OF THE CALIFORNIA DENTAL ASSOCIATION

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Dental services for individuals WITH SPECIAL HEALTH CARE NEEDS

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DEPARTMENTS

FEATURES

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A Rembrandt in the Attic

KERRY K. CARNEY, DDS

In 1996, the art exhibit titled *Body Worlds*, caused quite a stir when it opened in Japan. Over the next two years, almost 3 million visitors viewed the exhibit. The installation consisted of numerous human cadavers preserved through a "plastination" technique, which allowed the specimens to be posed in active positions and allowed easy differentiation of organ systems. Without the dermis, one could see how the human machine works in the every day environment. *Body Worlds* is an example of information as art.

Much of the controversy surrounding the exhibit stemmed from the questions about the cadavers. Who were these people? How did their bodies end up in this collection? Any experience with cadavers can produce an uneasy mix of fascination and repulsion. Anyone who has witnessed the death of a loved one knows that it is animating life that imbues the body with a presence. Once inanimate, the human body is simultaneously less than it was and more than it is. Every dental student has faced this antithesis on the first day of anatomy lab.

Anatomy is one of the oldest of sciences. Before we learned how the body worked, we learned its geography. Dissecting, mapping, and describing relationships between organ systems — these functions are the foundation of modern medicine. Rembrandt's 1632 painting, *The Anatomy Lesson of Dr. Nicolaes Tulp*, is a beautiful rendition of a dissection and an excellent example of art as information. In it, Dr. Tulp demonstrates muscle flexion and the resulting movement of the fingers to an audience of his contemporaries.

Using his media, pigments, and a flat substrate, Rembrandt was able to transmit information about the dynamic interaction of muscle and bone. Within a single static frame, he was able to represent motion. He achieved this, and conveyed the cultural norms of 17th century Holland and the personality traits of his subjects. There is so much to be learned from that single, hand-wrought image. It is a masterpiece of information.

Learning the geography of the body is like trying to find your way in a new country.

Every dental student has to spend some amount of time in the study of anatomy. (I still associate the smell of formaldehyde with September anatomy labs.) There are many aspects to the study of anatomy. Learning the geography of the body is like trying to find your way in a new country. You can have the map in front of you; but, without the proper reference points, it is easy to mistakenly think you are in an entirely different location. The human body is a network of integrated systems. To understand all aspects of head and neck anatomy, it must be considered within the context of the whole body.

Today's anatomy class has changed. It has to share precious curriculum time with other emerging sciences. When Dr. Tulp was dissecting in the 17th century in Amsterdam, there were no classes on immunology to compete for student attention. Along with more competition for academic exposure, the very nature of dissection and display has drastically changed over time.

Soon, there will be no formaldehyde smell associated with anatomy labs. There will be no cadavers and no scalpels. The era of virtual dissection and 3-D display is beginning.

Long before I visited Disneyland in person, I visited it virtually with the aid of a View-Master. The View-Master stereoscope was one of those technological breakthroughs that initially held great promise for its military applications, but today has since devolved into part of the Fisher-Price holdings. Invented by William Gruber, it made 3-D viewing child's play. In 1948, Dr. David Bassett recognized the View-Master's potential for transporting the anatomy student into his lab at Stanford University. Not only was Dr. Bassett recognized for his incredibly precise dissections, he also was famous for perfecting a means of fixing and differentiating human tissues thereby making them much easier to visualize.

For more than 17 years, Bassett and Gruber collaborated to produce an astounding collection of more than 1,500 stereoscopic views comprising an atlas of human anatomy. Though wildly popular when they were introduced in 1962, the View-Master reels languished and eventually were all but forgotten.

Dr. Paul Brown, a Bay Area endodontist, came across the dusty volumes of View-Master reels in the anatomy lab at

Stanford. Recognizing the quality of the films and subjects, he and his colleagues have used NASA software to digitize the Bassett collection and turn it into a Google Earth version of the human body. Their digital atlas has preserved Dr. Bassett's exquisite dissections and translated them into a more interactive, educational tool. Like *Body Worlds*, the Bassett collection offers up a visual presentation of astounding complexity. Layer after layer of the human body is dissected and displayed. Notes on origin, insertion, innervations, and function are all available with the click of a mouse. It is the human body's "Missing Manual."

The digital atlas has the potential to illustrate human anatomy to students all around the globe at all levels of sophistication. We will be able to acquire images to help communicate complex anatomical relationships to our patients. The iPhone application will bring the Bassett collection to a populous never dreamed of by Bassett or Gruber.

Information can be the simple transmission of a fact or it can be facts organized and presented in such a manner that the information unfolds in complexity like a rose. The Bassett collection is a rediscovered masterpiece of scientific information that will see the light of day again. And like a rediscovered masterpiece of art, it will impact the lives of all those who interact with it.

Thanks to a combination of advances in three different fields — anatomy, photography, and computer software — and a serendipitous find by an inquisitive dentist, a masterpiece of information has been rescued from the attic and brought back for us to appreciate and to enrich our lives. ■■■■

Address comments, letters, and questions to the editor to kerry.carney@cda.org.

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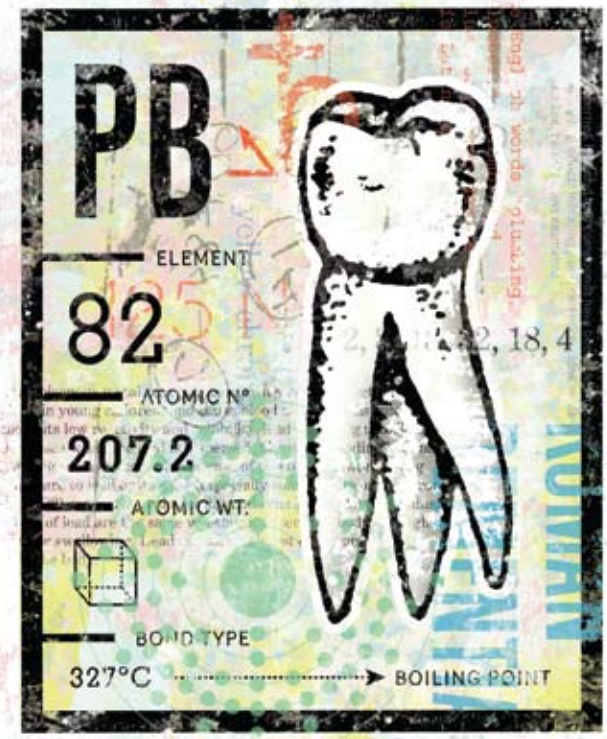

Matt Mullin

Lab Tests: No Release of Lead From Dental Crowns

Following comprehensive analyses and testing by the ADA, scientists found "no detectable amount of lead released from the 102 porcelain–metal dental crowns evaluated even under extreme laboratory testing conditions."

Scientists from the ADA Division of Science and the ADA's Paffenbarger Research Center, PRC, analyzed porcelain powders (raw materials in the making of dental crowns) from various manufacturers and more than 100 finished porcelain-metal crowns produced in foreign and domestic labs.

Figurines and plates are among a number of porcelain items where lead can be found. A natural mineral and processed for use in dentistry, Feldspathic porcelain

CONTINUES ON 370

Venus Supra

VIP 2.1, Virtual Implant Placement Software BioHorizons announces the release of a cost-effective dental implant treatment planning solution, the VIP 2.1. This virtual implant placement software will allow dentists to confidently place implants and achieve predictable esthetic results. The VIP 2.1 offers a user friendly interface and performance enhancements that will reduce the clinical challenges dentists face and provide improvement in postoperative outcomes. The software is compatible with most dental implant and scanning systems, self-process CT scan images, imports images directly into the program allowing the dentist to immediately begin treatment planning, and can easily integrate into any clinician's practice. For more information visit biohorizons.com.

Evidence-Based Dentistry Web Site Debuts

Ebd.ada.org, is the latest electronic tool by the ADA that facilitates access to a database of systematic reviews of oral health clinical information, among other things, all in one spot.

Key components of the evidence-based dentistry site feature single-page summaries of a systematic review that a dental team member should know when making treatment decisions. (Authors are practicing dentists specially trained in critical assessment of published studies.) Other components include clinical recommendations that provide evidence-based guidance on applications of current scientific evidence to patient care, according to a press release; a section where dentists can inform the ADA of their questions they've encountered while trying to treat their patients; and links to other resources including glossaries, databases, and tutorials.

"This is just a first step for ebd.ada.org," said John S. Findley, DDS, ADA president. "We will continue to gather feedback to make sure the Web site provides the most clinically relevant and current information in a concise and user friendly manner for dental and health care professionals."

A grant from the National Library of Medicine and the National Institute for Dental and Craniofacial Research (grant number Go8 LM008956), supports the Web site.

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The benefits of osteoporosis medications greatly outweigh the risks of developing osteonecrosis of the jaw, said the ADA.

Brochure to Help Osteoporosis Patients

The ADA, in collaboration with the National Osteoporosis Foundation, developed a brochure, "Osteoporosis Medications and Your Dental Health."

The pamphlet was designed to help patients "separate fact from fiction," if they were perplexed about how their medications for osteoporosis affect their oral health, according to a press release.

"Patients who take bisphosphonates for osteoporosis are encouraged to talk to their dentist so that their dentist can show them good oral hygiene practices as well as monitor their oral health," says Matthew Messina, DDS, ADA consumer adviser and a general dentist based in Ohio. "Patients should not stop taking their osteoporosis medications without speaking with their physicians."

In patients who have taken these medications, some have developed bisphosphonate-associated osteonecrosis of the jaw, according to the brochure that explains that the condition is diagnosed in individuals who have no history of radiation therapy to the neck and head area, have an area of exposed bone in the jaw that persists for more than two months, and those who take or have taken a bisphosphonate medication.

The brochures will be available in dental offices or for purchase by dentists on the ADA's Web site,ada.org.

CROWNS, CONTINUED FROM 369

contains trace elements that occur organically in divergent concentrations, based on the refining process and source.

ADA scientists, in assessing for total lead content, fully dissolved the finished crowns and powders then measured the amount of lead remaining in the solution. Finding trace amounts of the naturally occurring element, the results ranged from below detectable to 113 parts per million (ppm) in the 44 porcelain powders and an average of 46 ppm in the 102 porcelain dental crowns.

Subsequently, but more significantly, researchers also tested the finished crowns under laboratory conditions far more intense than could occur in the mouth. The results: no measureable lead escaping from the porcelain crown, even at the limit of detection at 1 ppm and under accelerated acidic conditions at higher temps.

"Based on all the information to date, both from our own testing as well as reports of other analyses, we are confident that no measurable levels of lead are released from dental crowns made from dental porcelain typical of available sources," explained Clifton Carey, PhD, administrative director, PRC, in a press release.

"Moreover," he added, "we intentionally added lead to a separate sample of dental crowns and found that even up to 500 ppm of lead levels, no measurable amount was released. This was a much higher total concentration than any laboratory-fabricated crown tested."

During the time when many products from China were under scrutiny about their lead-containing products, an Ohio woman wondered aloud about her problematic bridge that was manufactured there. In early 2008, the swirl of speculation prompted one local television station in Ohio to send her bridge to test for lead. Of the several Chinese-made dental crowns also scrutinized in the investigation, one returned as positive for lead. At the time of testing, there was no accepted standardized method to determine the content of lead in dental materials as porcelain, and whether lead in dental crowns is released in the mouth, according to a press release.

In response to the news story, the ADA went into action contacting the Food and Drug Administration, the Centers for Disease Control and Prevention, and informing the public and member dentists in an effort to make everyone aware. The ADA also devised a way to measure the concentration of lead in sample crowns it had obtained from dental labs in the United States, China, and other countries. The test also measured whether lead was released from these crowns.

The ADA has posted the results on its Web site, ada.org, as well as shared its findings with the FDA (ada.org/prof/advocacy/fda_letter_090316.pdf) and CDC (ada.org/prof/advocacy/cdc_letter_090316.pdf).

Common Sense Will Help You Hold Onto Your Dollars and Cents

With more people, even those with decent health insurance, shouldering an even bigger share of their health care costs (i.e., deductibles, out-of-pocket, and copays), *Harvard Health Letter* editors consulted with its editorial board doctors to develop 12 cost-savings moves, all of which were published in its March issue.

Among the maneuvers to keeping more greenbacks in your wallet:

- Build a stable rapport with your primary care doctor. A physician familiar with you and your history is likely to give sound advice "take care of you in context," according to the article.
- Reserve using the emergency department until after you have consulted with your doctor in person or via the phone.
- Being vigilant with taking prescribed meds, attending routine check-ups, and sticking to lifestyle changes for the better is great at managing chronic diseases and the costs associated with them.
- Allow your primary care doctor to coordinate your care, even if insurance permits you to go directly to a specialist. This helps avoid unnecessary, potentially harmful testing and treatment duplication.
- After checking with your physician, opt for generics as they generally are less expensive than brand-name drugs. Many insurers charge a higher copay for nonge-neric brands.
- Eschew ennui. Talk to your doctor about the length of time you've been tak-ing this medication, whether it still works. If it doesn't, by all means, stop taking it.
- Should your doctor order an expensive test, i.e., CT or MRI, ask why it's needed and if it will make a difference in your treatment.
- Take care of your body by exercising, eating healthful foods, getting enough zzzzzzzzzs, and not smoking. These simple habits could reduce one's risk for conditions requiring medical care.

For more information or to read the full article, go to: health.harvard.edu/newsletters/Harvard_Health_Letter/2009/March/12-ways-to-cut-health-care-costs.

Summit on Improving Access to Dental Care Held

More than 100 representatives from nonprofits, private companies and government agencies came together recently at a summit on the topic of dental care. The objective? To improve the oral health of populations in need.

"Both the private and public sectors are challenged to meet the needs of an ever-growing number of U.S. residents who cannot regularly access oral health care," said John S. Findley, DDS, ADA president. "In many ways, this is a societal issue.

"We are very pleased with the success of the summit, which will serve as a milestone toward our common goal of improving access to dental care. The ADA firmly believes that practical solutions must come from a broad spectrum of stakeholders and then be implemented first among those populations at highest risk for oral disease and with the least ability to access care. We are committed to finding common ground and shared solutions to address the oral health needs of the most vulnerable among us."

Participants at the event, convened by the ADA, ranged from health care policymakers, dental special interest groups, advocacy groups, federal agencies, and the dental industry to dental education and research communities, financing communities, including philanthropic organizations, safety net providers, third-party payers, and non-dental health care providers, as well as those in ADA leadership, dental volunteer leaders, and executive directors from state dental societies.

Stepping up the collaboration between the medical and dental communities, developing workforce strategies, strengthening dental delivery systems, and improving oral health literacy through social marketing were a few topics discussed.

"We are committed to finding common ground and shared solutions to address the oral health needs of the most vulnerable among us."

JOHN S. FINDLEY, DDS

Denmark Bans Mercury-containing Products, Excludes Dental Amalgam

Following its Scandinavian brethren, Denmark was the latest country to put the kibosh on the sale of many mercury-containing products.

Denmark's move, which is expected to take effect this summer, and pending EU approval, was purely for environmental reasons. The government, in a press release, recognized that dental amalgam needs to remain available for certain applications.

The new law in Demark pointedly excludes dental amalgam from prohibitive use in "permanent molar teeth where an amalgam filling will last longer than a plastic filling, and where there is no opportunity to keep the tooth dry, difficult cavity accessibility, particularly large cavities, or a large distance to neighboring teeth," according to a press release.

Honors

Arthur A. Dugoni, DDS, MSD, recently was awarded "Outstanding Achievement — Dental Educator," by the American Dental Education Association Gies Foundation for his vision, innovation and achievement.

"I am deeply humbled and honored to be selected (for this award)," said Dugoni. "Education has been my passion for more than 60 years. It has been a special privilege to be in dental education because educators affect all eternity, as those who are taught teach others."

He currently is president of the American Dental Association Foundation, the ADA's philanthropic branch, and has served as president of the ADA, the American Association of Dental Schools, and the California Dental Association.

Ernest Giachetti, DDS, has been recognized with the Arthur A. Dugoni School of Dentistry's 2009 Medallion of Distinction.

The award is the alumni association's highest honor and given to individuals who have made significant contributions to the Dugoni School of Dentistry, research, dental education, or the community. Giachetti has served on the school's faculty for 42 years. Additionally, he volunteers with a small group of fellow alumni to provide a homemade cioppino dinner for the dental school's first-year students each July.

Arthur A. Dugoni, DDS, MSD

Ernest Giachetti, DDS

"To be recognized by the Dugoni School for doing what I love doing is incredible," said Giachetti. "It is one of the most significant and humbling honors I've ever received." He also maintains a private dental practice in Cupertino, Calif.

High Energy Drinks Are Highly Acidic, May Contribute to Tooth Erosion

Sports drinks offer a boost all right, but not probably not the kind you want. Dental researchers at New York University recently found that longtime consumption of sports drinks may increase tooth erosion.

Because of the drinks' levels of acid, the smooth, hard enamel coating becomes eroded with repeated exposure, seeping into the bone-like material below, weakening and softening the tooth. Severe tooth damage or even tooth loss, if left untreated, can occur. One in 15 Americans are affected.

"This is the first time that the citric acid in sports drinks has been linked to erosive tooth wear," said Mark Wolff, DDS, PhD, professor and chairman of the Department of Cariology and Comprehensive Care at New York University College of Dentistry, who led the study.

Slicing a cow's tooth in half, researchers soaked one half of the specimens in water, the remaining half in a top-selling sports drink. The two halves were later compared and it was discovered that the one exposed to the sports drink showed a greater amount of softening and erosion.

"Five teeth were immersed in each drink for 75 to 90 minutes to simulate the effects of sipping on sports drinks over the course of the day," Wolff said, commenting that brushing one's teeth immediately after consuming a sports drink is not beneficial since softened enamel is susceptible to the abrasive properties of toothpaste.

"To prevent tooth erosion, consume sports drinks in moderation, and wait at least 30 minutes before brushing your teeth, to allow softened enamel to re-harden," Wolff said. "If you frequently consume sports drinks, ask your dentist if you should use an acid-neutralizing remineralizing toothpaste to help re-harden soft enamel."

Coinvestigators on the study included Michael Rice, an Arthur A. Dugoni School of Dentistry student; and Dr. Mitchell S. Pines, a clinical professor of Biomaterials and Biomimetics at the NYU College of Dentistry.

Social Interaction Difficult in Children With Cleft Lip and Palate

While children with cleft lip and palate may not experience more emotional problems than their counterparts, they are more likely to have difficulties with social interaction.

In a recent issue of *Cleft Palate — Craniofacial Journal*, a study did not find differences in emotional problems, conduct problems, or hyperactivity between a control group and a group of children with CLP. However, the study found that youths with CLP were six times more likely to report trouble with social interaction. Participants included 32 children and teens with CLP, and 34 of their counterparts as a control group. The youths ranged in age from 6 to 16.

The article, "Psychosocial Functioning and Sleep Patterns in Children and Adolescents With Cleft Lip and Palate (CLP) Compared With Healthy Controls," assessed sleep patterns, interactional competencies, and psychosocial functioning, in children with CLP.

The authors found, according to a press release:

- Increased difficulties and degraded participation in everyday life due to the presence of CLP were expected. However, impaired psychosocial functioning was not observed in every aspect of the participants' lives. And while CLP subjects showed increased impairment in the general social environment, they did not show such behavior among their peers, friends, and family.
- Sleep patterns were examined because psychological and sociocultural factors may negatively influence sleep. The data showed impaired sleep patterns associated with age, especially adolescence but not with the presence of CLP.
- With increasing age, a weekend shift to a prolonged sleep period should be observable independent of CLP, meaning that a deviation from this expected sleep pattern could show underlying psychosocial causes. This shift was observed as a function of age, but again a difference attributable to CLP was not seen.

While CLP subjects showed increased impairment in the general social environment, they did not show such behavior among their peers, friends,and family.

Additionally, the authors discovered that interactional problems amplify as the child transitions to the teen years and that skill training to improve competencies in specific social settings may be beneficial.

