	Florida	Oregon
Hawaii	Dist. of Columbia	Massachusetts	Virginia
Indiana			
Between 40% and 472% increase (In decreasing order)			
Washington	Michigan	West Virginia	Amer. Samoa
N. Mariana Is.	North Carolina	Louisiana	Puerto Rico
Tennessee	New York	Delaware	U.S. Virgin Is.
National average = 2,560% increase			

evidence indicates that the increasing number of diagnosed cases of autism arises from anything other than purposely broadened diagnostic criteria, coupled with deliberate greater public awareness and intentionally improved case finding."[23]

Treatment Keyed to General and Specific Symptoms

"There is no cure for autism."[12]

People with ASD differ greatly in the way they act and their capabilities. A symptom may be mild in one person and severe in another. Some examples of the types of problems and behaviors a child or adult with an autism spectrum disorder might have include:

Social Skills

Limited to no interaction with other people; might not make eye contact and might just want to be alone. They may have difficulty understanding other people's feelings or talking about their own feelings. Children might not like to be held or cuddled, or might cuddle only when they want. They may not seem to notice when other people try to talk to them; others may be interested, but not know how to talk, play, or relate to other persons.

Speech, Language, and Communication

About 40 percent of children with ASD do not talk at all. Others repeat words or questions that are directed to them rather than responding to an inquiry. Individual with ASD may not understand gestures, such as waving goodbye. Some can speak well and know lots of words but have a hard time listening to what other people have to say.

Repeated Behaviors and Routines

Individuals with ASD may repeat actions over and over again. They may want to have routines where things stay the same and may have trouble if family routines change.

Therapies and behavioral interventions are designed to remedy specific symptoms and bring about improvement. These include:

- Educational behavioral interventions: Structured intensive skill-oriented training sessions to help children develop social and language skills. Family counseling for parents and siblings often helps families to cope with the particular challenges of living with an autistic child.
- Antidepressant medication to handle symptoms of anxiety, depression, or obsessive-compulsive disorders. Antipsychotic medications are used to treat severe behavioral problems. Anticonvulsants are used for seizures and stimulant drugs (such as those used for children with attention deficit disorder) have been used to help decrease impulse and hyper activities.[12]

About 30 percent of children with ASD are prescribed antipsychotic drugs; 40 percent antidepressants; 40 percent stimulants; and about 30 percent some other class of drugs, including mood stabilizers and anticonvulsants. Some patients are treated with several medications.[24]

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Associated Oral Conditions

The complex neuro/developmental disabilities compound and exacerbate the all-too-frequent oral health disorders in the general child and adult populations, including: poor oral hygiene, rampant caries, generalized advanced periodontitis, oral-facial pain, xerostomia, poor nutrition, and poor diet. There may be:

- Eating disturbances due to idiosyncrasies and sameness in diet
- Preferences for soft food and food with high sugar content. Pocketing and pouching of food may contribute to increased incidence of caries.
- Limited self-cleansing action of the mouth due to poor tongue and cheek coordination. Oral hygiene may be a low priority due to the overwhelming attention by parents/caretakers to other needs.
- High incidence of bruxism
- Increased mouth trauma due to self-abusive injuries and a tendency for accidents. Decreased salivary flow due to side effects of medication
- Increased incidence of anemia leading to compromised gingival health

Dental Services in a Private Practice

There are reports in the literature that indicate that "(All too often) dental caries are neglected until so far advanced that drugs, or hospitalization, or general anesthesia are required to treat them (i.e., individuals with ASD)."[25]

The actual technical aspects of care are similar to the delivery of services for the general population of patients. Modifications in practitioner-patient-staff-parent or guardian interactions, however, may be necessary. Providing dental care and ensuring follow-up home care for individuals with ASD will vary by patient age, type, and level of the particular disorder, as well as an appreciation of family/living arrangements.

"The practitioner needs special equipment less than compassion and tolerance."[26]

Preparing for the Dental Visit

New experiences can cause problems for people with autism. Planning for a dental visit with the parent/guardian can reduce the difficulties.

- In addition to the "standard" history series, develop a thorough record of the patient's limitations and reactions to previous medical and dental services (e.g., usual limits of the patient's attention span and particular difficulties that arose in the past).

LET THE PATIENT KNOW what to expect and gradually expose them to the new stimulus allowing them time to experience it.

- Assist the parent/guardian in initiating a series of pre-visit sessions (e.g., use of dental pictures, toy models and a "walk-through" visit of the dental office).

Take Your Time[26]

The reality is that more time often is required to provide even simple services for individuals with ASD.

- Although the actual dental procedures may be performed in a reasonable period, the behavior management of the patients will require more time and patience.
- The average attention span for many of these patients may be between 15 and 20 minutes. Doing as little of the procedure at a time may help.
- Treatment may require physical restraint/support. A bite block/opening device may be used.
- There may be a high incidence of lip biting after local anesthesia.

Dental care in a private practice setting is possible in most cases. The degree in which dental care is provided may be limited but certainly not an all or none approach. The strategy should be to develop trust in the patient by gradually desensitizing a person with ASD to a new environment. This may be done as an introductory meeting/appointment rather than a procedure attempted appointment. A good way to approach this desensitization is just by finding out what triggers negative reactions from the family, caregiver, or patient and avoid it. Patients with ASD may be very sensitive to sound and light. Let the patient know what to expect and gradually expose them to the new stimulus allowing them time to experience it. Never overexpose them or force a procedure upon a patient. Help the patient to learn the routine then follow the routine.

Consistency and sameness are qualities in which patients with ASD find comfort. Patients appreciate sameness including same dental chair, color of bib, taste of polishing paste, etc. Depending on the patient, it may be helpful to have the caregiver accompany the patient in order for them to understand your requests to help in reinforcement, encouragement, and visualization of future dental visits. The adage "inform before you perform" is exponentially important in the case of patients with ASD. Letting your patient know what is going to be done will need to be broken down into small gradual steps for them to process.

A practitioner who is able to simply observe a patient with ASD brushing their teeth and offer suggestions in modifying their technique and recommending prevention strategies is going to be a tremendous help in the dental prevention paradigm.

All too frequently, the messages of oral hygiene and caries prevention may be overshadowed because the patients are often in a crisis mode. The dental team may need to be creative in their approaches including examining the patient in a chair or be examined in the waiting room instead of the conventional reclined dental chair. Making the office experience a positive one for the patient will make it worthwhile for the patient, caregiver, and dental team.

Speak the Patient's Language[26]

The parent/guardian can help you get a feel for a patient's level of functioning. When possible, talk to the patient on his/her level of understanding. Communicating in a soft voice and using gentle touch will go along way toward helping the patient relax.[26]

Reality

In the past, many of the youngsters and adults with ASD were residents of state institutions where they received needed dental and medical services. Today, the vast majorities of these individuals reside in our communities and are dependent upon local practitioners for care. The increasing numbers of youngsters with ASD (whether because of an actual increase and/or improved diagnostic procedures) have been featured in *Time*, *Newsweek*, the *New York Times Magazine*, and untold numbers of other public and professional publications. Throughout these writings has been the emphasis on the need for increased health, education, and social services for these youngsters. A number of local dental societies, and government and voluntary agencies have responded by developing and distributed listings of practitioners willing to provide care for patients with ASD and other disabilities. But a greater numbers of dentists willing to provide care are still needed.

Since January 2006, the Commission on Dental Accreditation instituted new standards for dental and dental hygiene education programs to better prepare dental professionals for the care of persons with developmental disabilities, complex medical problems, significant physical limitations, and a vast array of other conditions that are considered under the rubric of "individuals with special needs." "Graduates *must* be competent in assessing the treatment needs of patients with special needs."[27] Specifically, patients with special needs were defined as "those patients whose medical, physical, psychological, or social situations that make it necessary to modify normal dental routines in order to provide dental treatment for that individual. These individuals include, but are not limited to, people with developmental disabilities, complex medical problems, and significant physical limitations."[27]

The recent modification in standards for dental education programs seeks to recognize and specifically prepare the next generations of practitioners who will be called upon to care for individuals (who live in our communities), and whose physical and intellectual limitations extend beyond the traditional definition of a "medically compromised patient."[28]

The reality is that many individuals with ASD are members of families currently being treated by dentists in your community, probably in your practice, too. ■■■■

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An Evaluation of Color Stability of Reinforced Composite Resin Compared With Dental Porcelain in Commonly Consumed Beverages

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ABSTRACT The effect of tea, cola, orange juice, and distilled water on the color stability of a porcelain (VITA VMK 95) and a reinforced composite rein (GC Gradia) was evaluated. Standardized specimens for each material was prepared. Specimens from each group were immersed in staining solutions at 50 degree Celsius for 30 days. Tea caused the most significant color change. ΔE of all of the materials was changed after the immersion in all of the staining solutions during the experimental process.

