

CDA

Managing Caries in
the 21st Century

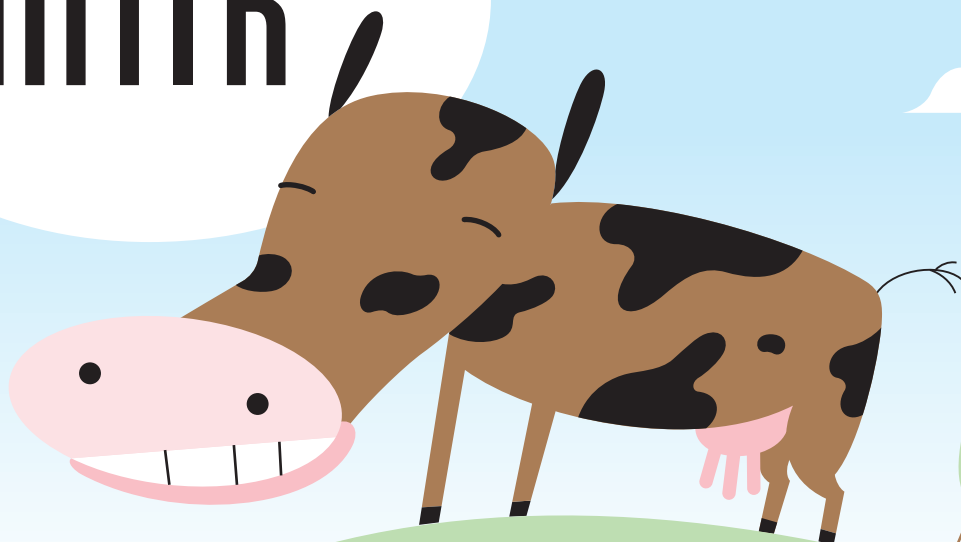
Practice Sale

Dental Business Activities

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milk



and oral health.





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A Bitter Pill

Two recent events drew my attention to a disturbing trend we are witnessing in health care. One of these events took place within my office; the other nationally. The first involved a patient, in for a routine hygiene appointment. He revealed a change in his medical history: a two-fold increase in his dosage of Lipitor. He is in his 40s and in otherwise good health. With a feeling of déjà vu, my hygienist checked the medical history and, sure enough, almost a year ago to the date, he reported the first doubling of his Lipitor dose. "How much are you exercising?" she asked him. "I walk from my car to my office," he laughed. Questions about his diet elicited a similar response. I am not an expert on hypercholesterolemia, but I do have information directly from a trusted physician (mine), that exercising regularly in addition to a diet low in saturated fat and high in fiber will almost always lower an individual's serum cholesterol level. Was this explained to the patient by his physician?

The second event garnered a front page story in the Feb. 10 *Los Angeles Times*. A Food and Drug Administration panel cited heart risks in a strong cautionary advisory on Ritalin and similar medications given to individuals diagnosed with attention deficit hyperactive disorder. The number of patients potentially affected is in the millions. Cardiologist and member of the panel Dr. Steven Nissen characterized the situation as "out-of-control use of drugs that have profound cardiovascular consequences." He went on to warn, "We have got a po-

tential public health crisis." The trend highlighted by these two events is what many refer to as the overmedication of America.

These are only two examples of instances where medications have been potentially overused and/or misused. Pain medications such as Vioxx, and weight loss medications such as fen-phen have been in the headlines in recent years when adverse effects on cardiac function and health were discovered and made public. Both drugs enjoyed widespread use prior to this discovery, leaving a wake of users either suffering with these effects or must, at least, carry a higher level of concern. Antibiotics are another class of drugs which many experts feel is overprescribed. Most of us are aware of instances where patients are given antibiotics almost without thought for a variety of symptoms indicative of the common cold, muscle aches, and other nonbacterial-related ailments. Experts further feel that this widespread misuse of antibiotics has led directly to a more serious problem: the selection and propagation of antibiotic resistant bacterial strains.

It must be made clear that the benefits to humankind derived from medications cannot be overstated. In modern Western medicine, two triumphs in quality of life improvement that come immediately to mind are infection control and pain control. These were accomplished with the help of antibiotics, analgesics, and anesthetics, respectively. In Eastern cultures, the use of medicinal compounds



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While it is true these drugs may assist in treatment of these conditions, to ignore other contributing factors and to fail to educate patients about the importance of their habits and actions is to do them a disservice.

dates back a millennia. Two examples, the Chinese use of herbal medications and the ancient Indian philosophy of Ayurveda, are only beginning to be understood and accepted by the American culture. But in 2006, those who feel America has become too pill happy certainly have numerous arguments to bolster their position.