To read the entire article go to allenpress.com/pdf/CPCJ46.2_10.1597-07-165.pdf.

UPCOMING MEETINGS

2009	
Sept. 11-13	*CDA Presents The Art and Science of Dentistry*, San Francisco, 800-CDA-SMILE (232-7645), cda.org.
Sept. 30-Oct.-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.
2010	
April 11-17	United States Dental Tennis Association, Amelia Island Plantation, Fla., www.dentaltennis.org.
April 26-28	National Oral Health Conference, St. Louis, Mo., nationaloralhealthconference.com.
May 13-16	*CDA Presents the Art and Science of Dentistry*, Anaheim, 800-CDA-SMILE (232-7645), cda.org.
Sept. 24-26	*CDA Presents the Art and Science of Dentistry*, San Francisco, 800-CDA-SMILE (232-7645), cda.org.
Nov. 7-13	United States Dental Tennis Association, Grand Wailea, Hawaii, www.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.

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Dental Services for Individuals With Special Health Care Needs Are an Increased Reality for Practitioners in California

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

ABSTRACT A series of government and voluntary agency reports is used to compare the increasing growth of the numbers of children and adults with disabilities and special health care needs in California and the nation. Demographic data are used to emphasize the extent and impact of these special needs. The finding that dental care is the service most needed but not received by children with special needs is cited with a challenge to the profession.

AUTHORS

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In a previous presentation in the *Journal of the California Dental Association*, the authors explored the reality that dental care for individuals with developmental disabilities is expensive, but needed.[1] That paper was followed by an article with the results from the 2000 Census that, nationally, "... more than 2.6 million U.S. children between the ages of 5 and 15 ... 5.8 percent in that population group had one or more disabilities, including almost 300,000 children in California."[2]

In that manuscript, the authors detailed the number of children with disabilities in the various cities, metropolitan areas, and congressional districts in California in an effort to increase awareness of the extent of the problem. The authors challenged dental practitioners to meet the oral health needs of this population but recognized the fact that at the time, "... during their predoctoral education, current dental school graduates (did) not gain the necessary expertise to treat the special needs patients."[2-4] The recent modification of dental school accreditation standards, which requires that, "Graduates must be competent in assessing the treatment needs of patients with special needs" is but one of many steps to provide the needed care.[5]

Note: The Commission on Dental Accreditation defines "patients with special needs" 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."[5]

The term "assessing" does not mean actual treatment but just an evaluation. The postdoctoral general dentistry programs maintain the same definition for patients with special needs, but go a step further in their competency statement. The postdoctoral general dentistry programs (AEGD/GPR) list: "... assess, diagnose, and plan for the provision of multidisciplinary oral health care for a wide variety of patients including patients with special needs."[6]

Increasing Numbers

A series of recent reports from government and voluntary agencies provides revised estimates of the increasing number of individuals with disabilities throughout the country and in California, as well as the continuing difficulty in securing needed services.[7-10] It is now estimated that nationally, there are 10.2 million children (13.9 percent of all noninstitutionalized children); including 964,200 in California (9.9 percent of all children in the state).[8]

In addition, there are about 50 million adults with disabilities in the country, including 4.6 million in California (19.1 percent of the adults in the state).[9]

Nationwide

Children

While the focus of a demographic review of the number of youngsters with special health care needs (SHCN) emphasizes the millions of children with a wide range of needs, it is critical that the impact on the entire family also be considered. The emotional, economic, missed school days (and the need for coverage), and social complexities, the intersibling and interparental conflicts, and the ongoing efforts to secure needed services are but some of the unimaginable day-to-day and year-to-year difficulties faced by households in which a child with SHCN resides.

In 2005-06, 1 in 5 households (21.8 percent) with children had one or more youngsters with SHCN. Children with SHCN are defined as "those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition, and who also require health and related services of a type or amount beyond that required by children generally."[11]

The reality is that while numerous practitioners currently are treating many of these youngsters (many of whom who have various forms of health insurance coverage), great numbers of other children (and adults) with SHCN are unable to secure needed care because of series of factors (including, the past lack of dental school training) and the misguided perception that all children with SHCN needs are beyond practitioner abilities. But more than half of the children with SHCN have any number of allergies, more than one-third have asthma.

Nevertheless, 30 percent have attention deficit disorder, and more than 1 in 10 have an intellectual disability (**TABLE 1**).

- 16.1 percent of male and 11.6 percent of female children have SHCN.[8]
- The prevalence of SHCN among the child population does not vary significantly by income group; prevalence rate in each income group (from below federal poverty levels to incomes well above the poverty level) are approximately 14 percent.[8]
- The proportion of children with disabilities increases with age, from 8.8 percent of children less than 6 years old, to 16 percent in the 6-11 year group, and 16.8 percent in the 12-17 years. Some of this increase in the early years may be associated with the recognition of the need for special care as chil-

TABLE 1

Percent of U.S. Children With Special Health Needs Who Have These Selected Conditions: 2005-06[8]

	Percent
Allergies	53.0%
Asthma	38.8
Attention deficit disorder/Attention deficit hyperactivity disorder	29.8
Depression, anxiety, or other emotional problems	21.1
Migraine or frequent headaches	15.1
Intellectual disability	11.4
Autism/autism spectrum disorder	5.4
Joint problems	4.3
Seizure disorder	3.5
Heart problems	3.5
Blood problems	2.3
Cerebral palsy	1.9
Diabetes	1.6
Down syndrome	1.0
Muscular dystrophy	0.3
Cystic fibrosis	0.3

dren enter their first school years.[8]

■ The prevalence of children with SHCN is highest among multiracial children, 18 percent; followed by non-Hispanic whites, 15.5 percent; non-Hispanic blacks, 15 percent; American Indian/Alaska Native, 14.5 percent; and Native Hawaiian/Pacific Islander children, 11.5 percent. The prevalence rate is lowest among Hispanic children, 8.3 percent, and Asian children, 6.3 percent.[8]

Adults

The prevalence rate of the 50 million adults with disabilities increases with age. The median prevalence rate by state increases from 12.3 percent for young adults between 18 and 44 years, to 23.6 percent for the 45-64 age group, and 32.7 percent for the 65+ population.[9] Within two decades, 1 in 5 U.S. residents (about 70 million individuals) will be 65 years and older. One in 4 will be 65 year or older in six states: Florida, Maine, Montana, New Mexico, North Dakota, and Wyoming.[12]

If the current estimate prevails (about one-third of the 65 and older population has one or more disabilities), then there needs to be preparation for almost 24 million seniors with disabilities (plus the current and next generations of youngsters with special needs).[9]

TABLE 2

The Proportion of Children in California and Countywide by Selected Demographic Characteristics, Health Insurance Coverage and Access to Health Services: 2005-06[8]

	California	National
Children with special health care needs	9.9%	13.9%
AGE		
0-5 years	5.6	8.8
6-11	11.7	16.0
12-17	12.4	16.8
GENDER		
Male	11.7	16.1
Female	8.1	11.6
POVERTY LEVEL		
0-99% federal poverty level	6.9	13.9
100-199% federal poverty level	9.8	14.0
200-399 federal poverty level	10.9	13.6
400% federal poverty level-plus	11.4	14.0
HISPANIC ORIGIN AND RACE		
Non-Hispanic white	13.9	15.5
Non-Hispanic black	15.1	15.0
Asian	5.2	6.3
Hispanic	6.2	8.3
Spanish-speaking household	3.7	4.6
English-speaking household	10.1	13.1
HEALTH INSURANCE COVERAGE		
No insurance some time in past year	8.0	8.8
Current insurance is inadequate	35.5	33.1
ACCESS TO CARE		
Has unmet special health care needs	17.1	16.1
Difficult to get needed referral	27.6	21.1
No usual source of care when sick, rely on emergency room	7.4	5.7

California

Although the proportion of children with SHCN in California (9.9 percent) is lower than the national average (13.9 percent), the proportion of adults with disabilities and the national average is the same (19.1 percent).

Children

On a daily basis, 1 in 4 children with SHCN are affected usually, always or a great deal; 38 percent are moderately affected by their special health care needs some of the time. More than one-third of children living in poverty, compared to 16 percent of children in families with incomes of 400 percent of poverty or more, are affected usually, always, or a great deal by their condition. Missing school days, functioning difficulties, and physical and emotional difficulties in dealing with their peers are part of the daily life of youngsters with SHCN.[8]

Compared to national prevalence rates, the proportion of children with SHCN living in California is lower in all age groups, for both male and female children, at all income levels, and among all racial and Hispanic groups (except non-Hispanic blacks, where the percentages are essentially the same.[8] The proportion of children with SHCN is

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lowest for Asian and Hispanic children at the national level and in California.

It should be noted that among Hispanics, the proportion of children with SHCN in Spanish-speaking households is one-third the rate in households that are English speaking (TABLE 2). The prevalence among English-speaking Hispanics more closely resembles that of the population as a whole. "These finds are consistent with other studies of the prevalence of health conditions among Hispanic children."[8]

Adults

Almost 1 in 10 U.S. adults with disabilities reside in California. Among adult residents, 17.7 percent of men and 20.3 percent of women have a disability.[9] The proportion of adults with disabilities in the state varies by race/ethnicity. The proportion of adults in California with a disability includes:

- 16.5 percent of Hispanics
- 21.1 percent of non-Hispanic whites
- 25.7 percent of non-Hispanic blacks

In addition, as with national data, the proportion of adults with disabilities in the state increases with age. The proportion of adults with a disability includes:

- 12.4 percent in the 18-44 year population
- 23 percent in 45-64 year age group
- 32.8 percent in the 65-plus year population

Compared to residents without a disability, a greater proportion of California adults with disabilities smoke, 23 percent versus 16 percent; are obese, 32 percent versus 20 percent; and are physically inactive, 20 percent versus 11 percent. One-third of adults with a disability report that their health is very good or excellent. Another third report their health is fair or poor. By contrast, almost two-thirds of adults without disabilities report that their health is very good or excellent.[9]

TABLE 3

Percent of Children With Special Health Care Needs With Reported Health Services Needed but Not Received: 2005-06[8]

	Percent
Preventive dental care	6.3%
Mental health care	3.7
Physical, occupational, or speech therapy	3.1
Specialty care	2.8
Other dental care	2.6
Routine preventive care	1.9
Prescription drugs	1.6
Eyeglasses/vision care	1.4

Health Insurance

The availability of health insurance coverage is the all too frequent sine qua nondeterminant of the accessibility to, and use of, health services. One of the more common first queries at the time of admission to hospitals and entrée to private practices, is the "usual" and for many, the dreaded question, "What type of health insurance do you have?"

In California, 8 percent of children with SHCN (compared to 8.8 percent nationally) had no health insurance at some time in the past years.[8] The inadequacy of current insurance was reported for 35.5 percent of California children with SHCN, compared to 33.1 percent nationally (TABLE 2).

The related limited access to care is reflected in the reports that in California:

- 17 percent of children with SHCN have unmet service needs.[8]
- More than 1 in 4 (27.6 percent) of children with SHCN have a difficult time securing needed referrals for care.[8]
- 7.4 percent of children with SHCN have no usual source of care when sick and rely on emergency rooms for needed care.[8]

Among California Adults With Disabilities

- Ages 18-44 years: 22 percent (371,000 residents) lack health insurance. One-third (564,000 residents) lack a continuous source for health services.
- Ages 45-64 years: 12 percent (208,000 residents) lack health insurance; 11 percent (194,000 residents) lack a continuous source for health care.
- Ages 65-plus years: Most residents are covered by the Medicare program; however, 5 percent (60,000 residents) lack a continuous source for health care.

Type of Health Insurance

The Robert Wood Johnson Foundation 2008 study on children with SHCN and health insurance coverage provides special insight into the relationship between private and public insurance, primarily Medicaid and the State Children's Insurance Program, SCHIP, and the securing of needed services. The report "demonstrates the strength ... (of these public programs) as a safety net for kids."[10]

However, among the children with SHCN in California, 613,000 (64 percent) have private insurance, 321,000 (33 percent) have public coverage, and 30,400 (3 percent) are uninsured; compared, respectively to national levels of (60 percent, 36 percent, and 4 percent). Most significant is the finding related to the relationship between the types of insurance coverage and "delayed or foregone (care)."[10]

In California, among children with SHCN who have:

- Private insurance: 7 percent have delayed or have foregone care; 5 percent do not have a personal physician.
- Public insurance: 11.5 percent have delayed or have foregone care; 10 percent do not have a personal physician.[10]

Needed Services

The 2001 and 2005-06 National Survey of Children with Special Health Care Needs both reported that "The services most commonly reported as needed but not received was dental care ..." In the 2005-06 study, 6.3 percent of children with SHCN were reported to need preventive dental care, but did not receive it. The service with the next highest percent that was needed but not received the mental health care, 3.7 percent. In addition, 2.6 percent of children with SHCN needed but did not receive "other dental care" (**TABLE 3**).

So What Do All These Numbers and Proportions Mean?

The reality is that whether it is in California or the rest of the nation, there is an increasing number of youngsters and adults with disabilities and special health care needs who are surviving and increasingly are dependent upon community health providers for services — including dental practitioners. The repeated finding that dental care ranks highest as "the needed but not provided service" is a reflection of the often-cited inadequate educational preparation of practitioners to provide needed care, the financial constraints of the Medicaid program and its Byzantine administrative functioning, and the actual difficulties in providing the needed care.[13,14]

The change in dental and dental hygiene school accreditation requirements to prepare the next generations of practitioners to provide services is a step in the right direction. However, unless there is a dramatic increase in the number of practitioners actually providing needed services, the growing unmet dental needs of the children with SHCN will become an increasing problem as these youngsters reach their middle and older years, a time of soaring numbers of elderly with disabilities and escalating costs for all phases of health services.

Yes, thousands of dentists are providing needed care to the many individuals with special needs. But in the interim period until the arrival of the newly trained men and women, how does one explain to the 10.2 million children with special health care needs in the country (including 964,200 in California) and about 50 million adults with disabilities in the country, (including 4.6 million in California), that dental care ranks highest as "the needed but not provided service"? ■■■■

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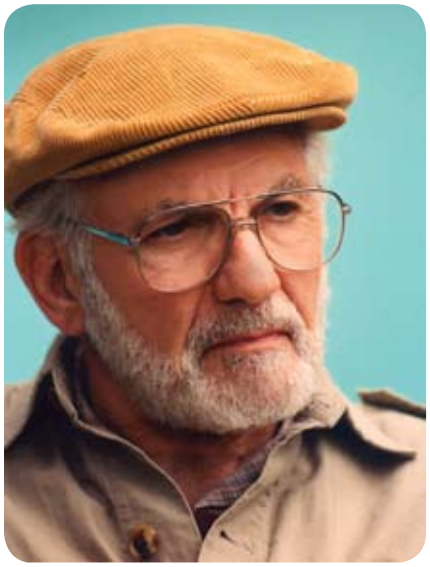

Charles M. "Charlie" Goldstein

Remembering a Contemporary Dental Legend and Exemplary Humanitarian

JACK F. CONLEY, DDS, MED, AND ALVIN B. ROSENBLUM, DDS

AUTHORS

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At a time in our society when we have a dearth of real heroes, it is this story of an individual whose lifework may be summed up in words such as "giving," "teacher," or "mentor" that gives us perspective and hope of what embodies a real hero. What's even more significant is that this hero was one of our own — a member of our profession, a member of CDA.

This tribute to Charles M. Goldstein details a life well-lived. It inspires and motivates us to look outside of ourselves and to think outside of the box. I am thankful I was personally able to call him a mentor, teacher, and colleague, and it is my hope that his message lives on for many generations to come through his mobile clinic. — Santos Cortez, Jr., DDS

Many individuals have contributed to the development of the dental profession and the stature it achieved prior to the dawn of the 21st century.

Some names stand out more than others, as their contributions and accomplishments have been the subject of many stories and historical retrospectives. Pierre Fauchard, who was considered the Father of Modern Dentistry, was perhaps the first to provide a complete scientific description of dentistry, establishing it as a distinct scientifically based profession. His work, "The Surgeon Dentist," was used to train new dentists for a century after his death and he was credited with sharing his many discoveries with his colleagues.

Horace Hayden and Chapin Harris, the founders of the Baltimore College of Dental Surgery in February 1840, the first dental college in the world, are usually part of any discussion about dental legends. Greene Vardiman Black, who became the first dean of the Northwestern University Dental School, became an

extraordinary part of the history of the profession as a result of his research and writing that included such important works as "Classification of Dental Caries" and the "Principles of Tooth Preparation."

Since the second half of the 20th century, it has been more difficult for any individual to have the same clear visibility in the historical development of the profession. In addition, a social consciousness within the dental profession has led to some new pathways for recognition that must be acknowledged. In response to the nationwide and statewide need for improvement of the oral health of underserved populations, there has been significant support from the organized profession and from individual dentists.

Given this background, there has been one modern-day dental pioneer who quietly contributed to, as well as spearheaded some of, this change, not in just the past decade when it has become more visible, but for most of the past four decades. Those who were involved in his efforts or touched by his efforts would agree that the impact of his work and his persona have been legendary, even though his accomplishments have not been widely recognized beyond the immediate sphere of his activities. That was not unusual for individuals who go quietly about their business of helping and educating others.

His name, simply, was "Charlie." Charles Meyer Goldstein was 87 when he passed away, leaving behind several generations of dentist and health care colleagues whom he had taught, mentored, or befriended. He had also touched the lives of at least a few generations of children for whom he either improved access to care, or to whom he personally provided treatment through his humanitarian efforts dating back almost 40 years.

It is important to remember Charlie's service efforts, as they addressed an important facet of the dental profession's increased responsibility to society, providing oral health education and dental treatment to those with little or no access to care. He did this in a variety of ways, always characterized by selfless service to others, despite his devotion to his family.

Perhaps the vehicle that provided the initial momentum for what would become his tireless humanitarian effort was his interest in education. In the spirit of Fauchard, his love of teaching what he knew to others probably led to his first faculty appointment at the University of Southern California's School of Dentistry in 1959. What really ignited this superlative career came in 1970 when he was appointed director of the new USC Mobile Dental Clinic. His former students, many of whom would later become his colleagues and his associates, marveled at his lifelong love for the mobile clinic and the mentoring and the professional relationships that Charlie provided.

> "I URGE YOU to not overtreat. If it isn't broken, don't fix it. No restoration looks as natural as a sound beautiful tooth."

In the final analysis, he was a superb mentor. His advice and guidance to students and colleagues covered many important personal beliefs, from an uncompromising commitment to family, to service to the underserved. A few examples of how he conducted his practice and lived his life include, "I urge you to not overtreat. If it isn't broken, don't fix it. No restoration looks as natural as a sound beautiful tooth. Please don't sell dentistry; rather, inform and educate so that a patient understands the benefits and risks of treatment. Be a lifelong learner. You can never know it all. One of the best ways to learn is to teach."

One current student, like many USC dental graduates who had come before him, after completing two community rotations and a mobile clinic rotation in which he had numerous experiences treating children, wrote an unsolicited statement praising his mobile clinic experience in comparison with the others. He specifically referred to his experience as "Charlie Goldstein's Mobile Clinic." He went on to say "without him and the tradition he kept alive, I may have not felt such passion in my future goals. His legend and the fine ambassadors of his mission (a reference to faculty, some of whom had been students of Charlie) shall forever keep this fire burning."

In addition to providing an outstanding educational experience for the dental students, he did everything possible to advance the outreach and service to the communities the mobile clinic served. He raised monetary support for the clinic facilities and services, he personally provided dental care, and, of course, his mentoring of his young dentists is always mentioned with reverence and appreciation. Beyond that, he did most everything else associated with keeping the mobile clinic operating at a level of efficiency. Longtime associate Dr. Alvin Rosenblum said, "I've got photographs of him pushing a broom, hauling equipment; he really set an example!"

As the years passed, Charlie designed mobile dental equipment, from dental units to chairs, to facilitate not only mobility of operation, but the quality of care. He also was instrumental in designing the

vehicles that would house and transport the equipment. As one associate commented, "He was always thinking about ways to make it (the mobile clinic) better."