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Porcelain veneers have established themselves as ultimate conservative anterior esthetic restorations because of their natural appearance, good wear resistance, and color stability. Porcelain has color-rendering properties and optical properties that stimulate natural teeth. Although porcelains have high compressive strength and resist discoloration, which is superior to any other restorative material, they have a number of undesirable characteristics such as the time-consuming and technically demanding fabrication and abrasiveness of the porcelain when used against natural tooth structures.[1] It's important to note that the long-term clinical success of porcelain veneers depends on a careful case selection and diagnostic approach as well as an accurate and appropriate tooth preparation.[2]

Recently introduced indirect composite systems try to resolve some of the problems inherent with dental porcelains. Over the last few years, the development of indirect resin-based composite resins has given the dental profession the possibility of fabricating adhesive aesthetic veneers for anterior teeth. Indirect resin composite veneers have been used minimally for several reasons: the dentists' ability to place direct resin-based composite themselves; difficulty

FIGURE 1. A four-hole metal mold was used to prepare porcelain disks.

TABLE 1

Recommended Firing Cycle Used for VITA VMK 95 as Instructed by the Manufacturer

Firing	Preheat temp °C	→	↗	Temp. approx °C	→	VAC
Glaze firing with fluid	600	4.00	4.00	900	1.00	0.00

in bonding laboratory-made fully cured composite resins to acid-etched tooth structure, and the color unpredictability.[3]

Light-cured GRADIA is an indirect restoration system for crown and bridge, inlays, onlays, and veneers. The chemistry of GRADIA couples a micro-fine ceramic/pre-polymer filler with a urethane dimethacrylate matrix to produce a superior ceramic composite, thus the system has improved mechanical properties, has the advantage of more strength, better translucency, and smoother surface finish, thus providing an ideal material for some prosthetic purposes.[4] Still, one of the properties these composites have to pass the test of time is their color stability.

Composites are susceptible to discoloration that may be intrinsic or extrinsic.[5] Intrinsic factors involve discoloration because of alteration of the resin matrix itself or the interface of matrix and fillers, oxidation, or hydrolysis in resin matrix.[6] The resin matrix, a major component of composite materials, has been reported to play a critical role in color stability and is affected by different pH solutions and alcohol concentration.[7] Studies of Ferracane et al. have shown that alcohol can plasticize the resin matrix, making it soft and prone to degradation.[8,9] In addition, a study by Dietschi et al. showed that the intrinsic staining may be related to high resin content and water absorption.[10]

Extrinsic factors for discoloration include staining by adsorption or absorption of colorants as a result of contamination from various exogenous sources.[11-13] Thus, dietary habits such as large consumption of soft drinks and beverages can contribute to the external staining of the laminates.[14-17]

Ertaş in 2006 showed that there are noticeable color changes of resin composites after immersion in different drinks.[18] In 2005, Gupta manifested that the color match of esthetic restorations in the oral cavity is affected by dietary habits.[19] However, because of the inconsistencies inherent in color perception and specification among observers, only visual comparison is not reliable. Colorimetry, based on comparison with a known standard is the most scientific and practical method to assess color stability.[20]

The CIELAB (Commission Internationale de l'Eclairage) color coordinates system is a very useful mode that provides information about location of object color in a uniform 3-D color space. It quantifies the color in terms of three coordinate values L*, a*, and b*. Here, L* represents brightness or lightness (value) and a* and b* serve as numeric correlates both for hue and chroma.[21] The a*and b* values represent position on a red/green and yellow/blue axis, respectively: + a*=red, - a*= green, + b*=yellow, and - b*= blue. The magnitude of the color difference perceived between two objects is calculated by formula $\Delta E = (\Delta L2 + \Delta b2 + \Delta a2)$ ½.

Color stability is decisive for the success of any anterior veneering material. Color mismatch is a major cause for the replacement of conventional anterior composites. Discoloration of restorative materials may result in patient dissatisfaction and additional time and expense for replacement. However, in this regard, the color stability of microceramic-reinforced composites has not been evaluated and clarified. These composite materials designed for anterior fixed prosthodontic applications must possess color stability at least comparable to that of dental porcelain.

This study was conducted to evaluate the effect of three commonly consumed beverages: orange juice, tea, and cola, on color stability of an indirect microceramic-reinforced composite and a porcelain.

Materials and Method

A microceramic-reinforced composite, i.e., GC Gradia, (GC America Inc.) and a dental porcelain, i.e., Vita VMK 95 (Vita 3D-Master) were selected for this study.

Specimens were prepared in the form of discs. The shade used for test material was Vita VMK 95 EN 1 and GC Gradia El 1. Twenty discs of each material were prepared with a diameter of 20±2 mm and thickness of 2± 0.2 mm.

VITA VMK Disk Preparation

A four-piece metal mold with specified dimensions was machined and used for making the VITA VMK 95 discs. The metal mold consisted of three parts. The upper and lower parts were two simple flat metal plates, whereas the middle part consisted of four holes (FIGURE 1). A disc of condensation silicone; Speedex (Colten, Whaledent, USA) was prepared by injecting the material between the two halves of a metal mold; both halves of the metal mold were then pressed together uniformly. The silicone disc thus obtained was

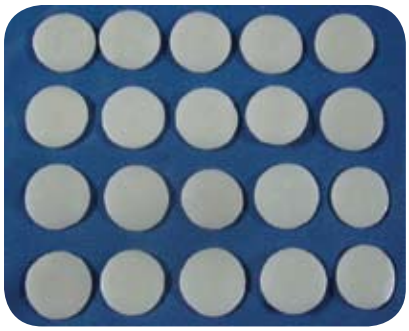


FIGURE 2. The prepared porcelain disks.

FIGURE 3. A five-hole glass mold was used for the preparation of GC Gradia disks. It consisted of three parts: upper, lower, and a middle hole part.

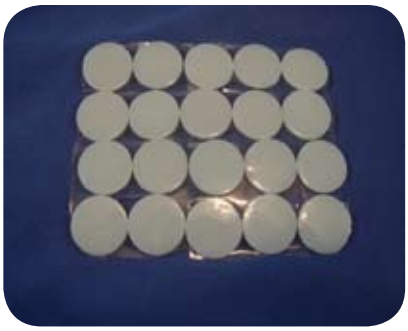


FIGURE 4. The prepared composite disks.

then placed inside a wax mold and the wax mold was filled with a refractory investment material to prepare a mold. VITA VMK 95 was applied on this mold, condensed, and trimmed flush with the upper part of the metal mold and fired. The purpose of this procedure was to have standardized porcelain disks.

Before firing the disks, thorough testing of the ceramic furnace was performed. Damaged fireclay bases as well as contaminated furnace linings were exchanged before firing. Furnaces featuring large temperature fluctuations were not used in this study.

Corrections on the disks were made using diamond-coated burs. The entire surface was ground with one abrasive instrument as different abrasive materials result in different degrees of roughness, and hence different degrees of surface gloss. The disks were cleaned again. Then, the glaze was applied to the entire surface. Excess glaze was removed with a dry brush until only a film of glaze remained. Final glazing was done according to **TABLE 1** as instructed by the manufacturer:

Afterward, the discs were removed from refractory mold taking care not to damage the glazed surface (**FIGURE 2**).

GC Gradia Disk Preparation

A five-piece glass mold was used for making the composite disks. Like the metal mold described, it consisted of three parts (**FIGURE 3**). A cellophane sheet was placed at the base of the mold and then the material was placed in the mold and pressed uniformly. Extra flash was removed and the material was made flush with the top of the mold surface. Discs were light-cured 20 seconds from both sides, as instructed by the manufacturer using a visible light cure unit, GC Steplight SL-I (GC America Inc.). Final curing was performed by GC Labolight LV-III (GC America Inc.) for three minutes as instructed by the manufacturer, but they were cured two minutes more to ensure sufficient polymerization.