Two separate, yet connected phenomena seem to be driving the over-medication of America. First, there is a clear, profit-driven promotion of prescription medications backed by the drug industry. In the past few years, we have seen an explosion in the number of advertisements for prescription drugs aimed directly at the consumer in all forms of media. This creates a situation where the patient presents to the doctor's office with a predetermined demand for a particular drug. In fact, some prescription drugs gain a certain trendy status. The drug of choice of the young Hollywood set recently, according to one tabloid, has apparently been the "Z Pac" (azithromycin). Second, there is a "quick fix" mentality to health problems that is apt to skew judgment of the risks a particular drug carries or ignore those risks altogether. As a society, we seem all too willing to put Lipitor or fen-phen into our bodies to control excess cholesterol or weight rather than change our diet and exercise habits. Taking a pill certainly requires less effort.

To place the blame of the overuse of prescription medications on so-

ciety or on individual patients is to ignore the fact that the responsibility of writing prescriptions rests with doctors. Since dentists are one of only two professions, the other being physicians, who can legally write prescriptions for humans, our role in the safe and responsible prescription of drugs is pivotal. Individual health care practitioners, including dentists, must make sure that every prescription written is based, not on a commercially driven trend, but on a scientifically grounded diagnosis. Any given drug for a given patient must have a low risk relative to therapeutic benefit. We also must look at individuals and diseases from a broader vantage point and realize there may be better treatments than medications. After all, the root cause of disease is not typically the absence of medication. High cholesterol is not due to an absence of Lipitor in the diet. Nor is dental caries due to a lack of fluoride or periodontal disease due to a lack of antibiotics. While it is true these drugs may assist in treatment of these conditions, to ignore other contributing factors and to fail to educate patients about the importance of their habits and actions is to do them a disservice.

The dental profession must critically examine its role in the overuse of medications in this country. Furthermore, it must set a course and example befitting a profession of our stature, and be consistent with our mission of caring for people's health. **CDA**



Polly Powell

Brainpower Fueled Best by Seafood

Adolescents whose mothers stayed on high-fish diets during pregnancy did better than their counterparts whose moms consumed less seafood, according to a new study.

The study, conducted in the Seychelles Islands — where weekly seafood consumption features 12 to 14 fish meals in

comparison to an average of one meal a week in the United States — tracked the health status of children since birth whose mothers consumed 10 times more mercury during pregnancy than mothers residing in the United States.

After nearly 16 years, all 789 children are healthy and “the large consumption of seafood appeared to benefit the chil-



*"If these people ate 10 times
the level of fish with no
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consuming fish."*

CONRAD SHAMLAYE, MD

dren in some developmental aspects," according to the study. In fact, those children outperformed other children whose mothers consumed less fish during pregnancy in language, drawing, and copy motor skills, said Philip W. Davidson, PhD, professor of pediatrics, environmental medicine and psychiatry at the University of Rochester School of Medicine and Dentistry, who presented the findings recently to the American Association for the Advancement of Science.

A previous longtime study centered on 14,000 British children provided beneficial information into the valuable effects of omega-3 fatty acids found in fish. Six months ago, Joseph Hibbeln, MD, from the National Institutes of Health, presented a report that the amount of omega-3 fatty acids in the diets of pregnant women assisted in determining a child's intelligence, behavior, and motor skills.

The children of pregnant women whose diets reflected the least amount of omega-3 fatty acids had verbal IQs six points lower than the average, according to Hibbeln's analysis.

The new Seychelles study also reflects the real world experience of high-fish-consuming countries, such as the United Kingdom and Japan. Studies in these countries found, that while fish consumption and mercury levels are higher than in the United States, children have no neurological problems. In fact, data from the National Institute for Minamata Disease in Japan, recently showed that the Japanese, who consume an average of 145.7 pounds of tuna and other fish annually — compared to only 16.6 pounds for the average American — have healthier children who score exceptionally high on science, math, and IQ tests.

Conrad Shamlaye, MD, an epidemiologist with the Ministry of Health in the Seychelles, put the findings into perspective. "If these people ate 10 times the level of fish with no problems, then Americans

should not worry about consuming fish."