In summary, he was involved in every facet of that program as it traveled throughout many underserved areas in counties throughout California from north to south, east to west. Many a day was spent in the San Joaquin Valley providing care for the children of farm workers.

Charlie's humanitarian efforts reached well beyond the mobile clinic, although his impact may have been felt most strongly there. He also contributed to the establishment of a number of other important facilities, including the School of Dentistry at Tel Aviv University in the 1980s after he had provided care to Palestinian children in the 1970s. Closer to home, he helped establish Synanon in Santa Monica, dentistry at the Los Angeles Free Clinic, a dental clinic for Native Americans, and a USC-staffed dental clinic at the Union Rescue Mission in downtown Los Angeles.

In the latter, he was overseeing the clinic operation that included supervision of staff, faculty, and students; and, in addition, providing patient care, well into his 80s. In fact, his faculty role, which included his work with the Rescue Mission clinic and the mobile clinic, continued until his health deteriorated in the months before his death.

As his health continued to decline, this period in his life provided him the time to develop his "dream," an effort to create the "Charlie Goldstein USC Mobile Clinic Fund," and raise a $4 million endowment to fund his plan to keep the mobile clinic functioning in perpetuity.

Charlie shared his plan with his colleagues and friends. He figured that if 1,000 dentists would contribute the net receipts of approximately $1,000 from the provision of a crown, an endo treatment, and an extraction each year for four years, the endowment would be fully funded by the year 2012. It is a goal that his many friends and close colleagues have committed to help achieve in his name. Anyone who wishes to join them and help to keep his dream and his legacy alive, can contact the USC Dental Development Office.

Charlie Goldstein really was a visionary. While many of his efforts had focused on providing care to children in underserved communities, the growing geriatric population also had caught his attention at an early time. According to longtime colleague, Roseann Mul-

> "WITHOUT HIM and the tradition he kept alive, I may have not felt such passion in my future goals."

ligan, DDS, "As is typical of Charlie, he recognized long before anyone else did, a societal issue, in this case the aging of the population and their growing need for oral health care." Her statement was recalling a conversation she had with Charlie in the fall of 1981.

"Charlie said that the curriculum did not provide training in geriatric dentistry that would prepare its dental and hygiene students to care for increasing numbers of elders. He said all of this long before the aging of our societies was recognized by the experts." She noted that this led Charlie to ask her to join him in developing a geriatric dentistry program at the USC School of Dentistry.

According to Rosenblum, Charlie Goldstein "was a born caregiver." An important reminder of his legendary contributions was the presentation by the California Dental Association Dental Foundation of its inaugural Humanitarian Award the day before he passed away. In making the presentation, Dr. Bruce Toy, chairman of the Foundation remarked, "He represented the best of professional dentistry through his selfless service, leadership, and commitment to helping improve the quality of life and oral health of thousands of children. His endless compassion will live on through the lives he has touched."

A few years ago, he presented his thoughts on the meaning of "success." He stated that his favorite words on the subject were penned by Ralph Waldo Emerson:

"*To laugh often and much;*

To win the respect of intelligent people and the affection of children;

To earn the appreciation of honest critics and endure the betrayal of false friends;

To appreciate beauty;

To find the best in others;

To leave the world a bit better, whether a healthy child, a garden patch, or a redeemed social condition;

To know even one life has breathed easier because you have lived."

Charlie Goldstein was an outstanding human being and a rare professional. He was a fine dentist who possessed good organizational and practice management skills. He was creative and, above all, he was giving. When all of these attributes and skills are combined, you have an individual who was an exemplary humanitarian who should be remembered forever as a contemporary dental legend. ■■■■

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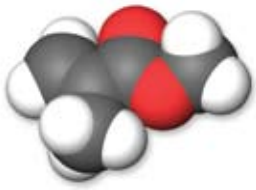

Monomer Systems for Dental Composites and Their Future: A Review

GAURAV VASUDEVA, MDS

ABSTRACT This review discusses the history of monomers used in resin composites, highlights recent and ongoing research reported in the field of dental monomer systems, and future development. The main deficiencies of current resin composites are polymerization shrinkage and insufficient wear resistance under high masticatory forces. The problem has been approached with the synthesis of potentially low-shrinking/nonshrinking resin composites. Monomer systems have been formulated that improve the degree of conversion and mechanical properties.

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Dental resin composites comprise a blend of hard, inorganic particles bound together by a soft, resin matrix, and generally encompass three main components: the resin matrix comprising: (1) a monomer system, (a) an initiator system for free radical polymerization, and (b) stabilizers for maximizing the storage stability of the uncured resin composite and the chemical stability of the cured resin composite; (2) the inorganic filler consisting of particulates such as glass, quartz, and/or fused silica; and (3) the coupling agent, usually an organo-silane that chemically bonds the reinforcing filler to the resin matrix.

Obviously, the properties, and hence the performance of resin composites, are dependent upon the three basic components of the material. Some of the properties are mainly related to the filler and the coupling agent, whereas other properties mainly stem from the resin matrix. The first group of properties includes strength, stiffness, abrasion resistance, and coefficient of thermal expansion while color stability and softening tendency can be found in the second group. A third group of properties may be identified that to a higher degree, depends on both filler and matrix. Such properties are polymerization shrinkage and water sorption.

Mechanical properties are, as stated, highly influenced by the filler and the coupling agent, but also the organic matrix plays a significant role for strength, stiffness, and abrasion resistance.

Judging from the formulation changes that have been reflected in commercial resin composites over the years, the development of these materials has

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mainly focused on mechanisms of initiation and filler technology, whereas the resin monomer component has remained essentially unchanged. Thus, to this day, the majority of commercial resin composites contain a monomer system based on BisGMA or variations thereof. This fact may indicate that for several years following the development of BisGMA, other components of resin composites than the monomer system were more in need of optimization. However, recent research in the field of dental monomers has produced several results that may be expected to appear in commercial resin composites in the future.

Organic Resin Matrix

The organic resin matrix is a high molecular weight monomer such as bisphenol A glycidyl methacrylate (bis-GMA) or urethane dimethacrylate. Bis-GMA, which stands for 2,2-bis[4(2-hydroxy-3-methacryloxypropoxy) phenyl]-propane, is an aromatic methacrylate developed by Rafael Bowen of the National Bureau of Standards in the early 1960s. Terminal methacrylate groups provide sites for free radical polymerization; it sets to a relatively rigid polymer because it has two benzene rings near its center.[1]

Two disadvantages of bis-GMA are its questionable color stability and high viscosity. High viscosity is the result of its –OH groups, which hydrogen bond. To lower the viscosity, manufacturers add low molecular weight (low viscosity) monomers like triethyleneglycol dimethacrylate (TEGDMA) and ethyleneglycol dimethacrylate (EGDMA). These reduce the bis-GMA's viscosity, increase cross-linking, and increase hardness.[2]

Another monomer frequently used as the matrix for resin composites is urethane dimethacrylate. This monomer was introduced in 1974 and is a brittle material with low viscosity. No study has shown bis-GMA-based resins to be superior to UDMA-based ones.[2]

The resin component of a cured dental resin composite is a polymeric matrix. A polymer is a large molecule built up by the repetitive bonding together of many smaller units called monomers. The process by which monomers are joined together and converted into polymers is called polymerization. Monomers used in dentistry are generally liquids, and during the process of polymerization they become converted to solids. The extent to which monomer is changed into polymer is termed the degree of conversion.[3]

MONOMERS USED in dentistry are generally liquids, and during the process of polymerization they become converted to solids.

Various monomer systems used

1. Methyl methacrylate resins
2. Epoxy resins
3. BIS-GMA resins
4. Eutectic monomer system
5. Urethane dimethacrylate resin

Methyl Methacrylate Resins

The story of the current resin monomers extends back to 1843 when J. Redtenbacher, a German chemist, discovered a new acid, to which he gave the name of acrylic acid. By 1900, methacrylic acid, as well as several of its esters including methyl methacylate, had been synthesized and polymerized. Methyl methacrylate polymerizes by an addition mechanism through the carbon-carbon double bonds to form poly (methyl methacrylate). In the late 1930s, poly was introduced for denture base resin, and a few years later for indirect filling resin. The discovery of the benzoyl peroxide-tertiary amine redox initiator-accelerator system, allowing methyl methacrylate to polymerize at ambient temperature, laid the basis for direct filling resins, which were developed in Germany during World War II.[4]

The methyl methacrylate resins turned out to be associated with significant defects, including large polymerization shrinkage, high coefficient of thermal expansion, serious discoloration, severe pulp damage, and a high incidence of secondary caries.

Epoxy Resins

Motivated by the inherent limitations of methyl methacrylate resins, American dentist R.L. Bowen, working at the National Bureau of Standards in Washington, D.C., developed other synthetic resins for use as dental filling material. Epoxy resins appeared to be worth investigating as they harden at room temperature with little shrinkage to produce an insoluble polymer.[2]

Polymerization occurs through the epoxide groups in which the ring is in a somewhat unstable condition and prone to open and combine with nucleophilic compounds. Work on the coefficient of thermal expansion, adhesion to tooth structure, and color stability gave promising results with the first dental resin composite: an epoxy resin with aggregates of fused quartz or porcelain particles. The addition of mineral fillers to direct filling resins had been proposed already in 1951 as a method of reinforcement.

Subsequently, a few indirectly placed restorations of heat-cured epoxy resin

composite showed good esthetics in the oral cavity. However, epoxy resins were given up due to slow hardening, preventing their use as a direct filling material.[1,2]

Bis-GMA Resins

In response to the impracticability of epoxy resins, Bowen, in 1956, synthesized a new monomer, initiating the era of dental resin composites. The monomer, 2,2-bis [4-(2-hydroxy-3-methacrylyl-oxypropoxy) phenyl]. Propane, resembles an epoxy resin, except that the epoxy groups are replaced by methacrylate groups. It was prepared from bisphenol A and glycidyl methacrylate, and later also from the diglycidyl ether of bisphenol A and methacrylic acid. Polymerization of the monomer, which was given the acronym BisGMA, occurs through the carbon-carbon double bonds of the two methacrylate groups.[2,5]

This bulky, difunctional monomer is superior to methyl methacrylate because of its large molecular size and chemical structure, providing lower volatility, lower polymerization shrinkage, more rapid hardening, and production of stronger and stiffer resins. The high viscosity of BisGMA is lowered by admixture with dimethacrylate monomers of a lower molecular weight to achieve a viscosity suitable for incorporating fillers. The monomers most often used as diluents for BisGMA are ethyleneglycol dimethacrylate (EGDMA) and triethyleneglycol dimethacrylate (TEGDMA).[5]

The lower the viscosity of the monomer mixture, the more filler may be incorporated into the mixture. All other things being equal, increased filler content will improve several properties of the polymerized material, e.g., strength, stiffness, and coefficient of thermal expansion. However, a dilution of BisGMA also has negative effects such as increased polymerization shrinkage, as discussed in the following.[6]

As a consequence of polymerization, resin systems shrink mainly because the formation of a macromolecular chain network from discrete monomer species involves conversion of intermolecular distances of 0.3-0.4 nm into primary, covalent bonds with lengths of about 0.15 nm. The extent of polymerization shrinkage depends, among other things, on the molecular weight and functionality of the monomers. Thus, comparing monomers of the same molecular weight, polymerization shrinkage increases when functionality increases.

THE LOWER THE viscosity of the monomer mixture, the more filler may be incorporated into the mixture.

Comparing monomers of the same functionality, polymerization shrinkage increases when molecular weight decreases. Consequently, dilution of BisGMA increases polymerization shrinkage.[6,7]

Studies on the formation of homopolymers from dimethacrylates of mono-di-tri-, and tetraethyleneglycol have shown that the reactivity of the monomers increases with increasing distance between the methacrylate groups. It follows that TEGDMA is more reactive than EGDMA. Due to favorable stereochemistry, long-chain, flexible dimethacrylates of oligoethyleneglycols have been found to exhibit relatively high degrees of conversion.[5]

Compared with the dimethacrylates EGDMA and TEGDMA, the aromatic monomer BisGMA is much more rigid. As a consequence, the degree of conversion in BisGMA and TEGDMA copolymers has been found to decrease with an increasing content of BisGMA. Despite the resultant decrease in degree of conversion, an increasing content of BisGMA does not result in reduction in strength or in hardness. This lack of correlation between conversion and hardness, or strength may be explained by the fact that the flexible TEGDMA is substituted by the much stiffer BisGMA in the polymer network.[1]

The flexibility of TEGDMA is related to the ether linkages of the molecule, giving rise to only slight barriers to freely rotate about the bonds.

The relative stiffness of BisGMA is related to the bulky, aromatic groups of the central part of the molecule, causing much larger barriers to rotate about the bond. Thus, strength, hardness and certain other mechanical properties are influenced not only by the degree of conversion but also by the nature of the monomeric subunits in the polymer. On the other hand, other properties are determined mainly by the degree of conversion.[4,7]

As polymerization proceeds, diffusion rates of propagating free radicals and unreacted dimethacrylate molecules are drastically reduced, hampering the complete conversion of methacrylate double bonds. Thus, as much as 25 percent to 50 percent of the methacrylate groups remain unreacted. Of these 25 percent to 50 percent unreacted methacrylate groups, approximately one-tenth is present as residual monomer.[4,5]

The presence of unreacted monomer or unreacted carbon-carbon double bonds has a plasticizing effect on the polymer. Thus, in contrast to resin composites of differing monomer systems, the physical properties of a given system are cor-

related with the degree of conversion. Furthermore, residual carbon-carbon unsaturation can make the polymeric matrix more susceptible to degradative reactions. These reactions can, according some authors, result in reduced color stability and wear resistance, and in the formation and release of byproducts such as formaldehyde and methacrylic acid.[4-6]

Eutectic Monomer Systems

As mentioned previously, BisGMA finds widespread use in current commercial dental resin composites. However, this monomer is not completely color stable, is too viscous for use without being thinned, and cannot be purified by distillation or by crystallization because it is a mixture of high molecular weight optical isomers. In an effort to solve the problems associated with the use of BisGMA, Bowen devised a unique monomer system based on the premise that certain isomeric crystalline dimethacrylates are capable of forming a eutectic that is liquid at room temperature.[1]

Three aromatic diesters, the bis (2-methacrylyloxyethyl) esters of phthalic (MEP), isophthalic (MEI), and terephthalic acids (MET), were synthesized and purified by recrystallization. The ternary eutectic was found to have a viscosity suitable for use in resin composites. Numerous physical properties of three experimental resin composites based on this ternary eutectic dimethacrylate were determined. It was concluded that the mechanical properties were comparable with those of BisGMA-based resin composites, and that further improvements in polymerization shrinkage and color stability were needed.[1,5]

In a clinical trial, one of the experimental resin composites was found to compare favorably with Addent 35 (3M), which was based on BisGMA. The problem of color instability stemmed from the tendency of the isomeric dimethacrylates to form yellow-tinted charge-transfer complexes with the tertiary aromatic amines commonly used as polymerization accelerators in the initiator system. It has been stated that by the use of alternative accelerators, e.g., ascorbyl palmitate, the problem of color instability is avoided allowing the formulation of excellent resin materials.[1,3]

Urethane Dimethacrylate Resins

A group of monomers that have found commercial use are the urethane dimethacrylates. The first type of urethane dimethacrylate to appear was synthesized from hydroxyalkyl methacrylates and disocyanates. These monomers have molecular weights nearly equal to that of BisGMA, but are less viscous. The most commonly used monomer of this type, 1,6-bis (methacrylyloxy–2-ethoxy–carbonylamino)-2,4,4-trimethythexan (UEDMA = UDMA), is the reaction product of 2-hydroxyethyl methacrylate and 2,4,4-trimethyl- hexamethylenediisocyanate.[3] This monomer has been used alone (e.g., Isocap, Vivadent; Isopast, Vivadent) or in combination with other monomers such as BisGMA and TEGDMA (e.g., Heliomolar, Vivadent; Estic Microfill Composite, Kulzer; Estilux Microfill Kulzer; Durafill Light-curing Composite, Kulzer).[5,8]

DIMETHACRYLATES WITH aromatic groups have been reported to produce rigid polymers, while dimethacrylates with aliphatic groups produce flexible polymers.

As mentioned previously, urethanes have also been synthesized by the reaction of the secondary hydroxyl groups of BisGMA with isocyanates to create less hydrophilic monomer systems. Thus, Nuva-Fil (L.D. Caulk) as well as ful-fil and Prisma-Fil (L.D. Caulk) were based on oligomers synthesized from BisGMA and hexamethylene diisocyanate. Another urethane dimethacrylate system was used in Fotofil (Johnson & Johnson ICI), the very first proprietary resin composite to be visible light activated.[8]

The results of in vitro studies, in which all other components than the monomer system were kept constant, indicate that resin composites based on UEDMA will have improved mechanical properties compared with resin composites based on BisGMA. Also, there are indications that higher degrees of conversion are obtainable with urethane dimethacrylates as compared with BisGMA:TEGDMA mixtures. All other things being equal, this would result in improved biocompatibility of the resin composite.[8]

Dimethacrylates with aromatic groups have been reported to produce rigid polymers, while dimethacrylates with aliphatic groups produce flexible polymers has been theorized that dimethacrylates with "hard" segments (aromatic groups) and "soft" segments (aliphatic groups) in the same molecule will result in polymers with increased toughness. For the purpose of designing such a polymer, a dimethacrylate with a polyurethane chain was synthesized from HEMA and a polyurethane diisocyanate, imprecisely described as a "polyurethane diisocyanate, imprecisely described as a polyester urethane with propylene glycol and hexanediol."[8]

The dimethacrylate, (PUDMA),

incorporated two phenylmethyl groups as hard segments and propylene glycol or polymethylene as a soft segment. When heat-cured, this homopolymer exhibited less water sorption, lower volume shrinkage, and greater deflection than did polymers of BisGMA or of TEGDMA, while maintaining acceptable flexural strength and modulus of elasticity.[7,8]

Advances in Monomer Systems

1. Nonshrinking monomer system
2. Hydrophobic monomer system
3. Anti-cariogenic and antimicrobial monomer system
4. High-strength, high-conversion monomer system

Nonshrinking Monomers

Resin systems shrink during polymerization mainly because the monomer molecules are located at van der Waals distances from one another, while in the corresponding polymer; the monomeric units are within covalent bond distance of each other. Thus, in the polymer, atoms are closer to one another than they were in the original monomer. How well monomer and polymer molecules pack, if crystals are present in either phase, can also have a large effect on shrinkage.[9,10]

Shrinkage that occurs in a cavity before the gel point while the monomer–polymer is still fluid can be partially compensated for by flow of resin composite from the free surface of the filling. This mode of compensation is not possible after gelation and, consequently, large stresses are built up in the filling. In many cases, these stresses result in adhesive failure, in which the resin composite pulls away from the cavity wall, or in cohesive failure, voids or micro cracks are produced within the resin phase.[10,11]

Providing the tooth restoration interface remains intact, polymerization shrinkage has been reported to pull the cusps of MOD cavities inward, resulting in cuspal flexure. This movement has been suggested to be responsible for postoperative sensitivity and oblique cuspal fracture. Conclusively, polymerization shrinkage is one of the main factors that determine the longevity of resin composite restorations.[10]

Thus motivated, a search was started for a nonshrinking resin system. The first approach used bicyclic compounds in ring opening polymerization. In such monomers, for every van der Waals distance converted to a covalent distance, at least two rings are opened during polymerization. Bailey reported that a variety of bicyclic monomers, including spiro orthoesters, spiro orthocarbonates, bicyclo ketal lactones, trioxabicyclooctanes and unsaturated diketals of benzoquinone, would undergo a double-ring opening with either no change in volume or an actual expansion.[9]

POLYMERIZATION shrinkage is one of the main factors that determine the longevity of resin composite restorations.