The cured specimens were finished with six brush strokes in the same direction using Moore's disks (E.C. Moore Co., Dearborn, Mich.) to produce a standard rough surface. The specimens were then polished with the use of the Sof-Lex (3M ESPE, St. Paul, Minn.) system.[4] The system the authors used consisted of three steps:

1. Application of a medium aluminum oxide disc (40 µm)
2. Application of a fine aluminum oxide disc (24 µm)
3. Application of an ultrafine aluminum oxide disc (8 µm)

The same slow-speed handpiece was used for all procedures. The polishing procedure consisted of repetitive strokes for 30 seconds, 10 seconds per step of the system, to prevent heat buildup. An intentional effort was made to standardize the strokes, downward force, and the number of strokes for each polishing procedure. According to the manufacturer's instructions, Sof-Lex system was used dry. Specimens were labeled on one side using a fine, round bur.

All the disks (GC Gradia and VITA VMK 95) were stored in Saliva Substitute (Roxane Laboratories Inc., Columbus, Ohio) in plastic bags at 36 degrees Celsius 24 hours prior to their placement in the staining solutions (**FIGURE 4**).

Test Solutions

Tea (Lipton's black tea), orange juice (Tropicana), cola (Coke), and distilled water were used in this study. A solution of 250 ml each was taken and specimens were immersed in solutions. For tea preparation, a black tea bag was immersed in 300 ml boiling distilled water and simmered for two minutes. All solutions were kept at a constant temperature of 50 ± 1 degree Celsius in an incubator. Test solutions were changed every seventh day.

Color Evaluation

Color changes were measured at an interval of one day, 15 days, and 30 days for all the solutions.

Following removal from the staining solutions, the samples were dipped in distilled water and moved up and down 10 times. The samples were then wiped dry with tissue paper with light pressure and then placed in viewing port for color measurement. Each specimen

TABLE 2

Total Discoloration of VITA VMK 95 in Different Beverages at Different Time Periods

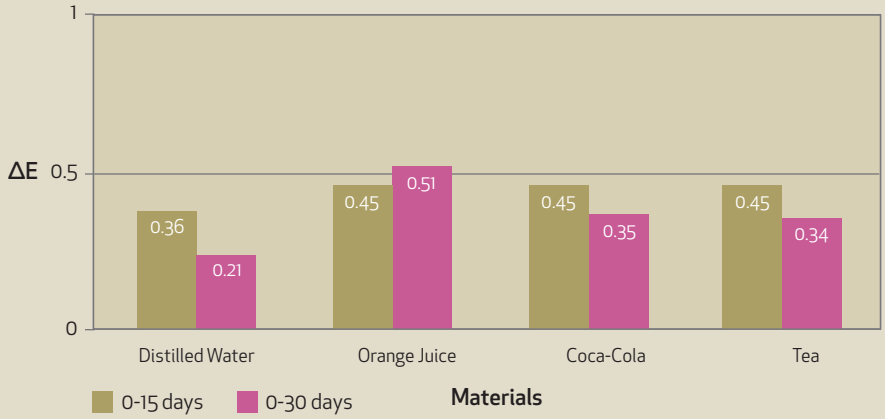
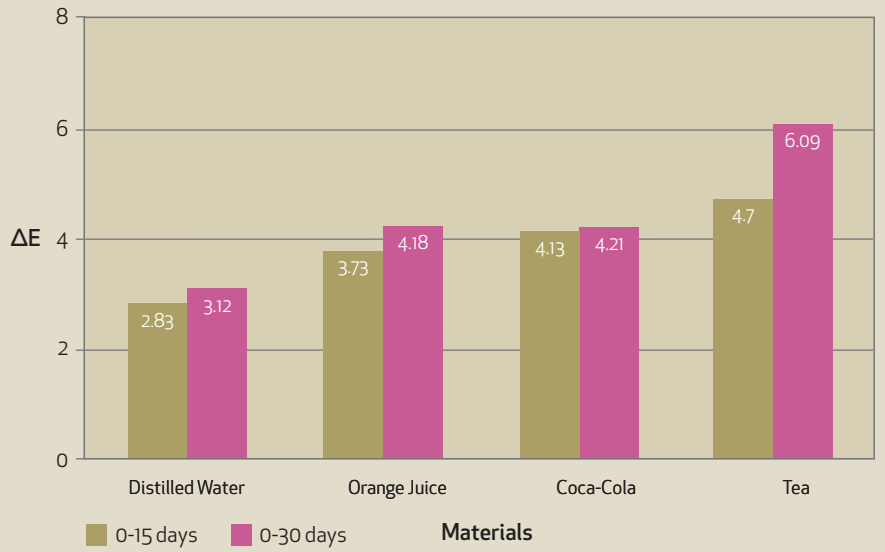


TABLE 3

Total Discoloration of GC Gradia in Different Beverages at Different Time Periods



was placed on a neutral gray background (Munsell N-7, Macbeth, New Windsor, N.Y.). This background was used for all color measurements. Minolta CR-10 was used in the study. Color changes were calculated by using the formula: Change in color $\Delta E = (\Delta L2 + \Delta b2 + \Delta a2)$ ½.

Statistical Analysis

A one-way ANOVA with a multiple-range test (Tukey test) was applied to see significant difference among the groups. To see the trend or impact of different beverages, a two-way ANOVA test was applied. A level of significance of 95 percent was satisfied during the entire statistical analysis.

Results

All three factors studied, i.e., type of material, solution, and time factors had a significant effect on each of the three measured color parameters. VITA VMK 95 after immersion in the test solutions showed a small amount of color change after one month that was clinically non-perceptible in all the solutions, including distilled water. The color change ranged from 0.21 ΔE units in water to 0.51 ΔE units in orange juice after one month (TABLE 2). GC Gradia showed increased discoloration over the observation period of one month. The color change ranged from 3.12 ΔE units in water to 6.09 ΔE units in tea after one month (TABLE 3).

The difference in total discoloration was significant between VITA VMK 95 and GC Gradia ($p<0.001$), with the latter showing more discoloration than porcelain in all the solutions. The maximum mean difference between VITA VMK 95 and GC Gradia was: 2.91 in water; -5.75 in tea; -3.67 in orange juice; and -3.86 in cola. Considering the mean staining intensity of all the solutions, tea was found to cause more discoloration than orange juice, cola, and water.

There was a significant change in ΔL (brightness) after a period of one month in both groups. Both groups showed a decrease in L value, i.e., became darker and less bright with time. However, the amount of ΔL changes after one month for VITA VMK 95 was clinically non-perceptible. This change ranged from 0.04 units in tea to 0.32 units in cola.

GC Gradia showed a significant change in L value ($p< 0.001$) ranging from 1.64 units in water to 3.88 units in tea.

When compared with porcelain there was significantly more change

in GC Gradia ($p < 0.001$). Δa (change along red-green axis) was found to be significant for all the materials after one month ($p< 0.001$) in all the solutions. Both VITA VMK and GC Gradia showed positive Δa, therefore indicating a shift toward red color. A maximum change in the "a" coordinate was seen in GC Gradia after exposure to tea. When compared with VITA VMK, there was significantly more change in GC Gradia ($p< 0.001$).

Δb (change along yellow-blue axis) was found to be significant for all the materials after one month ($p< 0.001$) in all the solutions. GC Gradia showed positive Δb, therefore indicating a shift toward yellow. A maximum change in the "b" coordinate was seen in GC Gradia after exposure to tea. VITA VMK 95 showed a negative Δb just in distilled water, thus indicating a shift toward blue or became less yellow.

In the other solutions, VITA VMK 95 showed positive Δb. When compared with porcelain, there was significantly more change in GC Gradia ($p < 0.001$).

Color change along individual coordinates of the CIELAB system (**TABLES 4-6**).