The use of spiro orthocarbonates as a component in dental resin composites resulted in a nearly volume neutral polymerization and in a doubling of the adhesive strength of the resin to etched enamel compared with a control. These advantages were obtained despite the presence of a large proportion of unreacted crystalline spiro orthocarbonate in the polymerized resin. Although these formulations showed some reductions in polymerization shrinkage when compared with the control resins, their shrinkage was still substantial.[10]

In alicyclic spiro orthocarbonates, a structure with an additional aliphatic ring is fused to the cyclic orthocarbonate rings. This spiro orthocarbonate monomer consists of four rings, two on each side of the spiro carbon. The expansion of the spiro orthocarbonate on polymerization is, as mentioned previously, attributed to a double spiro ring opening of the spiro orthocarbonate molecule, which involves the breaking of two covalent bonds to form one new bond.[9]

The expansion on homopolymerization was found to be 3.5 percent and experimental spiro orthocarbonate epoxy resins showed expansions between 0.1 percent and 0.8 percent compared with the 0.3 percent shrinkage of the epoxy resin control. Epoxy resins are suspect from a biocompatibility point of view.[10,11] A study of the mutagenicity of the experimental spiro orthocarbonate epoxy resins indicated a mutagenicity of the epoxy formulation per se, whereas the spiro orthocarbonate proved nonmutagenic. In abandoning the epoxy resins in favor of BisGMA:TEGDMA resins, the shrinkage reducing or the eliminating effect of the spiro orthocarbonate was found to be minimal.[12]

A new class of difunctional monomers, termed oxybismethacrylates, was synthesized. Oxybismethacrylates exhibit cyclopolymerization, which is a polymerization process in which nonconjugated diene monomers undergo alternating intermolecular addition and intramolecular cyclo addition. This type of reaction generally involves 1,6-dienes, which

cyclize to introduce five- and/or six-membered rings into the polymer backbone.[13]

When preliminarily evaluating these cyclopolymerizing monomers for use in dentistry, Stansbury in 1990 found a potential for developing high-conversion, low-shrinking monomers.[9] A 30 percent to 40 percent reduction in shrinkage was observed upon homopolymerization of oxybismethacrylate monomers and oligomers compared to dimethacrylates commonly used in dentistry.[14]

Depending on polymerization conditions, oxybiusmethacrylate monomers can produce either cyclopolymer exclusively or a mixture of cross-linked and cyclized polymer arising from competing 1,2- and 1,6-addition pathways. For polymerization shrinkage to be minimized, a resin must be prepared in which the monomer components can efficiently engage in the cyclopolymerization while still maintaining an adequate cross-link density in the resulting polymer. It seems that such resins with reduced, but not eliminated, polymerization shrinkage are now available in a form, which is compatible with the conventional dimethacrylate monomers used in dentistry.[15]

An in vitro biocompatibility test of oxirane/polyol dental composites and physical properties was done. It was observed that suitable oxirane/polyol formulations can be designed and optimized for development of dental composites with acceptable mechanical properties and biocompatibility. However, a leachable analysis of extracts obtained from longer incubation periods is needed before final conclusions could be drawn about the leachability of oxirane components.[16] ESPE developed other epoxy-based systems for use in dental resins.

These siloxane-based oxirane molecules are capable of cationic polymerization and produce composite materials with adequate properties for dental composites. They showed shrinkage after 60 minutes and 1.6 percent after 24 hours, which is half that of other posterior composites.[17] Farracain et al. reported that synthesis of methacrylated derivative of styrene-allyl alcohol, MSAA comonomer replaced 20 percent or more bis-GMA in a bis-GMA/TEGDMA resin composite formulation containing 62 volume percent filler and showed reduced polymerization contraction by 20 percent, presumably by facilitation molecular rearrangements to relieve stresses.[3]

STANSBURY IN 1990 found a potential for developing high-conversion, low-shrinking monomers.

Anti-cariogenic Monomer Systems

Yet another idea that could alleviate the detrimental effects of polymerization shrinkage has been a resin composite with anti-cariogenic effect. One approach has been to prevent plaque accumulation on and around resin composite fillings by the incorporation of an anti-bacterial agent into the resin matrix.[18] Different chlorhexidine compounds have been added to experimental materials, and these were found to exhibit anti-bacterial activity by the release of the chlorhexidine. However, the idea has not been used commercially, probably due to the reduction of activity with time and the deterioration of mechanical properties, which accompany the release of anti-bacterial agents.[19]

Light curable anti-bacterial, dental composite restoration materials, consisting of 80 weight percent of a strontium fluoroaluminosilicate glass dispersed in methacrylate monomers have been produced. The monomers contained 40 weight percent to 100 weight percent of a 10 weight percent chlorhexidine diacetate (CHXA) in hydroxyethylmethacrylate (HEMA) solution and 60-0 weight percent of a 50/50 mix of urethane dimethacrylate (UDMA) and triethyleneglycol dimethacrylate (TEGDMA). Both polymer and bacterial microleakage were prevented with a 90 weight percent HEMA/CHXA restoration in the bovine dentine due to swelling compensation for polymerization shrinkage in combination with anti-bacterial release.[18]

Chlorhexidine salts are available in various formulations for dental applications. Anusavice et al. tested the hypothesis that the release of chlorhexidine from a urethane dimethacrylate and triethylene glycol dimethacrylate resin system can be effectively controlled by the chlorhexidine diacetate content and pH. It was seen that the rates of release were significantly higher in pH 4 buffer, which was attributed to the increase of chlorhexidine diacetate solubility at lower pH. The higher level of filler loading reduced the degree of polymerization, leading to a greater loss of organic components and higher chlorhexidine release rates.[19]

Methacrylate copolymer systems with release of anti-microbial and anti-viral drugs have been formulated. Tallury et al. studied the release of anti-viral drug acyclovir (ACY) and anti-bacterial drug chlorhexidine diacetate (CDA) from synthesized copolymers of ethyl methacrylate and hexyl methacrylate of different molecular weights. They found

that varying the copolymer molecular weight, as well as the drug concentration, alters the drug release rates, and thus it is possible to control the drug release rates to a desired value.[20]

With the purpose of developing a nonreleasing anti-bacterial resin composite, new monomers with anti-bacterial properties have been synthesized. The most promising monomer, 12-methacryloyloxydodecylpyridinium bromide i.e., MDPB, is a compound of the anti-bacterial agent dodecylpyridinium bromide and a methacrylyl group. Since MDPB can copolymerize with conventional dental monomers, the anti-bacterial portion of this molecule is chemically bound to the resin matrix after curing. BisGMA-based resin composite incorporating MDPB has been shown to have inhibitory effect on surface growth of *Streptococcus mutans* without releasing the anti-bacterial component.[21,22]

Furthermore, MDPB has been found to have no adverse effect on curing or mechanical properties. However, a subsequent study has proven MDPB to have little bactericidal effect. The anti-bacterial effect of MDPB-containing resin composites is thought to be attributable mainly to an anti-adhesive activity of immobilized MDPB. As also Imazato et al. saw it, the essential question now is whether sufficient effect will be maintained once the surface is covered with acquired pellicle.[21]

MDPB, 12-methacryloyloxydodecylpyridinium bromide, was tested for its ability to inhibit the growth of organisms associated with active root caries lesions and to modify the growth characteristics of these organisms. It exhibited the potential to inhibit the growth of microbiota associated with active root caries lesions i.e., *S. mutans, S. oralis, S. salivarius, Actinomyces naeslundii, A. israelii, A. gerensceriae.*[22]

The anti-bacterial activity of an adhesive resin incorporating the anti-bacterial monomer 12-methacryloyloxydodecylpyridinium bromide (MDPB), as well as its bonding characteristics in terms of bond strength into dentin and curing ability, was investigated. The results indicated that an adhesive resin with anti-bacterial activity after curing could be produced by incorporation of MDPB without influencing bond strength or curing performance, suggesting the comprehensive bonding system including MDPB-containing primer and adhesive should be highly effective in its anti-bacterial effect before and after curing.[23]

ONE OF THE MATERIALS associated with fluoride release, fluoride uptake by adjacent enamel, and low prevalence of secondary caries was silicate cement.

Fluoride is well-documented as an anti-cariogenic agent and the beneficial effect of fluoride on the human dentition has motivated the incorporation of fluoride into a host of dental materials. One of the materials associated with fluoride release, fluoride uptake by adjacent enamel, and low prevalence of secondary caries was silicate cement.[24] In an effort to duplicate the fluoride-release behavior of silicate cement, other fluoride-containing dental materials have been developed and investigated, including cavity varnish, silver amalgam, polycarboxylate cement, glass ionomer cement, and resin composite.

Different methods have been investigated to combine fluoride with resin composite. One method incorporates fluoride as part of the filler system in the form of the nearly insoluble salt, YbF_3, (Heliomclar Radiopaque, Vivadent).[25] By other methods, fluoride is added to the resin system. Resin composite with a content of NaF has been found to release fluoride that is taken up by adjacent enamel. When NaF is added as a soluble salt, physical properties seem to be maintained, and although the amount of fluoride released is smaller than that of glass ionomer cements, the resin composite is expected to have an anti-cariogenic effect in vivo. For NaF (and YbF_3) to be released, water must diffuse through the matrix, dissolve the fluoride, and the fluoride must then diffuse out.[1,24]

According to another method, fluoride is bound to the resin matrix. For the fluoride to be released, water must diffuse into the matrix, cause a chemical change that liberates the fluoride, and then carry the fluoride out. In polymers, this fluoride-releasing principle allows the matrix to reorganize at the molecular level and thus to maintain structural integrity. One such material that has been developed is an acrylic-amine BF_3 Lewis salt that can copolymerize with BisGMA resins.[25]

Fluoride release has been reported to occur as a consequence of BF_3 separating from the amine complex and being hydrolyzed to from F-. This fluoride-containing monomer has been incorporated in a light-curing sealant for use in orthodontics (Flurobond, Ormco) and as a composite surface sealant (Optiguard, Kerr).

Another fluoride monomer that has been synthesized consists of methacrylyl fluoride. The fluoride ion is formed when the acid fluoride is hydrolyzed by water. The monomer has been used in a light-cured sealant and found to release fluo-

ride for over two years while maintaining tensile strength. A third fluoride-exchange material is based on an acrylic-amine HF salt that can copolymerize to impart a fluoride-releasing capacity to light-curing resin composites and sealants.[1,25]

A fluoride-releasing dimethacrylate monomer containing a ternary zirconium fluoride chelate was synthesized.[26] The combined use of the fluoride-releasing dimethacrylate monomer and fluoride-releasing filler can provide sustained high fluoride release and recharge as well as acceptable mechanical and physical properties. Simply adding organic fluoride salt in the monomer yields composites with poor mechanical and physical properties.

Pulp tissue reactions to a fluoride-releasing all-in-one resin bonding system (Reactmer Bond and Reactmer Paste) in nonexposed monkey teeth were histopathologically evaluated.[27] The pulpal response of the Reactmer group was minimally different from that of the control group. Consequently, the Reactmer system was determined as being biologically compatible with vital pulps.

Hydrophobic Monomer System

Sankarapandian et al. studied the water sorption, hardness, and glass transition of several bis-GMA analogues that substituted F and phenyl groups on the central carbon.[28] Fluorine addition to the central methyl group reduced sorption to less than 10 percent of bis-GMA, and the fluorinated polymers were more stable during water storage, showing less reduction in hardness. It was also reported that the increased flexibility of these resins contributed to a higher DC than occurs in bis-GMA during polymerization.

Fluorinated dimethacrylates based on bis-GMA and UDMA with lower water sorption than bis-GMA resins have been synthesis by Stansbury and Antonucci.[24] Mixtures having adequate strength for dental composites are created when these resins are mixed with fillers treated with silane coupling agents, such as 10-methacryloxydecyl-triethoxysilane, that are more hydrophobic than the normal gamma-methacryloxyrpropyl-trimethoxysilane.

In similar work, TEGDMA has been tried with limited success as a more hydrophobic diluent compomer to be used with bis-GMA base monomer for composites. The water sorption of composites have included the synthesis of UDMA analogues containing either a phenoxymethyl group on the periphery or a bulky aliphatic group to replace the core segment of the UDMA. The objective is to reduce the possibility for water to attack the urethane linkages through steric hindrances. These resins showed 10 percent to 30 percent reduction in water sorption compared to conventional UDMA, but also had lower flexure strength. Because of their low viscosity, these monomers are proposed as comonomers rather than base monomers for composites.[3,29]

FLUORINE ADDITION TO THE central methyl group reduced sorption to less than 10 percent of bis-GMA, and the fluorinated polymers were more stable during water storage,

High-Conversion, High-Strength Monomer Systems

As mentioned previously, a large number of methacrylate groups of the dimethacrylate monomers in most resin composites are left unreacted in the cross-linked polymer. As the presence of significant residual unsaturation impairs the physical, mechanical, and chemical properties, new monomer systems with a potential for better conversion have been requested.

High conversion is not a goal in itself, however. For instance, increasing the content of TEGDMA in a BisGMA:TEGDMA comonomer will increase conversion, leave hardness unaffected, but at the same time make the material very brittle and prone to fracture. Also, the degree of conversion of dimethacrylates may be very high if the distance between the methacrylate groups is long, i.e., the molecular weight is high. However, if the monomer is very flexible and not sufficiently bulky, mechanical properties will be poor. The task, therefore, is to develop high-conversion resin systems while not impairing mechanical properties.[30]

Stansbury and Antonucci theorized that one practical means of addressing the relatively low degrees of conversion of dental resins would be the use of a more reactive diluent monomer.[31] The monomer in mind was c-methylene-ŷ-butyrolactone (MBL), the cyclic analog of methyl methacrylate, which they evaluated for use as a comonomer in BisGMA-based dental resins. MBL is highly mobile and, apart from other favorable properties as compared with methyl methacrylate, is more reactive.

As anticipated, MBL had a beneficial influence on the degree of conversion of the experimental resins. Increased conversion was obtained and mechanical properties were preserved or even improved, and the authors concluded that methylene lactone polymers might result in new materials with enhanced performance.

To minimize the detrimental effects of polymerization shrinkage and

to maximize the degree of conversion, mechanical properties, and wear resistance, the concept of resin composite inlays was introduced a little more than 15 years ago. It was hoped that extraoral polymerization would increase the longevity of resin composite restorations and bring resin composite closer to being a feasible amalgam substitute.[3,5]

Subsequently, the marginal adaptation of resin composite inlays has been reported to surpass that of resin composite fillings. The inlay technique has not, on the other hand, been found to provide significant or long-term improvements in mechanical properties, although it appears to be an effective mechanism for increasing the degree of conversion. Judging from the relatively limited use of resin composite inlays, direct as well as indirect, the advantages of resin composite inlays have not been sufficiently pronounced to convince the dental profession of their justification.[7]

The addition of cross-linking agents has also been investigated in resin composite filling materials. Aldehyde and diketone were hypothesized to be able to increase the degree of cross-linking by reacting with methacrylate double bonds and other pendant and backbone functional groups from different polymer chains in either nucleophilic or free radical reactions.[32] The significant improvements in mechanical properties found as a consequence of aldehyde or diketone addition were seen as indications of an enhanced degree of cross-linking. Subsequent determinations were made of the effect of propanal (propional dehyde) and diacetyl (2,3-butanedione) on the degree of conversion of methacrylate double bonds.

Consequently, it was concluded that the enhancements in mechanical properties probably reflected an increased conversion of double bonds rather than a cross-linking of other functional groups.[33] Also, propanal and diacetyl were suggested to exert their effect mainly via chain transfer reactions. A recent study confirmed that these agents become bound in the polymer structure, and a theory of the chain transfer reaction mechanisms was presented; how propanal and diacetyl have been proposed to act as chain transfer agents and offer explanations as to the effects on strength, hardness, and degree of conversion of varying content of a chain transfer agent.[33]

In an attempt to develop a mechanically stronger and hopefully more wear and fracture resistant resin composite, Peutzfeldt and Asmussen proposed that the degree of cross-linking in the polymer matrix could be increased by the addition of carboxylic anhydride to conventional monomer mixtures. Most pronounced effects of anhydride addition were measured for resin composites based on UEDMA and HEMA, as compared with materials based on BisGMA and TEGDMA and for materials also containing methacrylamide. Such materials resulted in a 20 percent increase in strength and stiffness. Experiments directed to optimize the postcuring conditions of resin composites containing carboxylic anhydrides indicated that a one-hour heat treatment at 150 degrees Celsius was preferable.

IN A LATE STAGE OF polymerization, some remaining unreacted double, bonds may be expected to be situated singly rather than in pairs or groups.

Furthermore, in the early stages of polymerization, characterized by substantial unsaturation, a cross-link will be formed to an adjacent unreacted double bond. In a late stage of polymerization, some remaining unreacted double, bonds may be expected to be situated singly rather than in pairs or groups as they do in resins with a lower degree of conversion, i.e., in the early stages of polymerization.[32,34] At this late stage, the chain transfer agent will cause an increase in degree of conversion but not in additional cross-linking.

Consequently, it seems that the use of additives with the effect of diacetyl and propanal, causing some 15 percent increase in degree of conversion of methacrylate double bonds and some 25 percent increase in mechanical properties, could be one viable means of developing resin composites for use in stress-bearing areas.[34]

Prakki et al. evaluated the effect of two additives, aldehyde or diketone, on the wear, roughness, and hardness of bis-GMA-based composites/copolymers containing TEGDMA, propoxylated bis-GMA or propoxylated fluorinated bis-GMA combined with aldehyde (24 mol percent and 32 mol percent) or diketone (24 mol percent and 32 mol percent).[35] It was seen that Bis-GMA/TEGDMA and bis-GMA/CH(3)bis-GMA copolymers with additives became smoother after abrasion test and improved the degree of conversion of some composites/copolymers thereby enhancing mechanical properties.

Conclusion

Since the beginning of the 21st century, dental composites have made their presence felt and have become the leading dental restorative material. There have been many improvements in the proper-

ties of this material by change mostly in the filler particles. The real problem could not be fixed unless the matrix system was improved. Recently, there has been a remarkable invention of expanding monomers that have shown promising results by reducing or eliminating the polymerization shrinkage. The incorporation of acyclic spiro ortho carbonates and oxybiusmethacrylate with combinations have been able to achieve that goal and soon it will be seen composites marketed with negligible shrinkage. Research on fluoride and chlorhexidine-releasing monomers has been going on for more than a decade. Composite materials with fluoride release are in the market but with limited mechanical properties.

The use of MDPB, chlorhexidine and copolymers of various fluoride-releasing systems have been combined with the matrix systems with increased mechanical properties, and, in a few years, one should see dental composites with potent anti-microbial effect with high strength.

The degree of conversion for dental composites is also being increased by adding propanal- and diacetyl-based agents to increase the cross-linking, whereby increasing the wear resistance and strength of the composite. Composites, the restorative material of present and the future, have undergone many changes their composition and will surely and constantly improve to be the ideal restorative material for the future. ■■■■

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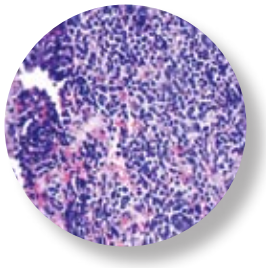

Small Cell Carcinoma of the Oral Cavity: Report of a Rare Case

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ABSTRACT Small cell carcinoma is primarily a lung malignancy occurring rarely in extra pulmonary sites such as the larynx, nasal cavity, paranasal sinuses, and oral cavity. The authors report a rare case of primary small cell carcinoma of the maxillary sinus presenting as a growth of the alveolus extending into the hard palate and the buccal vestibule.

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Small cell carcinoma is considered to be a distinct form of a malignant tumor that is most commonly of bronchogenic origin and well-recognized for aggressive clinical behavior. First described as an "oat cell carcinoma" by Barnard in 1926, this neoplasm can arise in extra pulmonary sites, including multiple areas in the head and neck.[1] In such cases, comprised of 2.5-5 percent of all SCC cases, however, a primary lesion in the oral cavity is very rare.[2,3]

This report describes a case of SCC of the maxillary antrum extending to involve the maxillary alveolus, buccal vestibule, and the hard palate. The clinical, radiographic, and histological features of this rare entity are presented.