Discussion

A number of factors are known to impact color stability of the composites. In this study, the researchers were very careful to reduce such factors to a minimum. Different factors that could precipitate the staining of samples during polymerization, finishing, and storage. Although a high-gloss surface generally is considered less susceptible to staining, other surface conditions, such as incomplete polymerization of the resin matrix, may lead to the surface staining of composites.[7] Microcracks, microvoids, or interfacial gaps located at the interface between the filler and the matrix are the most likely penetration pathways for stains.[22]

This study evaluated the extrinsic

TABLE 4

ANOVA for ΔL Changes in Different Beverages at Different Time Intervals

Material	Solutions	1 Day	15 Days	1 Month
GC GRADIA	Distilled water	64.24±0.32	62.72±0.08	62.60±0.07
	Orange juice	64.26±0.19	62.34±0.19	62.16±0.15
	Tea	64.34±0.30	61.60±0.24	60.46±0.59
	Cola	64.20±0.30	62.22±0.14	62.08±0.08
VITA VMK 95	Distilled water	60.06±0.55	60.40±0.54	60.18±0.50
	Orange juice	60.06±0.43	59.90±0.07	59.74±0.27
	Tea	60.12±0.20	60.22±0.43	60.08±0.27
	Cola	60.44±0.53	60.22±0.52	60.38±0.51

TABLE 5

ANOVA for ΔA Changes in Different Beverages at Different Time Intervals

Material	Solutions	1 Day	15 Days	1 Month
GC GRADIA	Distilled water	-2.56±0.15	-2.50±0.10	-2.34±0.11
	Orange juice	-2.52±0.13	-2.40±0.15	-2.24±0.15
	Tea	-2.56±0.16	-1.90±0.24	-1.26±0.41
	Cola	-2.54±0.11	-2.10±0.10	-1.92±0.08
VITA VMK 95	Distilled water	0.44±0.08	0.38±0.08	0.46±0.05
	Orange juice	0.48±0.08	0.44±0.08	0.64±0.15
	Tea	0.44±0.05	0.52±0.04	0.66±0.08
	Cola	0.50±0.07	0.58±0.04	0.76±0.08

TABLE 6

ANOVA for ΔB Changes in Different Beverages at Different Time Intervals

Material	Solutions	1 Day	15 Days	1 Month
GC GRADIA	Distilled water	0.24±0.28	2.62±0.19	2.88±0.22
	Orange juice	0.40±0.18	3.60±0.26	4.00±0.15
	Tea	0.46±0.18	4.22±0.26	4.96±0.29
	Cola	0.24±0.24	3.84±0.19	3.82±0.17
VITA VMK 95	Distilled water	3.24±0.15	3 26±0.16	3.14±0.13
	Orange juice	3.20±0.07	3.40±0.10	3.32±0.14
	Tea	3.18±0.16	3.44±0.15	3.32±0.19
	Cola	3.32±0.16	3.66±0.18	3.50±0.15

staining of the samples in different solutions. Extrinsic staining very likely depends upon the smoothness of the surface of the material. In this study, care was taken to have equal surface smoothness for the GC Gradia disks by performing standard procedures for all samples and the application of equal power during finishing and polishing procedures, the pressure used in this study was controlled by a conscious effort to standardize the stroke with a downward intermittent force, as well as the number of strokes for each polishing procedure. The amount of time to finish each sample with each abrasive material was also carefully controlled.

Careful following of the manufacturers guidelines regarding the glazing procedures of the VITA VMK 95 could possibly lead to an equal smoothness of surface for these samples. However, as porcelain samples were considered as controls in the study and since the two materials (GC Gradia and VITA VMK 95) are of totally different substances, no effort was made to equalize the surface smoothness of the composite groups to the porcelain disks.

To simulate the clinical discoloration potential of the samples, they were stored at 50 degrees Celsius in accordance with the accelerated lab test given by Asmussen in 1981 that stated color changes produced in composites by storing for one month at an increased temperature of 50-60 degree Celsius was well correlated with color change obtained after storing for 12 months at 37 degree Celsius.[21]

Color perception is a psychophysical phenomenon with variations, both between individuals and within an individual at different times, and instrumental measurement has the advantage of obviating the subjective errors of color assessment.[19] The CIELAB color system is used almost exclusively for color research in dentistry around the world. It was introduced in 1976 and recommended by the International Commission on Illumination. The strength of this system, unlike that of the Munsell system, is its ability for clinical interpretation, as equal distances across the CIELAB color space (color differences or ΔE) represent approximately uniform steps in human color perception, improving the interpretation of color measurements. This means that the magnitude of perceptible and/or acceptable color difference can be defined between for example, a porcelain crown and the adjacent natural dentition.[20] Thus, the application of this system helped the study have a rather precise method of color evaluation. As a result, observation bias in the collection of data by clinical observers has had little chance to occur.

TEA WAS FOUND to cause more discoloration than orange juice, cola, and water.

Even porcelain (VITA VMK 95) after immersion in the test solutions showed a color change ranging from 0.21 to 0.51 ΔE units after one month though it was not in a visually perceptible range. The overall color changes were in a range similar to that reported in a study by Razzoog et al., in which two porcelain systems vs. Ceramco and Procera showed a color change in the range of 0.5- 1.5 ΔE units after an accelerated aging process for 900 hours in a weathering chamber.[23]

Douglas evaluated the color stability of various indirect resins (Artglass, Zeta, Targis, Belleglass), one direct resin (Herculite XRV), and a porcelain system (Omega 900) after accelerated aging for 300 hours.[1] Porcelain was reported to discolor the least and was not significantly different from Zeta and Artglass that showed a color change in the range of 0.62-3.4 ΔE units. But these studies differed from the present study since these studies evaluated only the change that occurred over time (effect of aging) and did not evaluate the resistance against external staining. Color changes of composite materials can happen through different mechanisms: the formation of colored degradation products, alterations in surface structure due to wear and by extrinsic staining. The last mechanism is not tested in accelerated aging.[1]

Considering the mean staining intensity of all the solutions, tea was found to cause more discoloration than orange juice, cola, and water. The strong black tea used in the present study could have affected the results. This is in agreement with the results of some previous studies conducted to find effect of various staining agents on different resinous materials.[15,24,25] Nonetheless, it has been reported that discoloration with tea is superficial and can be easily removed after cleaning with soap and toothbrush.[19] As tea is a common drink in different countries, especially in Middle Eastern societies, clinicians should advise patients that drinking tea could intensify surface staining on composite restorations. It is highly recommended that a toothbrush be used to remove the stains after drinking tea.

When the trend for color change was observed over the observation period of one day to one month, it was noticed that GC Gradia showed a greater amount of discoloration in the first two weeks in general. The fact there is water solubility and leaches out after immersion in a solution might have affected

the early color changes in GC Gradia.

The results are in partial agreement with the study by Buchalla that was conducted to determine the color and translucency changes in a hybrid composite (Tetric) and a microfilled composite (Silux-plus) after exposure to an artificial light with and without water.[26] The samples were stored at room temperature (23 degrees Celsius) for one month. Both the materials in the study showed negative ΔL value (a decrease in L value), i.e., darkening with time. There was a blue shift (negative Δb) for both the materials. In the present study, changes along the "L" axis are in agreement with that by Buchalla, but changes along the "b" axis are different. The difference could be due to difference in the experimental conditions. In the authors' study, samples were stored at an increased temperature of 50 degrees Celsius to simulate a long-term clinical exposure.

Secondly, the test solutions in the present study were tea, orange juice, and cola, along with water as a control. Tea was found to cause yellowing and reddening of the composites, in agreement with previous studies, and has been explained on basis of yellow component present in the solution.[25] The response to cola and orange juice varied among the test materials. The extremely low pH of cola (approximately 2) and orange juice can be a contributing factor to changes in the color characteristics of the materials.[19] Cola gains its color through the addition of caramel color. Caramel exhibits colors ranging from palest yellow to deepest brown, and is made by heating sugar or glucose in the presence of alkali or mineral acid.[27] The positive b* values for the specimens immersed in the cola solution indicate a shift toward yellow. The control, i.e., distilled water, was also found to cause small variations in color, which may be due to increased temperature, causing increased water uptake by composites and leaching out of few soluble components of the materials.

The clinical relevance of the present study results depends on how much color change (represented by E values) is considered perceptible. It is shown that a E < 1 is not considered perceptible to most subjects with normal color vision. Studies state that observers do not believe that restorations with a E as high as 3.3 and 3.7 required replacement, although the color differences definitely were perceptible.[28,29] Considering the fact that color perception can vary significantly among people, the latter results probably would represent the color perception reality of the general population, for whom the color difference probably would be visually detected, but it also may be clinically acceptable.[30,31]

THE RESPONSE to cola and orange juice varied among the test materials.