Case Report

A 72-year-old Indian Dravidian male patient with no premorbid condition reported to the authors' department with a two-month history of tender swelling on the right side of face with associated symptoms of nasal congestion, epiphora, and rhinorrhoea. The patient was a chronic pan chewer and alcoholic for about 35 years but had no history of smoking. His past medical and dental history were noncontributory to his present oral condition.

Extraoral examination (**FIGURE 1**) revealed a large swelling in the right side of the face, which was approximately 8 x 8 cm in size, extending superior–inferiorly from the infraorbital margin to the inferior border of the mandible,

FIGURE 1. Extraoral view of the patient revealing a large swelling in the right side of face.

FIGURE 2. Intraoral view showing proliferative growth in the right alveolus in the posterior region.

FIGURE 3. A panoramic radiograph showing haziness and bony destruction of the floor and lateral wall of maxillary sinus.

FIGURE 4. Paranasal sinus view showing haziness and bony destruction of the floor, lateral wall of maxillary sinus, infraorbital margin, and lateral wall of the nose.

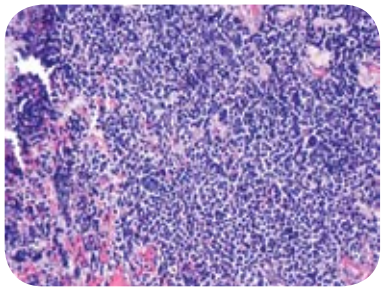

FIGURE 5. High-power photomicrograph showing large groups and sheets of diffusely infiltrating tumor with sheets of malignant cells with small round hyperchromatic nuclei, high nuclear cytoplasmic ratio, and nuclear moulding (H/E, X100).

and mediolaterally from the ala of the nose to 3 cms medial to the tragus of the ear. It had a woody consistency and was tender on palpation. However, submandibular lymph nodes were palpable on the same side, firm, mobile, and tender.

Intraorally (**FIGURE 2**), a proliferative growth was seen in the right alveolus. This was in the posterior region extending mediolaterally to the palate and the buccal sulcus causing the obliteration of latter. The teeth in the involved area had grade II mobility. A panoramic radiograph (**FIGURE 3**) revealed haziness and bony destruction of the maxillary sinus floor and lateral wall, the infraorbital margin, and lateral wall of the nose. A paranasal sinus, PNS, view (**FIGURE 4**) also showed similar radiographic changes.

The patient declined a computed tomography scan of the head and neck region due to financial constraints but did agree to have a surgical biopsy of the lesion. Clinical laboratory reports were also within normal limits.

An incisional biopsy revealed large groups and sheets of diffusely infiltrating tumor with sheets of malignant cells containing small round hyperchromatic nuclei, high nuclear cytoplasmic ratio and nuclear moulding (**FIGURE 5**). A diagnosis of small cell carcinoma was made.

The chest radiograph, bone marrow aspiration, ultrasonography-abdomen, USG-ABD, were negative for any primary metastatic deposits. The patient was then referred to a specialized hospital, where four cycles of cisplatin-ethoposide chemotherapy was administered. Unfortunately, the patient expired within few weeks.

Discussion

Small cell lung cancer is one of the most aggressive and lethal human cancers, and is the most common malignancy of the lung. The seminal case of SCC of the lung was reported by Barnard in 1926.[1] One-third of patients present with limited stage disease confined to the chest. The remaining two-thirds of patients have disseminated disease involving the non-pulmonary organs, including in the head and neck: larynx, salivary glands, oral cavity, tongue, nasal cavity, and paranasal sinuses. These are collectively called "extra pulmonary small cell carcinoma."

EPSCC is defined as biopsy proven small cell carcinoma in a nonpulmonary site. Additionally, chest radiograph, bone marrow biopsy, and USG-ABD should be negative for neoplastic cells.[4] It is postulated these tumors originate from totipotent stem cells that are native to all tissues and can differentiate into various cell types.[5]

Clinically, the presentation of EPSCC is difficult to characterize due to rarity of the lesion. The age at presentation has ranged from 26 to 77 years, with a median of 51.64. There is no clear sex predilection.[4,5] The lesions may appear as a smooth, polypoid mass or granular mucosal thickening. The most common presenting symptoms are epistaxis, nasal obstruction, and local pain. Proptosis and visual disturbances may occur when there is orbital involvement.[6]

SCC has a propensity to metastasize to other tissues. Hence, it is important to diagnose any extra pulmonary SCC as a primary site and not a metastases from another primary SCC. Two hypotheses have been proposed to explain the inability to detect the primary lesion.

These include involution of a primary tumor via spontaneous regression and the primary tumor possessing a phenotype and genotype favoring early metastasis.[7] In the authors' patient, since chest radiograph, bone marrow aspiration, USG-ABD were all negative, the oral lesion may be considered as a primary neoplasm.

Review of cases of HNSCC revealed that few cases have been described in the literature, with most occurring in the parotid area, one in the mandibular molar socket, and one in the nasal cavity.[8-10] Primary SCC of maxillary sinus is extremely uncommon.

The development of SCC is irrefutably correlated to cigarette smoking. In nonsmokers, SCC is extremely rare. In the authors' case, the patient was a nonsmoker. Even though it is reported that conventional microscopy is generally insufficient for diagnosis of SCC, an immunohistochemical analysis was not done in this case.[11]

With the paucity of reported cases of HNSCC, there is a definitive lack of standard protocol in the management of this tumor.[7] Surgery can be a treatment option in localized disease, however, this is usually not the case. Chemotherapy, RT, and combination therapy are the most preferred modalities.

Combination chemotherapy is considered more effective than the use of a single agent because of additive and synergistic effects. Cisplatin-Ethoposide (PE)-based regimens are most often used. Many chemotherapy regimens are not affective across the so-called "blood-brain barrier" thus the brain is left as a potential "sanctuary site" for metastatic disease. By giving prophylactic cranial irradiation, there is a decreased incidence of this complication. PE has been compared with other combination chemotherapy and has shown better results in terms of survival and prognosis for the patient.[12] Carboplatin has also been shown to be highly active and less toxic than cisplatin.

Despite high response rates, relapse and progression occur in the majority of SCC patients, and the median survival is one year. The prognosis of such patients is poor and five-year survival is only 13 percent, with a median survival from diagnosis of only 14.5 months.

Conclusion

SCC infrequently occurs as a primary tumor of the head and neck, and is considered to occur in nearly all structures associated with the aerodigestive tract. The prognosis for these patients is very poor. Defining the new combinations of agents for the survival of these patients is just a beginning, but the future appears to be promising. ■■■■

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Prevalence of Spit Tobacco Use and Health Effects Awareness in Baseball Coaches

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ABSTRACT *Objectives:* To assess spit tobacco usage and knowledge of health effects in baseball coaches. *Methods:* Participants (N=509) were affiliated with the American Baseball Coaches Association and completed a Web-based survey. *Results:* Data was ascertained in spit tobacco use, health effects, and possible intervention areas. *Conclusions:* The prevalence of use in respondents was 18.5 percent. The authors feel that the coaching profession is a fertile environment to decrease spit tobacco use in adolescents through positive role modeling and appropriate intervention techniques.

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Use of spit (smokeless) tobacco (ST) has become increasingly prevalent throughout the past 30 years, rising to a current annual consumption of nearly 121 million pounds in the United States alone.[1-3]

ST has been shown to be a health hazard, causing negative health consequences such as oral cancer, oral leukoplakia, dental caries, gingival recession, and nicotine addiction; as well as the lesser-known effects of hypertension, sexual impotence, and cardiovascular disease.[4,5] When ST use is combined with alcohol consumption, a common pattern found in users, the risk for oral, pharyngeal, and esophageal cancer has been shown to increase.[6]

A 2005 National Collegiate Athletic Association (NCAA) study reported that 16 percent of collegiate athletes used ST on a regular basis.[7] This percentage is comparable to the previous study (2001) and represents a significant number of ST users in collegiate athletics.[8] Widespread ST use still occurs in spite of an NCAA regulation, in effect since 1994, that bans the use of spit tobacco products in practice and competition.[1]

The highest percentage of ST users came from baseball, a sport long known for heavy consumption. The most recent NCAA survey found that 42 percent of collegiate baseball players were using ST regularly.[7] This percentage documents that despite the NCAA ban and intervention

efforts targeted toward athletes, especially baseball players, ST use is still prevalent in the sport and among its athletes.[9,10]

Baseball is an activity that allows ST use because of practice/game situations that are unique to the sport, including the opportunity to use ST products during competition with less concern for hazardous situations.[9] The lulls in activity and a decreased risk of contact or collision allow for an increased ST consumption during games.

There is often a social norm among baseball players that ST use is acceptable and even "mandated" in ritualistic or superstitious manners.[9,10] Baseball athletes experience intensive role modeling through the visible ST use of professional players, sports-centered advertising, and promotional programs with free samples.[9] Sport-specific use and role modeling are evident with research reporting that 59 percent of collegiate baseball athletes in one study predominately used ST during the competitive baseball season or used it dramatically more during the season than out of season.[9]

Coaches must be actively involved in efforts to decrease ST consumption in baseball. These individuals are capable of playing a substantial role in the prevention, rules enforcement, and referral for treatment of addiction for their athletes.[9] Coaches can be an integral aspect of this effort because they are often a role model for athletes, have access to the athletes at the different stages of ST use (initiation, experimentation, and regular use), and have an enormous influence over their team.[11,12]

Despite the potential opportunity to spearhead the effort to decrease ST use in baseball, coach-driven interventions are relatively uncommon. There are numerous potential reasons for a lack of coach-led initiatives; however, for the purpose of this research, the authors will investigate personal ST use and individual perceptions of use.

There is little known about ST use patterns in coaches or their personal beliefs on the use of tobacco products. What is known about coaches is often derived from the athletes' perceptions. These students often believe that coaches are indifferent about the individual athlete's spit tobacco use.[13,14] Also, athletes are often confused and surprised by the mixed messages conveyed by coaches who are chewing tobacco at sporting events or practice.[15]

THERE IS OFTEN
a social norm among baseball players that ST use is acceptable and even "mandated" in ritualistic or superstitious manners.

Coaches should recognize that their own use, knowledge, attitudes, or indifference toward spit tobacco might have a powerful influence on their athletes.[16,17] Research has demonstrated that ST use in baseball players was three times higher on a team where the coach also was an ST user.[5] Because of these concerns, it is essential coaches reconsider any personal ST use and how it may be perceived by their athletes while also developing an awareness of athletes who use ST and those who may be at risk.

In order to better understand the ST habits and behaviors of coaches, the authors developed a Web-based survey specifically for baseball coaches. The study was designed to assess the prevalence of the coaches' use, factors influencing use, level of knowledge about the health effects of ST, and the role coaches play in intervention. The authors hypothesized there would be a high percentage of ST use in the coaching population that is similar to the percentage of NCAA baseball athletes who consume ST.

Methods

Subjects in this study were members of the American Baseball Coaches Association (ABCA) supervising teams in high schools; NCAA divisions I, II, or III; NAIA; or community/junior colleges. The coaches received a personal e-mail requesting their assistance in the information-gathering portion of this study. The survey was sent to 4,253 baseball coaches listed on an ABCA-provided list serve. Those who were willing to participate were provided a Uniform Resource Locator (URL) address they could access in order to complete the survey.

Of those initial e-mail addresses, 1,175 were returned as undeliverable, resulting in 3,078 potential respondents. After submitting the initial request and two subsequent reminder notices, 509 surveys were completed for a response rate of 16.5 percent.

The choice to use a Web-based survey was made to reduce the time and cost of conducting a mail survey and to avoid the tedious and error-prone task of data entry.[18] This study specifically used a program that could only be accessed through the initial e-mail requesting participation. The program also prevented coaches from submitting information more than once to eliminate repeat responses.[18,19]

Research has determined that personalized follow-up contact with nonrespondents would dramatically increase the response rate for surveys.[19] The program created for this study was designed to send follow-up e-mails only to those coaches who had not initially responded while also maintaining anonymity for all subjects whether they responded or not.

The survey assessed four areas relating to ST: demographic factors, ST use, knowledge of the potential positive and negative health effects of ST use, and personal intervention roles. All questions were derived from surveys utilized in previous studies of baseball athletes and coaches.[7,16] The prevalence of ST use and the knowledge of the effects of ST use were measured using descriptive statistics through SPSS. The results then were evaluated and compared for significance to the relevant population.

Results

The demographic information derived from the study (TABLE 1) demonstrated that the respondents were consistent in gender (99.2 percent male) and ethnicity (90.8 percent Caucasian). There was more diversity found in age ranges with 30-39 (25.5 percent), 40-49 (27.9 percent), and 50-59 (28.5 percent) having the highest response rates.

High school coaches (38.9 percent) were more likely to complete the survey, although all team levels were represented. Head coaches (67 percent) also were more likely to respond than assistant coaches (25.1 percent).

The ST use section requested information on whether a coach used ST, the starting age range for ST use, the primary reasons for initiating use, the frequency of use, and the difference between ST use in and out of season (TABLE 2). The authors found that the prevalence of ST use among baseball coaches (18.5 percent) was similar to that seen in collegiate athletes of all sports responding to an NCAA study (2005) on social drug use (16.4 percent), but far less than that seen in collegiate baseball players (42 percent) responding to the same study.[7]

Within the health effects section of the survey, the respondents were given a list of potential positive and negative health effects of ST use, and asked if the health issues could be affected by ST consumption (TABLES 3 AND 4). The respondents were well aware that ST use did not improve athletic performance (97.2 percent), that there were harmful effects to ST use (95.1 percent), including addiction (96.1 percent), and that physical activity did not offset those harmful effects (97.2 percent).

Overall, the respondents were knowledgeable about the effects associated with ST use. The coaches appropriately connected ST use with oral leukoplakia (82.5 percent), oral cancer (96.7 percent), tooth decay (87.6 percent), gingival recession (89 percent), and nicotine addiction (95.1 percent). However, the more systemic illnesses — stomach ulcers (72.5 percent) and cancer (70.7 percent), hypertension

TABLE 1

Demographic Data of Spit Tobacco Study

Demographics		n (%)
Sex		
	Male	505 (99.2)
	Female	2 (0.4)
	N/A	2 (0.4)
Age (years)		
	20-29	44 (8.6)
	30-39	130 (25.5)
	40-49	142 (27.9)
	50-59	145 (28.5)
	60+	44 (8.6)
Ethnicity		
	Hispanic	19 (3.7)
	African-American	7 (1.4)
	Asian	2 (0.4)
	Native American	5 (1.0)
	Caucasian	462 (90.8)
	Other	2 (0.4)
Coaching position		
	Head coach	341 (67)
	Assistant coach	128 (25.1)
	Other	40 (7.9)
Team level		
	High school	198 (38.9)
	NCAA Division I	83 (16.3)
	NCAA Division II	35 (6.9)
	NCAA Division III	69 (13.6)
	NAIA	26 (5.1)
	Community/junior college	40 (7.9)
	Other	52 (10.2)

TABLE 2

Spit Tobacco Use in Respondents

Spit tobacco use		n (%) [% of *spit tobacco users*]
Use by coach		
	No	390 (76.6)
	Yes, but I have stopped	21 (4.1)
	Yes	94 (18.5)
Tried to quit before		
	No	23 (4.5) [24.4]
	Yes, once	15 (2.9) [15.9]
	Yes, several times	56 (11) [59.6]
Spit tobacco use starting age		
	Jr. high school or before	15 (2.9) [13]
	High school	36 (7.1) [31.3]
	18-19 years old	25 (4.9) [21.7]
	19+ years old	39 (7.7) [33.9]
Primary reason for use		
	Recreational/Social	45 (8.8) [47.9]
	Stress relief	24 (4.7) [25.5]
	Makes me feel good	25 (4.9) [26.6]
Primary reason to start use		
	Other teammates/players	65 (12.8) [65]
	Professional players	8 (1.6) [8]
	Coach using spit tobacco	1 (0.2) [1]
	Family members/friends	22 (4.3) [22]
	Promotional ads	4 (0.8) [4]
Use in-season vs. off-season		
	I don't use in-season	11 (2.2) [10.2]
	Less in-season	12 (2.4) [11.2]
	No difference	43 (8.4) [40.2]
	More in-season	41 (8.1) [38.3]
Do you use around players?		
	No	64 (12.6) [58.7]
	Yes	45 (8.8) [41.3]
Do you use at practices?		
	No	54 (10.6) [50]
	Yes, 1-2 times/week	28 (5.5) [25.9]
	Yes, 3+ times/week	26 (5.1) [24.1]
Do you use at games?		
	No	72 (14.1) [66.7]
	Yes, 1-2 times/week	17 (3.3) [15.7]
	Yes, 3+ times/week	19 (3.7) [17.6]

(63.7 percent), cardiovascular disease (60.8 percent), delayed wound healing (37.9 percent), and sexual impotence (28.9 percent) — were less likely to be perceived as an adverse effect of ST use according to the study population.

Finally, the coaches were asked to describe ST use in their athletes and if intervention would be effective in this population (TABLE 5). Less than half of the coaches who responded to this survey (48.5 percent) reported that ST use was a problem at least among some of their athletes. Most coaches believed that adolescent athletes should not become involved with ST (92.3 percent) because it can lead to long-term addiction or the other negative health effects mentioned previously. The coaches also reported being capable of positively influencing the athletes' decisions and providing assistance in their efforts to stop ST use once they had begun (55.8 percent), even if it is considered only in a small manner (40.5 percent).

Discussion

The data evaluating the prevalence of ST use within the coaches suggested that baseball coaches who responded to this study did not consume ST as frequently (18.5 percent) as collegiate baseball athletes who responded to the NCAA study (42 percent).[7]

This is a positive trend considering the number of coaches who competed in collegiate and/or minor league baseball and have been exposed to the same expectations or rituals their players currently face. Because of this prior experience in baseball and their position of authority with the team, the coaches who do not use ST have a distinct opportunity to demonstrate a healthy role model for their players to emulate.

Within ST users specifically, the study found that 15.9 percent had attempted

to quit use once and 59.6 percent had attempted to quit several times without success. This statistic reinforces the addictive nature of tobacco products and the difficulty associated with attempting to discontinue use. Knowing tobacco addiction is a serious concern, coaches should use all means necessary to stop use personally and utilize all appropriate intervention techniques to stop or prevent ST use in their athletes.

The average age the respondents started using ST is relatively balanced between high school and college. This is consistent with the NCAA study in regard to high school students and college freshmen, with both reporting a high percentage of athletes began use during this age range.[7] However, the authors' study findings differed from the NCAA study with regard to the category of 19-plus years old (one to two years after high school).

The NCAA study found this group to have the lowest ST initiation (9.7 percent) compared to other age groups while the authors' research found the highest percentage of initiation (33.9 percent).[7] This result might potentially be dictated by the playing ability of the coaches, in that many of them could possibly have deferred entrance to college to play minor league baseball where ST use is high (31 percent), although the exact reasoning could not be determined by this study.[4]

The primary reason provided for consuming ST was for recreational/social purposes (47.9 percent), the same as found in the NCAA study for athletes.[7] No coach in the study reported consuming ST to improve athletic performance, which suggests they are aware research has found no correlation between ST use and athletic improvement.[4] The ST users in this study stated that the primary reason to initiate use was based on seeing teammates or other players with ST. These findings suggest that parents and coaches can directly impact the decision-making process of their athletes by not demonstrating use, which inadvertently endorses the product.

The data also represents the influence of peer role modeling and peer pressure, whether intentional or not. This provides a definitive starting point for intervention techniques, either within the team or in society in general. Decreasing ST use in athletes and coaches will diminish the peer modeling and pressure that can lead to ST initiation in other athletes and in the general student population.