Conclusion

It has been claimed that under clinical conditions in the mouth, ΔE color differences have been reported as relevant only when the value is higher than 3.3 or 3.7. Thus, the changes in the GC Gradia are of relevance clinically as these changes would be apparent after prolonged and frequent exposure of the restorations to tea, orange juice, and cola. (Unlike some other studies, samples were stored at an increased temperature of 50 degrees Celsius to simulate a long-term clinical exposure). GC Gradia tested in this study demonstrated color changes that could not be considered acceptable as this material did not possess color stability comparable to dental porcelain and because of its poor resistance against external staining.

Although the usage of GC Gradia as an anterior veneering material is not advocated by results acquired in this in vitro study, further in vivo and in vitro studies are needed to confirm this result. Nevertheless, VITA VMK 95 can be considered color stable and resistant to external staining.

Finally, the authors would like to emphasize that it is difficult to entirely correlate laboratory findings with the clinical behavior of any restoration since a number of factors are at play in oral environment that cannot be fully simulated in laboratory conditions. Therefore, to find a correlation between clinical studies and lab measurements, further in vivo clinical evaluation is suggested. ■■■■

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Complete Denture Masticatory Efficiency: A Literature Review

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ABSTRACT The restoration of masticatory function and esthetics is an important aim in dentistry mainly when patients present with extensive tooth loss. The aim of mastication is to reduce food size to produce a homogeneous bolus appropriate to be swallowed. For edentulous patients, chewing efficiency is reduced because dental arches are replaced by artificial teeth. The aim of this study is to present factors related to chewing efficiency for the edentulous patient.

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The restoration of masticatory function and esthetics is an important aim in dentistry mainly when patients present with extensive tooth loss.[1]

Mastication is the first phase of the digestive process and it is considered an essential function of the stomatognathic system. Chewing breaks down food that will be swallowed and digested. The mechanical breakdown of food aids the enzymatic process that depends on food chewing.[2]

Chewing requires muscular coordination to perform mandibular movements and generate enough force to cut, crush, and grind food to keep it on the tooth occlusal surface. The activity of mandibular elevator muscles depends on food texture since they need to overcome food resistance during chewing.[2,3]

Chewing efficiency can be enhanced by the patient's capability of breaking down food evaluated by a system of sieves with different meshes. In edentulous patients, chewing efficiency is reduced due to replacement of dental arches by artificial teeth. Natural tooth loss causes alterations as bone resorption, temporomandibular disorders, and muscular hypotonicity that affect structures related to mastication and mandible stabilization.[4]

Literature Review

In 1954, Beyron stated that chewing should be performed usually by both sides since unilateral chewing could result in progressive occlusal disharmony as a result of abnormal wear.[5]

Sheppard et al. in 1968 evaluated usual mastication by cinefluorography to assess bolus placement during mas-

tication. The authors observed that among 25 subjects with natural dentition, seven preferred only one side.[6]

Ten years later, Rissin et al. studied chewing efficiency in 29 patients.[7] They used the sieving method and the electric activity record of the masticatory muscles. The patients were divided into three groups. Group 1 was composed of 10 dentate patients; group 2 was represented by 10 complete dentures wearers; and group 3, represented nine patients with upper denture and lower overdenture. Results showed that electric activity of the masseter muscle during mastication was similar among the groups.

Haraldson et al. in 1979 evaluated oral function in complete denture wearers by using a questionnaire, clinical examination, and bite force tests.[8] Ten patients with satisfactory and 10 with unsatisfactory dentures were studied. According to the authors, edentulous persons are very handicapped in masticatory function, and even satisfactory complete dentures are poor substitutes for natural teeth.

In 1982, Gunne et al. studied the masticatory efficiency in 19 patients before and after new complete dentures insertion.[9] The test chewing material was gelatin hardened by formalin and later dehydrated. The chewing test and the sieve system were standardized. Results revealed no statistical significant differences among the periods evaluated in chewing efficiency tests. No significant difference was noticed between old and new dentures during the seven months of evaluation.

Gunne and Wall evaluated masticatory efficiency in 43 patients with adequate intraoral conditions and favorable jaw and mandibular ridge.[10] The subjects were tested on three occasions: with the old and the new complete dentures, at the moment of insertion, and four months after insertion. The old dentures were unstable and with occlusal disharmony. Gelatin was used as a material for the masticatory efficiency test. Masticatory efficiency of old dentures wearers increased significantly four months after the new dentures were inserted. This study showed a correlation between new dentures insertion and previous experience.

Lucas et al. concluded that food comminution during mastication reduced the particles' size and decreased the time of masticatory cycles.[11] The maximum opening amplitude of masticatory movement is more related to food volume than to particle size.

EDENTULOUS PERSONS are very handicapped in masticatory function, and even satisfactory complete dentures are poor substitutes for natural teeth.

In 1992, Slagter et al. studied the force-deformation of natural and artificial foods for masticatory efficiency test.[12] Two artificial foods (Optosil and Optocal) and two natural foods (peanuts and carrots) were evaluated and compared. The influence of cusp form on food comminution also was evaluated. The force of trituration was lower for Optocal than for Optosil artificial test food.

The forces needed for Optocal coincided with those needed for carrots and peanuts. The natural foods showed more variation in force and percentage of deformation than the artificial foods. The artificial foods, with different cusp inclination, were more resistant to trituration than natural foods.

According to Wilding, chewing efficiency can be defined as food breakdown with minimum effort and maximum particle size reduction.[4] The number of masticatory cycles or time dispended during chewing before swallowing can reflect masticatory efficiency. The authors affirm that chewing efficiency is related to dentition conditions as a number of posterior teeth, occlusal contact area, malocclusion degree, and the number of teeth.

Many factors may determine masticatory performance. According to Julien et al., occlusal contact areas represent available area for shearing food during each chewing cycle.[13] Patterns of mandibular movements determine speed and direction with which teeth surfaces come together during each masticatory cycle. Muscular strength reflects the available force to cut or crush the food according to a bite force record.

Karkazis and Kossioni studied the influence of food texture during the electric activity of the masseter muscle in a sample of nine satisfactory complete denture wearers.[14] Carrots and apples cut into equally sized pieces were used as hard and soft test foods. The activity was higher for hard than soft foods. The chewing rate and chewing cycle duration presented inverse correlation since the higher masticatory muscle strength, the lower the chewing cycle.

Gavião determined the correlation between volume and consistency of natural and artificial foods and physiological chewing parameters.[15] Masticatory efficiency was evaluated by the measurement of digitalized images from Optosil particles. Results showed that food volume influenced significantly saliva secretion, and the number of chewing cycles before swallowing.

In 2004, Peyron et al. evaluated the influence of age on masticatory capability regarding food hardness.[16] Age was associated to an increase of 0.3 cycles for each year and an increase of electric activity. Cycle duration and mouth opening was negatively influenced by age. The number of cycles to perform an adequate chewing increases with age and the greater hardness of food.

Honma et al. assessed chewing efficiency among 116 patients with normal occlusal relationships.[17] The number of chewing cycles up to the point of the first swallowing for both free-sided chewing and unilateral chewing; saliva secretion; occlusal force; and contact points were measured for each patient. According to the averages of the three parameters, the patients were classified into two groups (high and low scores). There were patients with unilateral and bilateral biting at both groups. The amount of remaining coarse particles immediately prior to the first swallowing was evaluated at both groups. The patients of free-sided chewing presented fewer numbers of chewing cycles on three parameters at both groups. The amount of remaining coarse particles by free-sided chewing was significantly smaller than that of unilateral chewing on three parameters and at both groups.

Discussion

In some patients, the reduction of electric activity of masseter muscle during chewing with new dentures may result from a new occlusal condition.[5,18] The new prosthesis with adequate cusps position makes easy intercuspation and requires less strength to food comminution.[3,9,19-21] The reduction of strength activates proprioceptors in alveolar mucosa and muscular tendons that cause new patterns of force control during prosthetic intercuspation.[22]

According to the studies, new dentures wearers with occlusal equilibrium present an increase in chewing efficiency, even in a short period and without muscular adaptation.[2,9,10,12,19,20,23]

However, old denture wearers may present large particles of food after chewing as an increase and decrease in electric activity of temporal and masseter muscles, respectively. This fact may be associated to an absence of physical conditioning and muscular ability that results in inappropriate occlusal adjustment with premature contacts which destabilize and hamper mastication.[24-26]

NEW DENTURES WEARERS with occlusal equilibrium present an increase in chewing efficiency, even in a short period and without muscular adaptation.[2,9,10,12,19,20,23]

Many authors pointed to a decrease in the average of chewing cycles duration during chewing efficiency test after prostheses insertion.[4,13,17,27,28] This reduction resulted from a better occlusal equilibrium. The decrease in number of cycles occurs at the end of chewing were observed by Karkazis and Kossioni in 1998, Shikano in 1990, and Bradley in 1981 who reported a decrease of cycles during chewing due to a better food comminution.[7,11,14,16,17,29-32,34,35]

Kawazoe et al. concluded that, after a period of continuous chewing, the speed of muscle contraction decreases while its electric activity increases.[36] The patients present a greater bite force to masticate artificial foods due to the absence of cusps on the old denture.