The positive role modeling for healthy behavior the authors discussed unfortunately did not carry over to the coaches who use ST. There was an obvious increase in use by the coaches during the baseball season, a possible response to the atmosphere of the sport or to the stress of the season causing an increased desire for ST. The coaches did not choose

TABLE 3

Respondents' Perception of Health Effects of Spit Tobacco

Health effects of spit tobacco use		n (%)
Improve athletic performance		
	True	4 (0.8)
	False	495 (97.2)
Physical activity offsets effects		
	True	5 (1)
	False	495 (97.2)
No harmful effects with use		
	True	17 (3.3)
	False	484 (95.1)
No one can be addicted		
	True	15 (2.9)
	False	489 (96.1)

TABLE 4

Respondents' Perception of Negative Health Effects of Spit Tobacco

Negative health effects caused by spit tobacco use	True n (%)	False n (%)
Oral cancer	493 (96.7)	16 (3.1)
Oral leukoplakia (premalignant lesion)	420 (82.5)	89 (17.5)
Tooth decay	446 (87.6)	63 (12.4)
Gingival recession	454 (89)	55 (10.8)
Nicotine addiction	484 (95.1)	25 (4.9)
Stomach ulcers	369 (72.5)	140 (27.5)
Stomach cancer	360 (70.7)	149 (29.3)
Hypertension	324 (63.7)	185 (36.3)
Cardiovascular disease	310 (60.8)	199 (39)
Sexual impotence	147 (28.9)	362 (71.1)
Delayed wound healing	193 (37.9)	316 (62.1)

TABLE 5

Spit Tobacco Intervention Roles

Intervention roles		n (%)
Is spit tobacco use a problem with your athletes?		
	No, it is not	251 (49.3)
	Yes, with some athletes	229 (45)
	Yes, with most athletes	18 (3.5)
Should adolescent/college-age athletes use spit tobacco?		
	No, they should not	470 (92.3)
	Yes, if they understand the risk	29 (5.7)
	Yes, they should be allowed no matter what	3 (0.6)
Can adolescent users quit with intervention?		
	No, it does not help	11 (2.2)
	Yes, but only if they want to quit	318 (62.5)
	Yes, intervention can help anyone	167 (32.8)
Do coaches play a role in preventing spit tobacco use?		
	No, we do not	22 (4.3)
	Yes, in a small way	118 (23.2)
	Yes, we can help prevent use	358 (70.3)
Can coaches help athletes who want to stop use?		
	No, they do now want our help	7 (1.4)
	Yes, in a small way	206 (40.5)
	Yes, they need our help to stop use	284 (55.8)

to refrain from consuming ST around players or at practice, although use did decrease dramatically from 50 percent to 33.3 percent during competition. The decrease in use may be the result of high school and collegiate regulations against the use of ST during games or the enforcement of the regulations by outside officials (umpires or administrators).

In the third category of survey questions, the coaches demonstrated they were quite knowledgeable in most of the health effects of ST use. The coaches were given a list of potential negative health effects and asked whether or not they were associated with ST use. All of the listed health effects have been previously reported to be associated with ST usage.[4,5] Overall, the respondents were knowledgeable about the direct effects associated with ST use. The coaches appropriately correlated ST use with oral leukoplakia, oral cancer, tooth decay, gingival recession, and nicotine addiction.

However, once the health effects became more systemic, the coaches appeared to be less certain that ST use could cause the health concerns. Therefore, it appeared the coaches were aware of the negative health effects of ST use that are relatively obvious, specifically mouth issues and addiction, but less knowledgeable on the general health effects and systemic diseases that may be caused by use.

These findings suggest that education regarding the vast array of negative health effects related to spit tobacco should be readily accessible to both coaches and athletes in an attempt to increase knowledge on the subject, which could potentially minimize use in both groups. A thorough understanding of these health effects may be a straightforward method for decreasing incidence of use and limiting the initiation of use in athletes and coaches.

Finally, the respondents to the survey answered several questions related to intervention, both in its effectiveness and the role of coaches in assisting athletes during their quest to quit. Less than half of the coaches who responded to this survey reported that ST use is a problem at least among some of their athletes. With the NCAA study reporting a 42 percent usage rate in baseball, it was surprising that the majority of coaches do not consider ST use an issue with their team.[7] This study did not determine if the respondents had implemented a strict policy that decreases student use or if the coaches were unaware of or chose to ignore the ST usage by their players. Further study should more thoroughly investigate this issue. The respondents stated they firmly believed adolescents should not be allowed to use ST because of the adverse health risks associated with tobacco use.

The majority of respondents agreed that ST users could discontinue the habit with proper intervention if they had the desire to quit. The coaches also understood they could play a role in preventing ST use and helping athletes who wish to stop using ST. The respondents felt their position as a positive role model and a leader for the students on their teams provided the opportunity to prevent an athlete from starting ST, even if it is in some small way, such as providing a healthy behavior model for the team by not using ST.

Developing the understanding in baseball coaches that they can be positive role models for their athletes is essential in the effort to rid the sport of ST addiction and the positive perception

of its use. If the coaches would utilize explicit and tacit efforts to guide the athletes on their team away from ST use, baseball would be better able to decrease adolescent and collegiate athlete addiction to this dangerous drug.

Future research on this topic is warranted based on the results of this study and should focus on high school coaches specifically. Numerous studies, including this one, have shown there is a high incidence of initial ST use and habit development during the high school years.[4-6,9,14,16,17] This important maturation and formative period of an adolescent's life should be evaluated more thoroughly to ensure that the role models who influence these athletes are providing a positive, healthy image.

Secondly, the specific intervention techniques utilized by these coaches should be investigated to ensure they are appropriate and successful in attempts to prevent and decrease use in students. If the current intervention techniques are ineffective, inappropriate, or do not exist, then a cohesive program should be implemented in as many school districts as possible to assist the coaches in their efforts to remove ST from the sport.

The limitations of this study are related specifically to the response rate. While lower than anticipated, there appears to be a current national trend of decreasing response rates to both Web-based and mailed surveys.[20,21] A meta-analysis conducted by Sheehan found that the mean response rate for all forms of survey research was at a rate of only 24 percent.[20] A review of previous Web-based research studies in ST prevalence among athletes, tobacco use studies, and research in other nonhealth domains found comparable or lower response rates (12-18 percent) than the authors' current response rate of 16.5 percent.[21-24] This suggests the response rate for this study was similar to related research and consistent for this research tool.[21-24] The lower response rate seen throughout Web-based research may reflect a general decline in responses to electronic surveys in this and other fields in recent years.[21] Although Web-based surveys are still a relatively novel methodological tool and response rates tend to be lower than traditional telephone and mail surveys, they have been found to generally be efficient, accurate, and cost-effective research tools.[21-24]

OPEN DISCOURSE
regarding ST use and the sport of baseball may help demonstrate that the majority of coaches act as positive, healthy role models.

Possible reasons for the lower response rate to this specific survey could be related to an increase in the number of surveys received by each potential subject, a lack of available time, or a lack of computer proficiency within the sample group. Also, there is the possibility the response rate could be affected by the coaches' concern for the public perception of their field/sport, or concerns for their privacy and the privacy of their athletes. The researchers, through the anonymity provided to respondents and the large sample size, attempted to minimize these concerns as much as possible.

A second limitation for this study was the potential for responder and nonresponder bias. Because of the anonymity of the coaches' responses, it was impossible to determine any demographic differences between responders and nonresponders. However, it was possible that a self-selection process occurred, especially among ST users, when coaches decided whether or not to respond to the survey request. Nonrespondents may have chosen not to complete the survey because of personal ST use. Therefore, there is a possible underestimation of ST use among baseball coaches based on the responses of this survey. Because of the structure of this specific survey, it was not possible to quantify the response or nonresponse bias that may have been present. Future research should further assess prevalence of ST use in baseball coaches to validate these results and determine if baseball coaches are acting as positive role models and providing the optimal lifestyle examples for their athletes.

Coaches and respondents should bear in mind that the overarching negative perception associated with baseball and ST use can only be allayed through full disclosure in future research. Open discourse regarding ST use and the sport of baseball may help demonstrate that the majority of coaches act as positive, healthy role models, and that they take the initiative to protect their athletes from the possible effects of ST use.

In conclusion, this study demonstrated a lower than expected rate of ST use in baseball coaches when compared to use in collegiate baseball players, which is a promising result. The coaches have a solid understanding of the negative health effects associated with ST use, understand their potential role in intervention techniques, and are willing to attempt to minimize use within their athletic population.

This study provided an initial understanding of baseball coaches and their modeling of healthy behaviors for athletes. The authors feel the coaching profession is a fertile environment for the education of adolescents and collegiate students

that needs to be thoroughly utilized to decrease ST use within the athletic population and minimize initiation of this addictive habit. Positive role modeling, intervention training, or modification of current intervention techniques can only improve the opportunity that coaches have available to reach out to the athletes who need assistance and guidance. ■■■■

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In Defense of Languor

High priest of the exercise group is a fitness fanatic named Jack LaLanne who exited the womb with a full set of steel abs some 94 years ago.

Robert E. Horseman, DDS

ILLUSTRATION BY CHARLIE O. HAYWARD

My 20-year search for the perfect diet pill — i.e., one taken daily that melts fat like warm butter on a hot pancake — is officially over.

There is no such thing.

In spite of mountains of hype and publicity, every diet pill manufacturer, by federal edict, must place on its package in the most inconspicuous place possible, the following caveat in print easily readable with 5x power loupes "Guaranteed to produce results when used in conjunction with proper diet and a vigorous exercise program."

Aha! If the diet scam people could manage it, the key word "exercise" would be visible only with an electron-scanning microscope. This insistence on exercise as an integral part of any successful weight loss program instantly splits the populace into two camps, into the larger and drowsier of which, I fall. My camp's credo reflects Mark Twain's views when he avowed, "I have never taken any exercise except sleeping and resting."

High priest of the exercise group is a fitness fanatic named Jack LaLanne who exited the womb with a full set of steel abs some 94 years ago. Speculation arose that his postnatal diet must surely have been liberally laced with anabolic steroids as sinew and Mr. America-type muscles prematurely replaced his baby fat.

During the following decades, these muscles developed muscles of their own until, for some inexplicable reason, at age 61 he felt compelled to swim the entire length of the Golden Gate bridge underwater. Handcuffed and shackled, he towed a 1,000-pound boat behind him, even though nobody asked him to. There is little doubt that LaLanne could have easily towed the QE2 from New York to Southampton clad in a full suit of armor, needing no more motivation than Nike's "Just Do It" slogan.

Mark Twain exercised his exit option at just a bit over 74; Jack is currently jumping up and down with excessive energy at 94 as if experiencing the geriatric throes of St. Vitus' Dance. Actuarially, he should have dropped off the twig at about 77.8 years of age. This is offered by workout aficionados as irrefutable evidence

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DR. BOB, CONTINUED FROM 438

that, statistically, what really happens if you exercise daily is you die healthier.

What gets the wind up with us couch potatoes is the term itself.

We always prefer a recliner to a couch, preferably one with a cup holder and the massage-vibration option. It should be positioned so that an unobstructed view of the 50-inch LCD/HD TV is had between our outstretched legs. We have taken as our mascot the sloth. A perfectly lovely, agreeable woodland creature whose characteristics of peaceful coexistence and conservation of energy were unfortunately included in the seven deadly sins by some salvation-happy bluenose with a paid-up annuity in Paradise.

Another seemingly difficult request involves never having to hear the terms "Pilates" and "cardio" issue from the mouths of 23-year-old celebrities who consider any personal weight in excess of 110 pounds as being morbidly obese. Pilates (from the Latin pileatus, i.e., "wearing the pileus," which was the badge of a freed slave) is a system of exercises involving elements of yoga and check writing.

Confusion arises when one of the earlier Pilates (Pontius) is sometimes linked with the present-day pursuit of the perfect body. His Roman family name was Pontii. For nearly 2,000 years genealogists have tried unsuccessfully to link the Pontii name with that of Charles Ponzi, a world-class crook who popularized pyramid schemes in the 1920s.

It was Joseph Pilates (1880-1967), a Greek/German who proposed a series of rehabilitation exercises for returning veterans of World War I. He gets full responsibility for the too-often heard claim among hyperthyroid people that "Today I did 1,200 Pilates; 60,000 crunches; 45,000 one-handed pushups" ad tedium.

The nation's 15,000 Pilates instructors are currently enjoying a bull market, surpassed only by Botox, liposuction, and innovative silicone applications. They are dedicated to teaching awareness of breath and alignment of the spine to strengthen the deep torso muscles, among other things. Basically, Joseph Pilates held that forced exhalation is the key to full inhalation. Sometimes this is mistakenly referred to as "heavy breathing," but is essentially the same phenomenon experienced when activating the lever at the side of every La-Z-Boy recliner, accompanied by the expression, "Ahhhhh!"

The dilemma for us Barcaloungers professing regard for our deep torso muscles and our continued dedication to inhaling and exhaling is clear. Diet pills are only valuable for their placebo effect and exercise is no less a deadly sin than "pride" and "envy." Our only hope to achieve and maintain our monthly Social Security largesse is diet.

The cheeseburger quadumvirate of Wendy's; Carl's, Jr.; Burger King; and In-N-Out enthusiastically obeying the basic industry canon of Give 'Em Want They Want, supplies us with our daily requirements of vegetables, dairy products, meat, and grease. It enjoys the support of the American people, only 78 percent of whom are considered overweight. Accusations of greed or gluttony hurt and are uncalled for. I suppose we could forego the drive-up window and exercise the option to walk inside for our food. But hey! What's the point if your cardio program requires conserving your finite number of heartbeats for something more important down the road? ■■■■

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Continuing Education Courses

Listed are C.E. courses offered by California's dental schools, local dental societies, ethnic dental societies and specialty organizations, from January through June 2011. For more information, please contact the course provider.

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
ALPHA OMEGA DENTAL FRATERNITY — LOS ANGELES CHAPTER					**310-398-9626**
Botox Application for TMD	Feb. 23	David Dana, DDS	Los Angeles	$85	3
Access to Care	April 27	Alan Felsenfeld, DDS	Los Angeles	$85	3
ARTHUR A. DUGONI SCHOOL OF DENTISTRY					**415-929-6486**
The Essentials of Aesthetics	Jan. 29	Howard Chi, DMD, MA; Maritza Mende, DMD	Stockton	$395	7
Infection Control and the California Dental Practice Act	Feb. 25	Eve Cuny, BA, MS; Bruce Peltier, PhD, MBA	San Francisco	$125	4
Atraumatic Extraction, Ridge Preservation and Crown Lengthening Study Club	Feb. 25, 26; March 25, 26	Gretchen Bruce, DDS, MBA; William Lundergan, DDS, MA; Frank Martinez, DDS; Anders Nattestad, DDS, PhD	San Francisco	$2,195	28
CALIFORNIA ASSOCIATION OF ORAL AND MAXILLOFACIAL SURGEONS					**916-783-1332**
CALAOMS 2011 January Anesthesia Meeting	Jan. 15-16	O. Ross Beirne, DMD, PhD; Jacob Haiavy, DDS, MD, FACS	Monterey	TBD	9
CALAOMS 11th Annual Meeting	May 21-22	Jason B. Cope, DDS, PhD; Alan L. Felsenfeld, DDS	Rancho Palos Verdes	TBD	TBD
CALIFORNIA DENTAL HYGIENISTS' ASSOCIATION					**818-500-8217**
Systemic Perio and Osteoporosis/Osteopenia: Clinical Implications in Periodontal Therapy	May 13	Joan Otomo-Corgel, DDS	Anaheim	$130	5
CALIFORNIA DENTAL SOCIETY OF ANESTHESIOLOGY					**626-287-1185**
Peri-Anesthetic Complications in the Dental Office	March 30-31	Robert C. Bosack, DDS	Irvine	$350	8
CALIFORNIA SOCIETY OF PEDIATRIC DENTISTRY					**831-625-2773**
CE Online	Continuous	Various	cspd.org	Varies	Varies
CSPD/WSPD 36th Annual Meeting	April 7-10	Multiple	San Francisco	$500 Reg Fee	16

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
CONTRA COSTA DENTAL SOCIETY					**925-932-8662**
Pediatric Dentistry: Are We Having Fun Yet?	Feb. 11	Marvin Berman, DDS	Walnut Creek	$195	7
California Dental Practice Act and Infection Control	March 4	LaDonna Drury-Klein, RDA	Concord	$80	4
Virtues of Profitable Dentistry	April 8	Howard Farran, DDS	Walnut Creek	$195	7
FRESNO-MADERA DENTAL FOUNDATION					**559-224-8747**
Local Anesthesia Update	Jan. 7	Alan Budenz, MS, DDS, MBA	Fresno	$140 Member/ $170 Non-Member/ $90 Auxiliary	7
Update in Periodontics	Feb. 4	Gary Armitage, DDS	Fresno	$140 Member/ $170 Non-Member/ $90 Auxiliary	7
OSHA, Infection Control and Dental Law	March 11	William Carpenter, DDS; Bruce Peltier, PhD, MBA	Fresno	$190 Member/ $220 Non-Member/ $105 Auxiliary	7
Restorative Update 2011	April 15	Parag Kachalia, DDS	Fresno	$140 Member/ $170 Non-Member/ $90 Auxiliary	7
Glass Ionamers – Direct Restorative Science Behind the Product	May 6	Joe Oxman	Fresno	$140 Member/ $170 Non-Member/ $90 Auxiliary	7
Management of the Extraction Site	June 3	Bach Le, DDS, MD, FICD	Fresno	$140 Member/ $170 Non-Member/ $90 Auxiliary	7
FRESNO-MADERA DENTAL SOCIETY					**559-438-7284**
Dental Practice Act, Infection Control, OSHA and HIPAA Updates	Jan. 21	Stanley Surabian, DDS, JD; Leslie Canham, CDA, RDA	Fresno	$150 Member/ $100 Staff/$75 RDA and Hygiene Students	8
HERMAN OSTROW SCHOOL OF DENTISTRY OF USC **CONTINUES ON NEXT PAGE**					**213-821-2127**
Implant CPR! Successful Management of Prosthetic Implant Complications (Module I)	Jan. 21	Harel Simon, DMD	Los Angeles	$275 Dentist/ $175 Auxiliary	7
Implant CPR! Successful Management of Prosthetic Implant Complications (Modules I and II)	Jan. 21-22	Harel Simon, DMD; Faculty	Los Angeles	$1,570 Dentist/ $995 Auxiliary	14
Implant CPR! Successful Management of Prosthetic Implant Complications (Modules I and II)	Jan. 21-22	Harel Simon, DMD; Faculty	Los Angeles	$1,450 Dentist/ $955 Auxiliary	14
Implant CPR! Successful Management of Prosthetic Implant Complications (Module II)	Jan. 22	Harel Simon, DMD; Faculty	Los Angeles	$1,345 Dentist/ $895 Auxiliary	7
USC Periodontal and Implant Symposium: Hands-On Cadaver Workshop I – Maxillary Sinus Augmentation	Jan. 27	Homayoun Zadeh, DDS, PhD; Pascal Valentini, DDS	Los Angeles	$1,795	7