Regarding efficiency and number of chewing cycles, most of the patients presented positive results with new prostheses due to occlusal equilibrium restoration and presence of artificial teeth cusps.

Furthermore, it is important that unsatisfactory denture wearers replace their prostheses every five years since muscular conditions, chewing efficiency, and temporomandibular articulation improve after occlusal restoration and better functional ability.

Conclusion

According to this review, the dental professional should know that a long period of complete denture wear may lead to denture instability due to a jaw's incorrect position, muscular and articular alterations, and chewing inefficiency.

Furthermore, progressive wear of artificial teeth causes reduction of occlusal vertical dimension and incorrect condylar placement that may cause difficult chewing. Dentists should guide patients regarding the use and replacement of complete dentures to improve oral health and chewing efficiency. ■■■■

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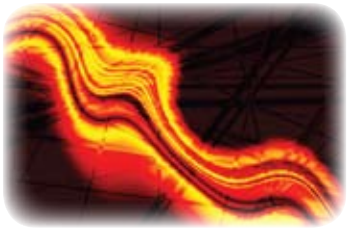

Iatrogenic Lip and Facial Burns Caused by an Overheated Surgical Instrument

YEHUDA ZADIK, DMD, MHA

ABSTRACT An unusual case of an iatrogenic superficial burn of the lip and face during third molar surgery is presented. The burn was caused by a heated surgical instrument after sterilization. Although completely healed within three weeks, the burn had a negative influence on the patient-doctor trust. The surgical team must avoid using recently sterilized instruments in an unsafe manner.

AUTHOR

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Thermal burns are documented complications associated with various medical and dental operations.[1-6] However, the majority of the reported iatrogenic burns could have been prevented by paying careful attention to this hazard by the clinic team. Peterson described abrasion of the lips and corners of the mouth as a result of the rotating shank of the bur rubbing on the soft tissue during dental extraction.[7] The author advised that when the surgeon is intent on the cutting end of the bur, the assistant should be aware of the location of the shank in relation to the soft tissues. Thermal burns, however, are not discussed as a potential complication of oral surgery operations in that textbook.[7] Reports of thermal burns related to oral surgery are scattered.[2]

This report describes a case of an iatrogenic burn resulting from inadequate cooling of a recently sterilized instrument.

Case Report

A 20-year-old healthy patient went to a dental clinic for extraction of upper and lower right third molars. The potential complications of the operation and healing period were described to the patient. After administering appropriate anesthesia that included a right inferior alveolar nerve block, the dental surgeon developed a flap around the lower tooth and asked the dental assistant for a smaller straight elevator than the one available in the extraction tray.

Accordingly, the assistant gave the dentist a recently sterilized instrument. Then, without checking its temperature, the dentist applied the elevator to the patient's mouth. As the elevator touched the intraoral tissue, the surgeon noticed that the instrument was hot. He immediately stopped the operation and then noticed that the heated instrument had made contact with, for a short time, the anesthetized lower face and lip area, inflicting

a minor superficial burn (**FIGURES 1A-B**).

The operator explained to the patient what had happened, but the patient was interested in completing the operation despite the burn event. After the removal of two teeth, the patient was medicated by oral paracetamol-propoxyphene HCl (Teva, Petah-Tikva, Israel) 500 mg q.i.d., 0.12 percent chlorhexidine (Taro, Jerusalem, Israel) b.i.d. mouthwash, along with a topical application of Vaseline Intensive Care lotion (Lever, Haifa, Israel) q.i.d.

Three days later, the patient reported his displeasure because of the facial lesion (**FIGURES 2A-B**) and complained that the intensity of the burn pain was greater than the intensity of pain from the intraoral extraction sites. The patient rated the intensity of the pain as 9 on a 1-to-10 visual analog scale (VAS) (with "10" as the most severe). One week after the event (**FIGURE 3**), the patient was referred to a plastic surgeon for completing the follow-up.

The plastic surgeon reported the burn lesion, as well as the intraoral extraction sites, was uneventful and completely healed within three weeks. Unfortunately, the patient developed distrust toward the clinic team as the healing process progressed. Although a lawsuit did not happen, the patient had threatened to sue the dental team for the mishap. The patient has not returned to the dental clinic since then even though he needed further dental and surgical treatments.

Discussion

Superficial burns (also known as first-degree burns), caused by very short flashes (flame exposure), are limited to the epidermis layer and are characterized by a dry and red appearance as well as pain. This type of burn usually heals without scarring. From the six "Cs" (clothing, cooling, cleaning, chemoprophylaxis, covering, and comforting) for treating burn wounds, only comforting (pain relief) was relevant in the present case. Superficial burns require neither infection prophylaxis nor wound dressings. Use of a skin lubricant is sufficient. Moreover, because of its relative simplicity, the extent of a superficial burn does not need to be estimated (by a "rule of nines" or other methods).[8]

The first rule of medicine, *Primum non nocere* ("First do no harm") was violated in this case with negative consequences to the trust between the patient and the doctor. Despite constant reassurance, the patient lost his confidence in the clinic team and eventually did not return to the clinic for completion of his planned treatment. Zinman reported a case of a lawsuit by a young student who was burned in her lower lip owing to overheated handpiece during endodontics. That lawsuit was settled for $280,000.[7] Moreover, beside the damage to the patient, the iatrogenic accident caused the operator and his assistant unnecessary stress and anxiety.

The burn could have been prevented by allowing an appropriate cooling period for instruments after sterilization before their use.

FIGURE 1A. Extraoral view of the patient several minutes after the burning event.

FIGURE 1B. Intraoral view of the patient several minutes after the burning event.

FIGURE 2A. Extraoral view of the patient three days post event.

FIGURE 2B. Intraoral view of the patient three days post event.

FIGURE 3. Extraoral view of the patient one week post event. The patient did not allow additional pictures to be taken.

This paper documented a case in which a relatively simple superficial burn healed within a short period but had a negative influence on the patient-physician trust. The dental and surgical teams must make every effort to prevent accidents of this type. ■■■■

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Winners of the 2008 Table Clinic Competition

Each year, the California Dental Association invites dental, dental hygiene and dental assisting students and military residents from across the state to enter the Table Clinic Competition at the Anaheim Scientific Session. The first-place finishers in each category receive cash awards and an invitation to write an abstract of their work to appear in the *Journal of the California Dental Association*.

CLINICAL DENTAL STUDENT WINNER

The CDA Foundation awarded multiple scholarships, totaling $1,750 to the first-, second- and third-place winners of the Dental Assisting Table Clinical Competition. Following are the winners of the 2008 table clinic competition.

Third-year dental student Rita Chuang is ecstatic at winning first place, clinical category, during the annual Spring Scientific Session table clinics. Chuang, flanked by Dr. Anthony Perez, left, and Dr. Brian Scott, attends the University of Southern California School of Dentistry.

Late Maxillary Protraction: Novel Treatment Modality for Cleft Lip and Palate Patients

Rita Y. Chuang, Alex Alcaraz, and Stephen L-K Yen, University of Southern California, School of Dentistry

Cleft lip and palate, CLP, is the most common craniofacial birth defect, occurring in 1/700 live births in the United States.

OBJECTIVE: To evaluate the effectiveness of a maxillary orthopedic protraction technique developed at Children's Hospital, Los Angeles, as a nonsurgical alternative to orthognathic surgery to treat maxillary hypoplasia in CLP patient population.

METHODS: Twenty-eight patients with maxillary hypoplasia received treatment using the protraction technique. The alternating rapid maxillary expansion and constriction consisted of seven days of expansion followed by seven days of constriction, administered over eight weeks to achieve overcorrection of negative overjet.