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
HERMAN OSTROW SCHOOL OF DENTISTRY OF USC CONTINUES ON NEXT PAGE					213-821-2127
The USC 36th Annual International Periodontal and Implant Symposium	Jan. 28-29	Homayoun Zadeh, DDS, PhD; International Speakers	Los Angeles	$495 Dentist/ $325 Auxiliary	14
The USC 36th Annual International Periodontal and Implant Symposium: Dental Hygiene Forum	Jan. 29	Homayoun Zadeh, DDS, PhD; International Speakers	Los Angeles	$155	7
USC Periodontal and Implant Symposium: Hands-On and Cadaver Workshop II — Alveolar Ridge Augmentation	Jan. 30	Homayoun Zadeh, DDS, PhD; Sascha Jovanovic, DDS, MS	Los Angeles	$1,795	7
Mastering Molar Endodontics	Feb. 4-5	Ilan Rotstein, DDS; Faculty	Los Angeles	$1,485	14
Oral Surgery for the General Practitioner	Feb. 5	Bach Le, DDS, MD, FICD; Faculty	Los Angeles	$285 Dentist/ $185 Auxiliary	7
Porcelain Veneers: Optimizing Results Using Supra-Gingival Principles and Understanding Adhesion and Occlusion	Feb. 11	Jose-Luis Ruiz, DDS, FAGD; Edward Lynch, PhD, Lond, MA, BDentSc, TCD	Los Angeles	$215 Dentist/ $145 Auxiliary	7
Complications Associated With Implant Treatment (Las Vegas)	Feb. 12	Bach Le, DDS, MD, FICD; Baldwin Marchack, DDS, MBA	Las Vegas, NV	$345 Dentist/ $225 Auxiliary	7
Emerging Diseases, Infection Control and California Dental Practice Act	Feb. 12	Joyce Galligan, RN, DDS; Gerald Vale, DDS, JD	Los Angeles	$190 Dentist/ $145 Auxiliary	6
Basic Protocols in Implant Surgery and Restoration	Feb. 24-27	Homayoun Zadeh, DDS, PhD; Faculty	Los Angeles	$2,695 Dentist/ $1,195 Auxiliary	22
Chronic Orofacial, Orodental and Headache Pains for the Dentist	Feb. 25-26	Glenn Clark, DDS, MS; Faculty	Los Angeles	$495 Dentist/ $315 Auxiliary	14
USC Ruth Ragland 25th Dental Hygiene Symposium	March 5	Diane Melrose, RDH, BS; National Speakers	Los Angeles	$185	7
Applied Hypnosis: Treat Pain, TMD and Other Dental Conditions	March 5-6	Peter Stone, DDS; Ronald Kaminishi, DDS	Los Angeles	$595	14
Implant Therapy in the Esthetic Zone	March 11-13	Homayoun Zadeh, DDS, PhD; Faculty	Los Angeles	$1,995 Dentist/ $995 Auxiliary	20
Esthetic Full-Mouth Implant Reconstruction: From Treatment Planning to Fixed Restoration (Module I)	March 18	Harel Simon, DMD	Los Angeles	$275 Dentist/ $175 Auxiliary	7
Interdisciplinary Dentistry to Promote Success in Clinical Practice	March 18	Ilan Rotstein, DDS; Faculty	Los Angeles	$75 Delta Dental Dentist/ $215 Non-Delta Dental Dentist	7
Esthetic Full-Mouth Implant Reconstruction: From Treatment Planning to Fixed Restoration (Module I, II, and III)	March 18-20	Harel Simon, DMD	Los Angeles	$1,945 Dentist/ $1,595 Auxiliary	21
Esthetic Full-Mouth Implant Reconstruction: From Treatment Planning to Fixed Restoration (Module II)	March 19	Harel Simon, DMD	Los Angeles	$275 Dentist/ $175 Auxiliary	7
Esthetic Full-Mouth Implant Reconstruction: From Treatment Planning to Fixed Restoration (Module III)	March 20	Harel Simon, DMD; Faculty	Los Angeles	$1,795	7

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
HERMAN OSTROW SCHOOL OF DENTISTRY OF USC CONTINUED					213-821-2127
Mastering Bone Grafting for Esthetic Implant Site Development — Lecture and Hands-On Workshop (Module I)	March 25	Bach Le, DDS, MD, FICD; Faculty	Los Angeles	$1,195 Dentist/ $595 Auxiliary	7
Mastering Bone Grafting for Esthetic Implant Site Development — Cadaver Workshop (Module II)	March 26	Bach Le, DDS, MD, FICD; Faculty	Los Angeles	$1,765 Dentist/ $995 Auxiliary	7
Obstructive Sleep Apnea, Snoring and Dental Advancement	April 1-2	Glenn Clark, DDS, MS; Faculty	Los Angeles	$495 Dentist/ $315 Auxiliary	14
Advanced Implant Restoration	April 1-3	Homayoun Zadeh, DDS, PhD; Faculty	Los Angeles	$1,995 Dentist/ $995 Auxiliary	20
Esthetic Periodontal Surgery for the General Practitioner (Module I)	April 8	Ziv Simon, DMD, MSc	Los Angeles	$295 Dentist/ $175 Auxiliary	7
Esthetic Periodontal Surgery for the General Practitioner: A Hands-On Course (Module I and II)	April 8-10	Ziv Simon, DMD, MSc	Los Angeles	$1,795	21
New Approaches for Antimicrobial Treatment of Periodontal Disease (Las Vegas)	April 9	Jorgen Slots, DDS, DMD, PhD, MS, MBA	Las Vegas, NV	$345 Dentist/ $225 Auxiliary	7
Digital Clinical Photography: All You Need to Know! (Part I and Lecture)	April 15	Abdi Sameni, DDS; Gary Harmatz, DDS	Los Angeles	$245	7
Fundamentals of Restorative Implant Dentistry for the General Dentist (Part I)	April 15	Baldwin Marchack, DDS, MBA	Los Angeles	$245	7
Fundamentals of Restorative Implant Dentistry for the General Dentist (Part I and II)	April 15-16	Baldwin Marchack, DDS, MBA	Los Angeles	$995	14
Digital Clinical Photography: All You Need To Know! (Part II and Hands-On)	April 16	Abdi Sameni, DDS; Gary Harmatz, DDS	Los Angeles	$895	7
Common Oral Lesions: Soft and Hard Tissue Disease	May 6	Parish Sedghizadeh, DDS, MS; Faculty	Los Angeles	$225 Dentist/ $145 Auxiliary	7
Physical Evaluation	May 16	Stanley Malamed, DDS; Ken Reed, DMD	Los Angeles	$275 Dentist/ $175 Auxiliary	7
Emergency Medicine	May 17	Stanley Malamed, DDS; Ken Reed, DMD	Los Angeles	$275 Dentist/ $175 Auxiliary	7
Monitoring and Clinical Emergency Medicine	May 18	Stanley Malamed, DDS; Ken Reed, DMD	Los Angeles	$375 Dentist/ $215 Auxiliary	7
Atraumatic Extraction and Minimally Invasive Implant Site Development (Module IA)	May 21	Bach Le, DDS, MD, FICD; Faculty	Los Angeles	$295 Dentist/ $185 Auxiliary	5
Atraumatic Extraction and Minimally Invasive Implant Site Development (Modules IA and IB)	May 21	Bach Le, DDS, MD, FICD; Faculty	Los Angeles	$995 Dentist/ $695 Auxiliary	8
Endodontics From A to Z: Hands-On Workshop for the General Practitioner	June 3-5, 17-19	Ilan Rotstein, DDS; Faculty	Los Angeles	$2,945	42
Implant Therapy in the Compromised Sites — Cadaver Workshop	June 10-12	Homayoun Zadeh, DDS, PhD; Faculty	Los Angeles	$2,995 Dentist/ $1,595 Auxiliary	26
Temporomandibular Disorders, Arthrocentesis and Botox/Trigger Point Injections	June 24-25	Glenn Clark, DDS, MS; Faculty	Los Angeles	$495 Dentist/ $315 Auxiliary	25

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
HUMBOLDT-DEL NORTE DENTAL SOCIETY					**707-443-7476**
Implant Options for Edentulous Patients	Jan. 28	Eugene LaBarre, DMD, MS	Arcata	$135 Member/ $100 Auxiliary	6
Treatment Planning and Behavior Modification for the Pediatric Patient	March 25	Ignatius Nate Gerodias, DDS	Arcata	$135 Member	6
Risk Management 101: The Fundamental Concepts	March 31	Carla Christensen	TBD	TBD	2
KERN COUNTY DENTAL SOCIETY					**661-327-2666**
Infection Control, Dental Practice Act, OSHA Compliance	Jan. 21	Marcella Oster, RDA	Bakersfield	$200 Member/ $300 Non-Member/ $75 Auxiliary	6
Occlusion for Dummies	Feb. 25	Donald Reid, DDS	Bakersfield	$200 Member/ $300 Non-Member/ $75 Auxiliary	6
Cone Beam CT in Your Practice	March 25	Gurminder Sidhu, BDS, DDS, MS	Bakersfield	$200 Member/ $300 Non-Member/ $75 Auxiliary	6
Antimicrobial Treatment of Periodontal Disease	April 29	Jorgen Slots, DDS, DMD, PhD, MS, MBA	Bakersfield	$200 Member/ $300 Non-Member/ $75 Auxiliary	6
LOMA LINDA UNIVERSITY SCHOOL OF DENTISTRY **CONTINUES ON NEXT PAGE**					**909-558-4685**
An Interdisciplinary Approach to the Cleft Repair and Care	Jan. 30	Alan Herford, DDS, MD; Anna Chen, DDS, MS, PhD; Bonnie Nelson, DDS	Loma Linda	$195 Dentist/ $135 Auxiliary	8
Ponic Design for Ridge Development	Feb. 10	Dennis Smith, DDS, MS	Loma Linda	$20	1
Track 1 Implant: Techniques for Sinus Augmentation	Feb. 10	Aladdin Al-Ardah, DDS	Loma Linda	$20	1
Track 1 Implant: 3D Model and Computer Guided Dental Implant Surgery	Feb. 10	Yshuji Yoshino, DDS	Loma Linda	$20	1
Track 1 Implant: Is the Platform Switch a More Predictable Abutment Connection?	Feb. 10	Yun-Chi Wang, DDS	Loma Linda	$20	1
Track 1 Implant: Management of Complications in Implant Dentistry	Feb. 10	John Won, DDS	Loma Linda	$20	1
Track 1 Implant: Comprehensive Implant Treatment Planning and Sequencing Workshop	Feb. 10	Montry Suprono, DDS	Loma Linda	$20	1
Track 1 Implant: The Role of Connective Tissue Grafts in Immediate Implant Placement in the Esthetic Zone	Feb. 10	Juan Mesquida, DDS	Loma Linda	$20	1
Track 1 Implant: Vertical Ridge Augmentation Prior to Implant Placement	Feb. 10	Jaime L. Lozada, DMD	Loma Linda	$20	1
Track 2 Periodontics: Implant Treatment Planning; Principles and Guidelines	Feb. 10	Wesam Salha, DDS	Loma Linda	$20	1
Track 2 Periodontics: Diabetes and Periodontal Disease	Feb. 10	Elham Javadi, DDS	Loma Linda	$20	1

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
LOMA LINDA UNIVERSITY SCHOOL OF DENTISTRY CONTINUES ON NEXT PAGE					909-558-4685
Track 2 Periodontics: Interrelationship Between Periodontics and Restorative Dentistry: The Basics	Feb. 10	Adrian Mobilia, DDS	Loma Linda	$20	1
Track 2 Periodontics: Socket Preservation, What You Need to Know	Feb. 10	Mohammad Hassan, DDS, MS	Loma Linda	$20	1
Track 2 Periodontics: The Perio-Systemic Connection	Feb. 10	Craig Ririe, DDS, MS	Loma Linda	$20	1
Track 2 Periodontics: Implant Complications: Prevention and Management	Feb. 10	Chun-Xiao Sun, DDS, MS	Loma Linda	$20	1
Track 3 Operative/Restorative: Ceramic Bonding Issues	Feb. 10	Michael Meharry, DDS, MS	Loma Linda	$20	1
Track 3 Operative/Restorative: Overview of Ceramic Restorative Materials	Feb. 10	Ronald Forde, DDS, MS	Loma Linda	$20	1
Track 3 Operative/Restorative: Who Caries?	Feb. 10	Brian Novy, DDS	Loma Linda	$20	1
Track 3 Operative/Restorative: RPD Alternatives	Feb. 10	Mark Estey, DDS	Loma Linda	$20	1
Track 3 Operative/Restorative: Post and Core Materials and Procedures	Feb. 10	Nadim Baba, DDS	Loma Linda	$20	1
Track 3 Operative/Restorative: Treatment Plan Considerations for Worn Dentition	Feb. 10	Robert Walter, DDS	Loma Linda	$20	1
Track 4 Dental Hygiene: Win the Battle Against Biofilm: Leverage the Power of Ultrasonics	Feb. 10	Karen Hays, RDH, BS	Loma Linda	$80	4
Track 5 Miscellaneous: Denture Treatment Issues	Feb. 10	Madelyn Fletcher, DDS	Loma Linda	$20	1
Track 5 Miscellaneous: Preparing to Sell: Maximize the Value of Your Practice	Feb. 10	Bette Robin, DDS, JD	Loma Linda	Free	0
Track 5 Miscellaneous: Minor Equipment Repair	Feb. 10	Stan Lillard	Loma Linda	Free	0
Track 5 Miscellaneous: Tooth Whitening Overview: Clinical and Research Perspectives	Feb. 10	Sean S. Lee, DDS	Loma Linda	$40	2
Track 5 Miscellaneous: Extrusion Cases	Feb. 10	Frederick Berry, DDS	Loma Linda	$40	2
Track 6 ODRP: Applying the Pareto Principle to TMD Care – An 80% Solution	Feb. 10	Harold Avila, DDS, MS	Loma Linda	$40	2
Track 6 ODRP: Panographic Radiology in a Cone Beam World	Feb. 10	Dwight Rice, DDS	Loma Linda	$40	2
Track 6 ODRP: What in the World is That? — A Review of Common Mucosal and Radiographic Lesions	Feb. 10	Lane Thomsen, DDS, MS	Loma Linda	$40	2
Track 10 Endodontics: Creative Off Label Methods for Handling Common Endodontic Complexities	Feb. 10	C. John Munce, DDS, MS	Loma Linda	$20	1

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
LOMA LINDA UNIVERSITY SCHOOL OF DENTISTRY CONTINUES ON NEXT PAGE					909-558-4685
Track 7 Prosthodontics: All-On-4? An Overview	Feb. 11	Amir Khatami, DDS	Loma Linda	$20	1
Track 7 Prosthodontics: Endodontic Treatment or Implant, Where Do You Draw the Line?	Feb. 11	Mehdad Fay, DDS	Loma Linda	$20	1
Track 7 Prosthodontics: Occlusal Analysis: Look Before You Leap!	Feb. 11	Myron Winer, DDS	Loma Linda	$20	1
Track 7 Prosthodontics: Mandibular Implant Overdenture – Standard of Care?	Feb. 11	Fernando Munguia, DDS	Loma Linda	$20	1
Track 8 Operative/Restorative: Esthetic Communication Issues and Procedures	Feb. 11	Richard Young, DDS	Loma Linda	$40	2
Track 8 Operative/Restorative: Esthetics in Operative Dentistry Methods and Materials	Feb. 11	Carlos Chavez, DDS	Loma Linda	$30	1.5
Track 9 Oral and Maxillofacial Surgery: Surgically Assisted Rapid Palatal Expansion (SARPE)	Feb. 11	Carlos M. Moretta, DDS	Loma Linda	$20	1
Track 9 Oral and Maxillofacial Surgery: Odontogenic Infections and Management	Feb. 11	Chan M. Park, DDS, MD	Loma Linda	$20	1
Track 9 Oral and Maxillofacial Surgery: Bone Grafting Options for Implant Placement	Feb. 11	Young Jun, DDS, MD	Loma Linda	$20	1
Track 9 Oral and Maxillofacial Surgery: Soft Tissue Manipulation Around Implants in the Aesthetic Zone	Feb. 11	Jeffrey A. Elo, DDS, MS	Loma Linda	$20	1
Track 10 Endodontics: Local Anesthesia for Non-Surgical Endodontic Therapy	Feb. 11	Kurt Marcks, DDS	Loma Linda	$20	1
Track 10 Endodontics: Root Canal Therapy: Keys to Long Term Success	Feb. 11	John Pratte, DDS	Loma Linda	$20	1
Track 11 Pediatrics: Ectodermal Dysplasia	Feb. 11	Meghanne Kruizenga, DDS	Loma Linda	$10	0.5
Track 11 Pediatrics: Case Presentation 1	Feb. 11	Monserrat Jorden, DDS	Loma Linda	$10	0.5
Track 11 Pediatrics: Case Presentation 2	Feb. 11	Laura McCormack, DDS	Loma Linda	$10	0.5
Track 11 Pediatrics: Case Presentation 3	Feb. 11	Noha Abdel-Salam, DDS	Loma Linda	$10	0.5
Track 11 Pediatrics: Cancer and Prosthesis	Feb. 11	Samah Omar, DDS	Loma Linda	$20	1
Track 11 Pediatrics: Child Abuse	Feb. 11	Wesley Okumura, DDS	Loma Linda	$20	1
Track 11 Pediatrics: Review of Behavior Management Techniques	Feb. 11	Bonnie Nelson, DDS, MS	Loma Linda	$20	1
Track 12 Miscellaneous: Overdentures and Overpartials; Over Teeth and Over Implants	Feb. 11	Judy Strutz, DDS	Loma Linda	$40	2
Track 12 Miscellaneous: How Many Root Canals Are Too Much? Differential Diagnosis for Odontogenic vs. Non-Odontogenic	Feb. 11	Susan Roche, DDS, MS, MA; Robert Handysides, DDS	Loma Linda	$40	2
Interdisciplinary Orthodontic Treatment	Feb. 11	Vincent O. Kokich Jr., DDS, MSD	Loma Linda	$160 Dentist/ $110 Auxiliary	7
Medically Compromised	Feb. 11	Heidi Christensen, DDS; Karen Well, MD	Loma Linda	$150 Dentist/ $95 Auxiliary	6

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
LOMA LINDA UNIVERSITY SCHOOL OF DENTISTRY CONTINUED					909-558-4685
31st Anesthesia Symposium	Feb. 13	Larry Trapp, DDS, MS; Barry Krall, DDS	Loma Linda	$195 Dentist/ $135 Auxiliary	8
My Patient Wants to Quit Smoking — What Do I Need to Know?	Feb. 13	Lindsay Ferry, MD, MPH; Lane Thomsen, DDS; Hyma Gogenini, PharmD; et al.	Loma Linda	$160 Dentist/ $110 Auxiliary	7
Oral Surgery Symposium	March 6	Alan Herford, DDS, MD	Loma Linda	$195 Dentist/ $135 Auxiliary	7
The Annual Implant Dentistry Study Club LLUSD and AAID MaxiCourse	March 10–Dec. 16	Jaime L. Lozada, DMD; Mathew Kattadiyil, DDS, MDS, MS	Loma Linda	$13,500	300
Infection Control and California Dental Practice Act	March 13	W. Eugene Rathbun, DDS; Bette Robin, DDS, JD; Nancy Andrews, BS, RDH	Loma Linda	$160 Dentist/ $110 Auxiliary	7
4th Annual Periodontic Symposium	April 3	Craig Ririe, DDS; Dennis Smith, DDS	Loma Linda	$195 Dentist/ $110 Auxiliary	8
Esthetic Symposium	April 10	James Dunn, DDS; Michael DiTolla, DDS; et al	Loma Linda	$195 Dentist/ $110 Auxiliary	8
Medical Emergencies	April 17	Steven Filler, DDS	Loma Linda	$160 Dentist/ $110 Auxiliary	7