After sutural loosening, patients received class III elastics with reverse pull headgear treatment at night. The control group of 26 CLP patients completed pubertal growth before Lefort I surgery. Lateral cephalometric were taken at three timepoints (pre-, immediately after, and six-months postprotraction) for analysis of maxillary length, mandibular length, rotation of the occlusal plane, and incisor positions. Soft tissue results were compared between postprotraction and post-LeFort 1 CLP patients.

RESULTS: In the control group, the class III malocclusion did not self-correct during adolescent growth. In the protraction group, the technique corrected class III

malocclusions ranging from 3-12 mm in 24 patients as measured by T2. The Cl III correction was attained by a combination of maxillary advancement, mandibular incisor uprighting, maxillary incisors proclination, and counterclockwise occlusal-plane rotation. The soft tissue change in nasolabial angle was comparable to those observed in LeFort 1 maxillary surgery.

CONCLUSION: The protraction technique demonstrates significant potential as an effective nonsurgical treatment to correct the maxillary hypoplasia in cleft lip patients during adolescent growth.

TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE CONTACT Rita Y. Chuang at justforPBL@gmail.com.

SCIENTIFIC DENTAL STUDENT WINNER

Drs. Anthony Perez and Brian Scott take a moment with Richard Rauth, who attends the University of California, Los Angeles, School of Dentistry. Rauth, who expects to graduate next June with a DDS, MS, presented a portion of his master's research at the table clinic competition, scientific category.

Engineered M180ki Mouse Enamel: Simply Hard

R.J. Rauth, University of California, Los Angeles, School of Dentistry; Y. Lei, D. Zhu, M.L. Paine, and M.L. Snead, University of Southern California, School of Dentistry; and S.N. White, PhD, MS, MA, University of California, Los Angeles, School of Dentistry

INTRODUCTION: Enamel formation is based upon a preassembled protein matrix that controls the mineral habitat, creating a ceramic composite with unique material properties that allow it to last a lifetime without renewal. Ameloblast cells synthesize enamel matrix proteins, with amelogenin being the most abundant protein that undergoes self-assembly to form nanospheres. Alternative splicing creates amelogenins of different lengths and potential functions. Although many tooth formation genes and proteins have been identified, their relations to mechanical function are still largely unknown.

OBJECTIVE: A knock-in approach was used to engineer enamel produced from a single amelogenin isoform; the authors measured the consequence of this simplified design on enamel hardness and toughness.

METHODS: Genetic M180KI mice were created and verified. Vickers micro-indentations were made in enamel and dentin. Ten repetitions per tooth were averaged for 10 teeth in each group; means and SDs were calculated. Microscopy was used to measure microstructure. Data were analyzed by T-tests.

RESULTS: Reducing amelogenin isoform complexity by over 1 order of magnitude, to only the M180 amelogenin protein, produced enamel that was significantly harder, 7 percent ($p=0.01$), but also significantly ($p<0.001$), 21 percent, less tough, than wild type enamel. Microstructural organization was indistinguishable between wild type and transgenic enamel and dentin. Dentin hardness did not differ between the animal types ($p=0.4$), suggesting that the amelogenin M180 isoform alone was sufficient for any epithelial-mesenchymal signaling required for dentin formation.

CONCLUSION: A marked reduction in the enamel matrix protein complexity produced an engineered enamel with unaltered architecture and acceptable material properties.

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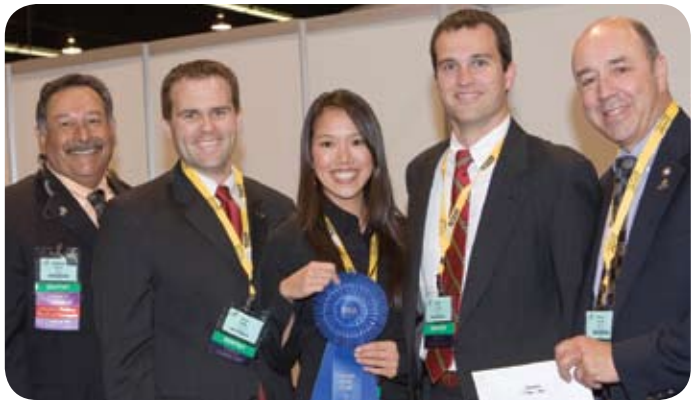
COMMUNITY/EDUCATION WINNERS



Loma Linda University's Ryan Falke, Sue Park, and Brian Evans took the blue ribbon in the Community/ Education category. They are congratulated by Dr. Anthony Perez, far left and Dr. Brian Scott.

Computer-aided Diagnosis of Oral Pathology

Brian Evans, Sue Park, and Ryan Falke, Loma Linda University

BACKGROUND: The use of computer-assisted diagnostic software may be effective in reducing clinician time and accuracy in diagnosing presenting problems.

METHODS: An experimental design was used to investigate the usefulness of computer-assisted diagnostic software to diagnose oral pathology. Participations (N=34) were recruited through convenience sampling. The group was given four patient vignettes from which they created a differential diagnosis, which were recorded for time and accuracy. The lesions were presented in a PowerPoint presentation so every participant had two minutes to diagnose. Accuracy was determined by grading each differential diagnosis and looking if the actual lesion was in the differential. Participants were also polled to find out if they felt the computer program was effective, if it was easy to use, and if they preferred using the program over a book.

RESULTS: From the results of the test the authors found that the majority of the lesions were correctly placed within the top three lesions of the differential diagnosis in more than 80 percent of the participants tested. In the participant survey, 64 percent reported they preferred using the CADOP program over a book for differential diagnosis with 21 percent reporting neutral over a book or CADOP.

Of the participants surveyed, 60 percent said they felt that the computer program was an effective tool for creating a differential diagnosis with 15 percent stating they were neutral if it was effective or not. Finally, 73 percent felt the CADOP program was easy to use with 15 percent reporting neutrality in the matter.

CONCLUSIONS: The results suggest that the CADOP program is effective tool for oral diagnosis. Survey results showed that CADOP is an effective and easy way to create a differential diagnosis. Dental professionals have a responsibility to provide efficient dental care to the patients that includes a timely and accurate diagnosis. Computer-assisted diagnostic software may be helpful for a working practitioner or dentists in training to fulfill this responsibility.

TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE CONTACT Brian Evans at bevans@llu.edu.

MILITARY — PUBLIC VOTE WINNER

Winning the Military/ Public vote category is Matthew Avrit, DMD, far right, as Drs. Gary Ackerman and Anthony Perez look on.

Maximizing Anterior Implant Esthetics

Matthew Avrit, DMD

ABSTRACT: Maximizing anterior implant esthetics is a multifaceted approach, involving multiple steps beginning before the extraction until the final delivery of the prosthesis.

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RDH STUDENT WINNERS

First-place finishers in the dental hygiene category Laura Zahorik, second from left, and Alison Corwin, proudly show their winning table clinic to Dr. Anthony Perez, far left, and Dr. Brian Scott.

Herbal Supplements: To Bleed or Not To Bleed?

Alison Corwin and Laura Zahorik, West Los Angeles College

BACKGROUND: With the growing popularity of herbal supplement use, concerns arise when used alone or in conjunction with other medications. According to research, the majority of health care practitioners and consumers are unaware of the potential side effects of commonly used herbal supplements.

METHODS: A literature review was conducted using dental and medical professional journals.

RESULTS: Herbal supplements used in conjunction with analgesics, nonsteroidal anti-inflammatory drugs, and commonly prescribed medications such as anticoagulants and antidepressants can cause oral and systemic effects. A thorough medical and dental history is necessary to prevent possible drug interactions. Modification of the dental treatment plan may be necessary with patients currently taking herbal supplements.

CONCLUSION: Dental professionals play a key role in the assessment and prevention of complications associated with the use of herbal supplements.

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RDA STUDENT WINNERS

Dr. Brian Scott congratulates the first-place winners of the dental assisting table clinic competition. The team members (in alphabetical order) are: Lorena Cairo, Hayley Campbell, Shannon Hewko, and Cindy Salazar, all of Citrus Community College.

Natural Sugar vs. Artificial Sugar

Cindy Salazar, Hayley Campbell, Shannon Hewko, and Lorena Cairo, Citrus Community College

To determine whether artificial sugar would produce the same amount of bacterial activity as natural sugar, two members of the group swished 2 ounces of water with dissolved sugar for one minute. After 20 minutes, a sample from the maxillary molars and the mandibular anteriors was taken and placed in a sterile Petri dish that contained agar.

Four types of sugars were tested: two natural and two chemically processed. The samples were incubated for five days.

The results showed that natural sugar produced significantly more bacteria than artificial sugar.

TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE CONTACT Cindy Salazar at salacindy@gmail.com.

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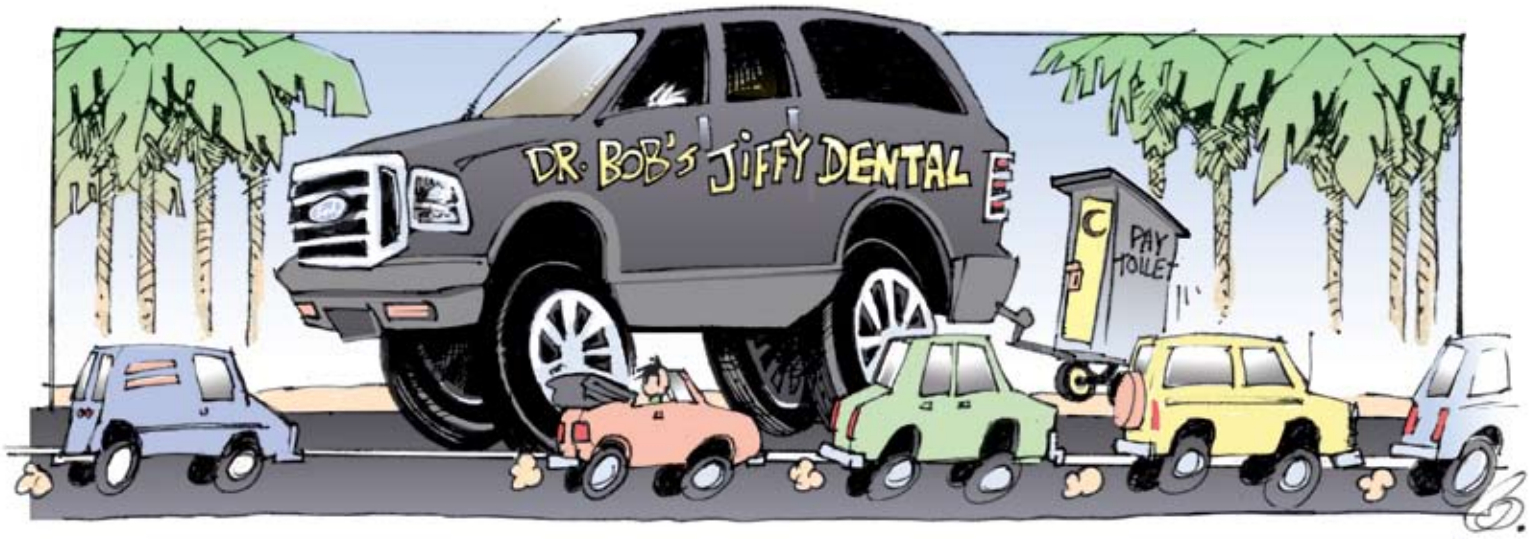
Cha-ching! Economic Solutions



Eliminate staff meetings. All input other than your own is patently biased.

Robert E. Horseman, DDS

ILLUSTRATION BY CHARLIE O. HAYWARD

"If you would know what the Lord God thinks of money, you have only to look at those to whom he gives it."

— Maurcie Baring, novelist and critic

Open to the financial section of any major news source, with the possible exception of the *National Enquirer*, and it will become quite clear, even if you lack the business acumen of the late Archie Bunker, that the economy is in the "terlet."

One of America's top corporations in terms of brilliant executive decisions is the Ford Motor Company. Its introduction of the Edsel in 1957 attracted worldwide attention, quickly supplanting America's love affair with the 1954 Nash Metropolitan. This placed the company's executives in pole position for the "What Were They Thinking?" award, not to be challenged until Pontiac buoyantly offered the spectacularly ugly Aztek in 2000. Later, when Ford rebounded with the SUV Excursion as the largest American vehicle to feature wheels taller than an 11-year-old child instead of the traditional tank treads, was that leadership was reconfirmed.

How is it then that Ford reports losses of $800 billion dollars in the first fiscal quarter, $69 bazillion dollars in the second quarter, sells off its Volvo and Maserati subsidiaries and still remains a viable corporate entity? Easy: A hostile takeover of Tonka Trucks and then outsourcing all actual manufacturing to Third World countries. Followed by downsizing the working staff to retain only the corporate jet pilots and executive washroom attendants, the upper echelon is able to maintain, even increase, its annual bonuses and stock options.

If big corporate honchos wearing suits more costly than your monthly gross can do it, you can, too. As CEO of your dental office, you need to tighten up

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DR. BOB, CONTINUED FROM 714

all aspects of your practice. Follow these essential steps to financial security:

■ Eliminate staff meetings. All input other than your own is patently biased. If you need suggestions how to conduct your affairs, you can get it at home from familial sources, including the dog.

■ Recognize that dentistry is evolving from a health care profession to a salvage industry dedicated to baby boomers who demand more than restorative procedures. Therapy involving Botox, massage of areas remote from the mouth, applications of very white porcelain to 60-year-old teeth, and employment of an esthetician are features of the current atmosphere. Read your dental magazines that arrive daily for confirmation.

■ Economically, upgrading your reception room makes no sense. A friendly, homelike milieu fools no one any more than a similar effort at a bus station would disguise the fact that a Greyhound behemoth wreathed in carbon monoxide lies just beyond the door. To induce the desired degree of torpor in waiting patients, an in-house pharmacy with a choice of insurance-approved hypnotics is recommended.

■ Everything in dentistry is now disposable. This started when Cooke-Waite stopped production of the syringe-holding jar with the semipermanent needle submerged in something resembling lime Kool-Aid. You are advised to issue each patient his own needle, syringe, bib, and prophy handpiece at a modest fee not to exceed 200 percent of wholesale. He can sterilize these things to any degree with which he feels comfortable. This should not be your problem; with so many scents to choose from, aromatherapy is your problem. Prophy paste is free as long as the Nu-Pro convention samples last.

■ Restrooms may be a convenience, but also a source of revenue when pay stalls are available. The same applies to vending machines for mouthwash. Your assistant can easily double as an attendant overseeing a selection of combs, towels, and a prominent bowl for tips, 30 percent of which should be hers, subject to federal and state taxes. Tap water limited to 3 cc is still an acceptable operating expense.

To induce the desired degree of torpor in waiting patients, an in-house pharmacy with a choice of insurance-approved hypnotics is recommended.

■ The manufacturers of the tanning booths will soon market the coin-operating bleaching light. Patients will be able to dial in the degree of whiteness they deem necessary to smile in public again. You should get one for each operatory in 10 years or less after you have depreciated your Cerec and digital X-ray equipment.

■ The most important member of the dental team is the management consultant. Unrestrained by ancient ethical standards, the advantages of your office should not only be saturating your own city, but those in neighboring states as well. When choosing a management person, a plus would be his or her contacts in Europe, South America, and East Asia. Just as certain celebrities must have their own hairdressers and makeup artists on call no matter where they are, you can enjoy the convenience of would-be patients coming to you. Your fee can still include the mileage cost, because money has no meaning to them, otherwise they would not wear $1,000 shoes and clutch $5,000 bug-eyed little creatures to their bosoms wherever they venture.

■ All it takes is one idea to create a competitive edge. It doesn't have to be a good idea, but different, one that attracts attention. Plastic surgery involving buttock enhancement comes to mind, but this idea is even better without your looking idiotic: mobile dentistry. Yes! Nobody likes going to the dentist, so you go to them. If this catches on, there will soon be fleets of dentists freed from the tyranny of the stationary 8-by-10 operatory.

■ Cruise up to Santa Barbara and back in an afternoon. A competent assistant at the wheel, stopping in affluent neighborhoods along the way at upscale 7-Elevens with sit-down facilities while another assistant rings doorbells like a modern day Avon lady. Offering discount veneers and 30-second bleaching to procrastinators who wouldn't be in the old-fashioned dental office until they were experiencing intractable discomfort, it's an idea whose time has come.

Perhaps the Ford Motor Company would be interested in the development of mobile dental offices using the old, unsold Excursions if the CEOs of the various divisions were offered free dental care and we don't mention the Edsel ever again. ■■■■