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
MARIN COUNTY DENTAL SOCIETY					**415-472-7974**
BLS/CPR Recertification Class	Jan. 27	TBD	San Rafael	$60 Member/ $120 Non-Member	3.5
General Membership Meeting	Feb. 15	Charles McNeill, DDS	Mill Valley	$45 Member/ $90 Non-Member	2
BLS/CPR Recertification	Feb. 24; March 31; April 28; May 26	TBD	Mill Valley	$60 Member/ $120 Non-Member	3.5
General Membership Meeting	March 15	David C. Hatcher, DDS, MSc	Mill Valley	$45 Member/ $90 Non-Member	2
General Membership Meeting	May 17	Steve Tiret, CPA	Mill Valley	$45 Member/ $90 Non-Member	2
MID-PENINSULA DENTAL SOCIETY					**650-328-2242**
Infection Control/Dental Practice Act	Jan. 21	Carolyn Mortenson; Staci Pruitt	Palo Alto	$100	6
Sleep Symposium	April 29	World Renowned Speakers/ Dental Health Foundation Fundraiser	Palo Alto	$250	7
Emergency Medicine and Sedation	May 20	Stanley Malamed, DDS	Palo Alto	$250	7
MONTEREY BAY DENTAL SOCIETY					**831-658-0168**
Diagnosis and Treatment Planning for TMD	April 1	Terry Tanaka, DDS	Monterey	$280 Member/ $130 Auxiliary	7
California Dental Practice Act and Infection Control	April 15	Art Curley, JD; Eve Cuny, RDA, MS	Monterey	$140 Member/ $60 Auxiliary	4
Clinical Tips and Material Recommendations Based on the Most Recent Clinical Research	May 20	Rella Christensen, PhD	Monterey	$280 Member/ $130 Auxiliary	6
Recipes for Predictable Anterior Esthetics	June 17	Gerard Chiche, DDS	Monterey	$280 Member/ $130 Auxiliary	7
NORTHERN CALIFORNIA DENTAL SOCIETY					**530-527-6764**
Nutrition for the Dental Patient and "Mental Health, What Dental Professionals Should Know"	Jan. 14	Tieraona Low Dog, MD	Red Bluff	$125 Member/ $225 Non-Member/ $55 Auxiliary	6
Presenting Dental Findings and Treatment Option	Feb. 3; March 3	John Van der Werff, DDS	Chico; Redding	$45 Member/ $90 Non-Member/ $30 Auxiliary	2
Six Steps to a Paperless Practice	Feb. 18	Lorne Lavine, DMD	Red Bluff	$125 Member/ $225 Non-Member/ $55 Auxiliary	7
CDPA, OSHA Refresher and Infection Control	March 18	LaDonna Drury-Klein RDA, CDA, BS	Red Bluff	$125 Member/ $225 Non-Member/ $55 Auxiliary	6
Clinical Jewels You Can Count On	April 15	Patrick Roetzer, DDS, FICD	Red Bluff	$125 Member/ $225 Non-Member/ $55 Auxiliary	6
Effective Communication and Enrollment Skills "Think Outside the Mouth" Treatment Planning	May 20	Karen Davis, RDH, BSDH, RDHMP	Red Bluff	$125 Member/ $225 Non-Member/ $55 Auxiliary	6

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ORANGE COUNTY DENTAL SOCIETY					**714-634-8944**
Infection Control/CDPA	Jan. 11	Leslie Canham, RDA, CDA	Irvine	$69	4
BLS	Jan. 19	Helen McCracken, RDH, MS	Orange	$69	3
You've Got It – Now Flaunt It: Marketing Your Brand	Feb. 8	Stewart Gandolph, MBA	Irvine	$69	2.5
A Bridge to Paperless: Using Technology to Improve Efficiency	March 8	Baldwin W. Marshack, DDS	Irvine	$69	2.5
Stuck On You: Profitable Adhesive Dentistry	April 12	Brian LeSage, DDS	Irvine	$69	2.5
PACIFIC COAST SOCIETY FOR PROSTHODONTICS					**360-459-4400**
Annual Meeting and Scientific Session	June 22-25	Multiple Speakers	Pasadena	$695	16
PUNJABI DENTAL SOCIETY					**866-422-5573**
Infection Control, Risk Management and California Dental Practice Act	Jan. 23	Luis R. Dominicis, DDS; Nancy Andrews, RDA; Gail Harris, RN, MS	Montebello	$79	7
California Dental Practice Act, Infection Control and Risk Management	Feb. 13	Luis R. Dominicis, DDS; Gail Harris, RN, MS; Rodney Stine, BA, MA	San Jose	$99	7
Advancing Your Vision In Restorative Dentistry	March 27	Lou Graham, DDS	Montebello	$79	7
Hands-On Contemporary Esthetics and Restorative Dentistry	April 24	Paresh Shah, MS, DMD	Diamond Bar	$149	7
The Art of Aesthetics and Occlusion	May 22	Todd C. Snyder, DDS	San Jose	$99	7
Oral Surgery Made Easy for General Dentists	June 26	Anil P. Punjabi, DDS	Montebello	$79	7
SACRAMENTO DISTRICT DENTAL SOCIETY **CONTINUES ON NEXT PAGE**					**916-446-1227**
CPR Basic Life Support (BLS) Renewal Course	Jan. 8, April 2	SDDS Instructors	Sacramento	$55 Member	4
Shift Happens: Incorporating New Protocols Into Practice	Jan. 11	Kristy Menage Bernie, RDH, BS, RYT	Sacramento	$57 Member	2
2011 Labor Law Update - HR Audio Conference	Jan. 13	California Employers Association	Sacramento	$35 Member	1
SDDS 31st Annual Mid-Winter Convention	Feb. 3-4	Visit sdds.org for speakers	Sacramento	Visit sdds.org for pricing	Various
Removable Partial Dentures: Clinical Considerations	March 4	Alan Carr, DMD, MS	Sacramento	$187 Member	5
Skin Cancer — Diagnosis and Treatment	March 8	Barbara Burrall, MD	Sacramento	$57 Member	2
Build Your Own Employee Handbook Workshop	March 18	Mari Bradford; California Employers Association	Sacramento	$69 Member	4
The Numbers of Your Practice: The Good, The Bad, Avoiding the Ugly	March 24	John Urrutia, CPA	Sacramento	$69	0
Crown Lengthening for the General Practitioner — Hands-On Course	April 8	Timothy Hempton, DDS	Sacramento	Call SDDS for cost	5

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
SACRAMENTO DISTRICT DENTAL SOCIETY CONTINUED					**916-446-1227**
Turn It On and Off: What's New In Local Anesthesia	April 12	Alan Budenz, MS, DDS, MBA	Sacramento	$57 Member	2
Top 10 SDDS Hotline Questions—HR Audio Conference	April 19	California Employers Association	Sacramento	$35 Member	1
Practice Management: Straight Talk About Balancing It All (People, Systems, Results)	April 21	Gayle Suarez, Dental Management Solutions	Sacramento	$69 Member	2
Infant and Early Childhood Oral Care	May 10	Jeffrey Wood, DDS	Sacramento	$57 Member	2
2nd Annual Right In Your Own Backyard	May 14	SDDS Members	Sacramento	$119 Member	4
California Dental Practice Act and Infection Control — Licensure Renewal Course	May 20	LaDonna Drury-Klein, RDA, CDA, BS	Sacramento	$125 Member	4
CPR — Basic Life Support (BLS) Full Course	June 25	SDDS Instructors	Sacramento	$70 Member	5
SAN FERNANDO VALLEY DENTAL SOCIETY					**818-884-7395**
Hot Topics in Esthetics, Dental Ceramics and Restorative Dentistry	Jan. 12	Ed McClaren, DDS	Van Nuys	$175 Member/ $300 Non-Member/ $90 Auxiliary/$75 Retired	7
How to Diagnose and Manage Common Oral Pathologies	Feb. 9	Diana Messadi, DDS	Van Nuys	$175 Member/ $300 Non-Member	7
CA Dental Practice Act and Infection Control	March 9	Nancy Andrews, RDH	Van Nuys	$175 Member/ $300 Non-Member/ $90 Auxiliary/$75 Retired	7
The Wonderful World of Prosthodontics	May 11	Mark Exler, DDS, FACP	Van Nuys	$175 Member/ $300 Non-Member	7
Pharmacologic Management of the Surgical Patient	June 22	John Yagiela, DDS	Van Nuys	$175 Member/ $300 Non-Member/ $90 Auxiliary/$75 Retired	7
SAN FRANCISCO DENTAL SOCIETY					**415-928-7337**
CPR for Healthcare Providers and Renewal Only	Jan. 26, Feb. 23, March 30, April 27, June 29	Adrian Curry, EMT	San Francisco	$67	4
The Role of Gingival Biotypes in Restorative and Implant Dentistry	Jan. 27	Richard T. Kao, DDS, PhD	San Francisco	$69	2
California Dental Practice Act (CDPA)	Feb. 25; May 20	Marcella Oster, RDA	San Francisco	$60 Member/ $90 Non-Member	2
OSHA Bloodborne Pathogen/Infection Control and Hazardous Communication Refresher	Feb. 25; May 20	Marcella Oster, RDA	San Francisco	$97 Member/ $145 Non-Member	4
Predicting Employee Success	April 2	Sally McKenzie, CMC	San Francisco	$95	3
Caries Management by Risk Assessment — The Caries Balance	May 5	John D. B. Featherstone, MSc, PhD	San Francisco	$69	2
CPR BLS Certification for Healthcare Providers and Basic Course	May 21	Adrian Curry, EMT	San Francisco	$97 Member/ $140 Non-Member	4
Restoring the Edentulous Mandible	June 9	Gaurav Setia, DDS	San Francisco	$69	2

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SAN GABRIEL VALLEY DENTAL SOCIETY					**626-285-1174**
CA Law and Infection Control	Jan. 18	Leslie Canham, CDA, RDA	Alhambra	$65 Member/ $100 Non-Member	4
Comprehensive Esthetic Dentistry Update	Feb. 15	Avishai Sadan, DMD	Alhambra	$65 Member/ $100 Non-Member	3
Mental Health and Well-Being for the Dental Professional	March 15	Jessica S. Mosich, PhD	Alhambra	$65 Member/ $100 Non-Member	3
Treatment of Endodontically Restored Teeth	April 19	Nadim Baba, DDS, MSD, FACP	Alhambra	$65 Member/ $100 Non-Member	3
SAN JOAQUIN DENTAL SOCIETY					**209-951-1311**
Implant Complications and Management	Feb. 24	Michael Jacobs, DDS	Stockton	TBD	3
The Virtues of Profitable Dentistry	March 24	Howard Farran, DDS	Lodi	TBD	7
California Dental Practice Act and Infection Control	April 21	Ladonna Drury-Klein, CDA, RDA, BS	Stockton	TBD	4
The Virtues of Profitable Dentistry	April 24	Howard Farran, DDS	Lodi	TBD	7
Evidence Based Dentistry and Practice Based Research Networks	May 19	Paul Benjamin, DMD, MAGD, FACD	Murphys	TBD	3
SAN MATEO COUNTY DENTAL SOCIETY					**650-637-1121**
New Professionals Forum	Jan. 6, March 3, April 7, May 12	TBD	Redwood City	$10 Member/ $25 Non-Member	0
AHA CPR – BLS Renewal Course	Jan. 18, March 15, April 19, May 17, Sept. 27, Nov. 15	Stephen R. John, DDS	Redwood City	$45 Member/ $60 Non-Member	4
7 Things Every Dentist Must Know About Data Security and HITECH ACT	Jan. 27	Lorne Lavine, DMD	Foster City	$45 Member/ $55 Non-Member	3
AHA CPR - BLS Renewal Course	Feb. 21, April 11, May 9, June 13	Richard A. Fagin, DDS	Redwood City	$45 Member/ $60 Non-Member	4
Dental Caries: Advances in Detection and Disease Management	Feb. 24	Karen Hays, RDH, BS	Foster City	$45 Member/ $55 Non-Member	3
Occlusion/Supra-gingival Dentistry	March 24	Jose-Luiz Ruiz, DDS, FAGD	Foster City	$45 Member/ $55 Non-Member	3
Introduction to Sleep Apnea Treatment for the General Dentist	April 21	Steve Keller, DMD	Foster City	$45 Member/ $55 Non-Member	3
Dental Office Regulatory Compliance Training	April 29, June 24	Julian Goduci, CHMM	Redwood City	$120 Member/ $150 Non-Member	8
Practice Management	May 26	Debbie Castagna; Virginia Moore	Foster City	$45 Member/ $55 Non-Member	3

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
SANTA BARBARA-VENTURA COUNTY DENTAL SOCIETY					**805-656-3166**
A Systematic Approach to Bonded Porcelain and Dental Implants	Feb. 11	Mohamadali Reshad, DDS, MSc	Oxnard	$185	7
Practice Management 101: Creating An Unforgettable Practice	March 25	William Van Dyke, DDS	Goleta	$185	6
Infection Control and Dental Practice Act	April 22	Noel Kelsch, RDH; Jason Wood	Oxnard	$150	4
Evolution and Management of Oralfacial Pain	June 10	Steven Graff-Radford, DDS	Thousand Oaks	$185	7
SANTA CLARA COUNTY DENTAL SOCIETY					**408-289-1480**
Management of Pediatric Trauma	Feb. 10	Ann Greenwell, DMD	Campbell	$35 Non-Member	2
Cone Beam CT Scans	March 10	Sotirios Tetradis, DDS, PhD	Campbell	$35 Non-Member	2
CAD/CAM Dentistry	April 14	Dino Javaheri, DDS	Campbell	$35 Non-Member	2
TBA	May 12	Terry Donovan, DDS	Campbell	$35 Non-Member	2
SOUTHERN CALIFORNIA OROFACIAL ACADEMY					**626-287-1185**
Implant Placement, Grafting, Membranes, Sinus Lift Techniques, Use of Osteotomes	March 11-13	Frank L. Pavel, DMD; Graham L. Simpson, DDS	San Diego	$500	10
TRI-COUNTY DENTAL SOCIETY					**909-370-2112**
Reconstructive Dentistry	Feb. 24	Tony Daher, DDS	Colton	$40	2
Soft Tissue Grafting and Socket and Bone Grafting	April 7	Armen Mardirossian, DDS; Gregg Filippelli, DDS	Colton	$40	2
TULARE-KINGS DENTAL SOCIETY					**559-625-9333**
Got OSHA? 6 Steps to Office Safety	March 10	Leslie Canham, RDA, CDA Speaker's Bureau	Visalia	TBD	2
Course on Full Mouth Reconstruction Using Dental Implants	April 8	Robert Bell, DDS	Visalia	TBD	3
Practicing Periodontics: From the Center to the Edge	April 8	John Kwan, DDS	Visalia	TBD	4
UNIVERSITY OF CALIFORNIA LOS ANGELES SCHOOL OF DENTISTRY **CONTINUES ON NEXT PAGE**					**310-206-8388**
RDAEF Expanded Duties Module III	Starts Jan. 15-16	Richard G. Stevenson, DDS; Joseph Cooney, BDS, MS	Los Angeles	$5,995 RDA/ $3,495 RDAEF	104
Sleep Medicine Mini-Residency	Starts Feb. 11-12	Dennis R. Bailey, DDS; Robert L. Merrill, DDS, MS	Los Angeles	$5,995	40
California Dental Practice Act and Infection Control	Feb. 26	Andy Wong, DDS	Los Angeles	$135 Dentist/ $95 Auxiliary	4
Advanced Anterior Esthetics	March 4-6, April 15-17	Jeff Morley, DDS	Los Angeles	$5,995	46
Pediatric Dentistry for the G.P. – An Update	March 5	Kumar Shah, BDS	Los Angeles	$198	7

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
UNIVERSITY OF CALIFORNIA LOS ANGELES SCHOOL OF DENTISTRY CONTINUED					310-206-8388
Hypnosis and Its Application to Dentistry	March 5-6	Don M. Goodman, PhD, CCHt; Ken Dubner, CHHt	Los Angeles	$495	14
Evidence-Based Dentistry for the Clinician	March 12	Francesco Chiappelli, PhD; Janet Bauer, DDS, MS	Los Angeles	$198	7
RDA Required Course – Infection Control	March 12	Cara Batson, RDA; Charlene Flowers-Taylor, RDA	Los Angeles	$250	8
Removable Partial Denture Course	March 12	Ting-Ling Chang, BDS	Los Angeles	$198	7
Dental Ethics for a Changing Profession	March 19	Gary Herman, DDS	Los Angeles	$198	7
Re-Certification in Pediatric Oral Sedation	March 19	John A. Yagiela, DDS, PhD; Cristine Quinn, DDS, MS	Los Angeles	$295	8
RDA Required Course – Pit and Fissure Sealants	March 26-27	Cara Batson, RDA; Charlene Flowers-Taylor, RDA	Los Angeles	$575	16
Find Your First Job	April 2	Michael Okuji, DDS	Los Angeles	$150 Dentist	7
UCLA Endodontic Continuum	April 7-10, April 28-May 1	Bernice Ko, DDS	Los Angeles	$3,995	58
RDA Required Course — Coronal Polishing	April 9	Cara Batson, RDA; Charlene Flowers-Taylor, RDA	Los Angeles	$325	8
Advanced Implant Therapy	April 25-29	Sascha A. Jovanovic, DDS, MS; Henry H. Takei, DDS, MS	Los Angeles	$3,995	40
Moderate Sedation with Multiple Oral and Parenteral Agents	April 14-17, May 19-22	John A. Yagiela, DDS, PhD; Roger J. Wendel, DMD	Vancouver, WA	$11,500	80
UCLA Implants A to Z 2011	Starts April 16	George Perri, DDS; Sascha A. Jovanovic, DDS, MS	Los Angeles	$3,995	56
Preventing and/or Resolving Patient Dissatisfaction	April 30	Jeffrey Goldstein, MBA, PhD; Ronald Mito, DDS, FDS	Los Angeles	$198	7
RDAEF Expanded Duties Module I	April 30-May 1	Richard G. Stevenson, DDS; Joseph Cooney, BDS, MS	Los Angeles	$3,995	104
The Integration of Technology — Building a Better Practice	May 7	Todd R. Schoenbaum, DDS	Los Angeles	$145	4
Dental Photography Workshop and Digital Presentations for Esthetic Treatment Planning	June 11	Brian P. LeSage, DDS	Los Angeles	$395	7
California Dental Practice Act and Infection Control	June 25	Andy Wong, DDS	Los Angeles	$135 Dentist; $95 Auxiliary	4

TOPIC	DATE	LECTURER(S)	LOCATION	COST	UNITS
UNIVERSITY OF CALIFORNIA SAN FRANCISCO SCHOOL OF DENTISTRY					**415-476-1101**
115th Scientific Session	Jan. 14-15	Various	San Francisco	$300	15
Implementing Occlusion Into Everyday Dentistry	Jan. 28	Jose-Luis Ruiz, DDS	San Francisco	$225	7
Clinicopathological Correlations	Feb. 5	M. Anthony Pogrel, DDS, MD; Richard Jordan, DDS, MSc, PhD	Hawaii	$225	4
18th International Symposium in OMFS	Feb. 7-11	Various	Hawaii	$995	20
17th Annual Island Dental Colloquium	Feb. 21-25	Christine Peters, DMD; Ove Peters, DMD, MS, PhD; Peter Loomer, BSc, DDS, PhD, MRCD	Maui, Hawaii	$695	20
17th Annual UCSF/UOP Island Dental Colloquium	Feb. 21-25	Various	Maui, Hawaii	$695	20
Pediatric Restorative Dentistry	March 4	David Rothman, DDS	San Francisco	$225	7
Veneers Made Easy— Workshop	March 5	Daniel Mendoza, DDS	San Francisco	TBD	7
Oral Surgery for the General Practitioner Part I	March 11	M. Anthony Pogrel, DDS, MD; Mehran Hossaini, DMD	San Francisco	$225	7
Medical Emergencies	March 12	Richard Smith, DDS	San Francisco	$225	7
UCSF Endodontic Research Day	March 18	Various	San Francisco	$250	7
Advanced Periodontal Instrumentation	April 1-2	Ana Pattison, RDH, MS	San Francisco	TBD	14
Oral Surgery for the General Practitioner Part II	April 8	M. Anthony Pogrel, DDS, MD; Mehran Hossaini, DMD	San Francisco	$225	7
Digital Photography - Workshop	April 9	Mark Dellinges, DDS	San Francisco	TBD	7
Fixed Prosthodontics	April 15	Terry Donovan, DDS	San Francisco	$225	7
WESTERN LOS ANGELES DENTAL SOCIETY					**310-349-2199**
Periodontics	Feb. 8	Ziv Simon, DMD, MSc	Culver City	$75 ADA Dentist/$120 Non-ADA Dentist/$60 Non-Dentist	3
Prosthodontics	March 8	Mamaly Reshad, DDS	Culver City	$75 ADA Dentist/$120 Non-ADA Dentist/$60 Non-Dentist	3
Dental Management for the Cancer Patient	April 12	Eric Sung, DDS	Culver City	$75 ADA Dentist/$120 Non-ADA Dentist/$60 Non-Dentist	3