The U.S. Tuna Foundation is concerned that misinformation is confusing the public and turning them away from canned tuna and fish.

According to a national Nielsen panel of 60,000 Americans, millions of U.S. families are no longer eating canned tuna, including lower-income consumers who are most affected by diabetes, heart disease, and obesity. At the same time, a poll for the University of Maryland by Opinion Research Corporation finds that almost one-third of the public, 31 percent, reports being worried about the amount of mercury in shellfish and fish, and subsequently, many consumers are reducing their consumption of seafood.

"I cannot understand how special interest groups can put their political agenda above the public health," said David Burney, executive director of the U.S. Tuna Foundation. "I am asking these organizations to stop scaring the public and to help us get out an accurate message that will benefit all Americans, especially lower-income and elderly Americans."

Canned tuna provides a number of important health benefits, as well as being a major source of fish for lower- and middle-class U.S. families. Researchers at Harvard found that if Americans reduced their fish consumption out of confusion about mercury, there will be serious public health consequences, notably higher death rates from heart disease and stroke.

"From the standpoint of public health, the real risk for the public is not getting enough fish and canned tuna in the diet," said Burney. "We need to end the confusion over mercury in fish for the welfare of all Americans and especially low-income consumers whose health will benefit the most from consuming fish and canned tuna on a regular basis. Those who depend on canned tuna the most need to know how healthy and safe this product is."

A Crowning Achievement

A root canal on an implant? It may be unusual, but not out of the realm of possibilities.

In an issue of the *Bulletin*, journal of the West Michigan District Dental Society, Derek Draft, DDS, recounted a case where he found himself considering performing a root canal on an implant.

An emergency patient came to his office complaining of a loose implant in place of No. 19, which had been restored only a couple of years ago.

"The crown showed slight mobility in the buccal-lingual direction. However, I could not appreciate any movement of the actual implant within the bone," Draft wrote.

What was wrong with the implant? It was an abutment screw that had loosened enough to allow the crown some mobility. Draft considered simply cutting off the crown and retightening the screw, but was reluctant to destroy a perfectly good crown. Further, because

he had used a resin-reinforced glass-ionomer cement to place the crown, he was concerned about damaging the implant should he try to break the cement bond.

He rescheduled the patient for a later date. That night, a thought occurred to him: What this crown needed was a root canal-like access opening to the abutment screw.

"I had one thing on my side," Draft said. "Before I cement my crowns to the implant abutment, I place a small piece of wax or impression material in the abutment screw head to keep from filling it up with cement."

Dr. Draft's plan worked well. He was able to access the screw head and tighten the abutment screw and re-secure the implant.

This incident showed how some successful dentists, when presented with unique problems, can go beyond the routine and "think outside the box."

Practice Tip: Technology Training Is Essential

When it comes to utilizing computers, dental offices are no different than the business world. What's more, digital imaging and other related technologies are quickly becoming just as vital for the practice of modern dentistry.

But untrained use of the equipment in a dental office can, in a worst-case scenario, hurt the practice or the user, said Craig Wilson, chief executive officer of Compudent Systems in an article in *Dental Practice Management*.



So, it is in an employer's best interest to see that longtime staff members and newer employees get current, proper technology training in the office, including high-tech diagnostic tools and routine computer programs, Wilson said.

"It is most important that a dental practice recognize that it is always in a state of ongoing skill development, and that staff are required to upgrade their skills routinely," Wilson wrote. "Training is not something that is performed once and then checked off the list."

Dentists seeking to ensure that their practices thrive should make technology and computer training part of their business costs. Since dental offices that are computerized turn over their computer equipment every three to five years, Wilson suggested giving that equipment to staff to guarantee they are working on similar tools at home, though for personal reasons. Employers also should encourage staff to use the web at home, thus ensuring the repeated use of e-mail and the Internet to hone their online skills.

“Some fears are mild and tolerable while others are extreme and can create severe physical reactions.”

TRINI GHOURI, PHD

Dental Fear and Dealing With It

Fear, while a valuable human response in many circumstances, can have a debilitating effect, particularly when it is inappropriate. It can appear when the dental patient starts to focus on the worst that can happen in a given situation.

Dentists are familiar with the anxieties and common fears some patients may exhibit while sitting in the dental chair. But sometimes the problem is so extreme, dentists may dread treating such patients, said Trini Ghauri, PhD, in a recent issue of *Oral Health*.

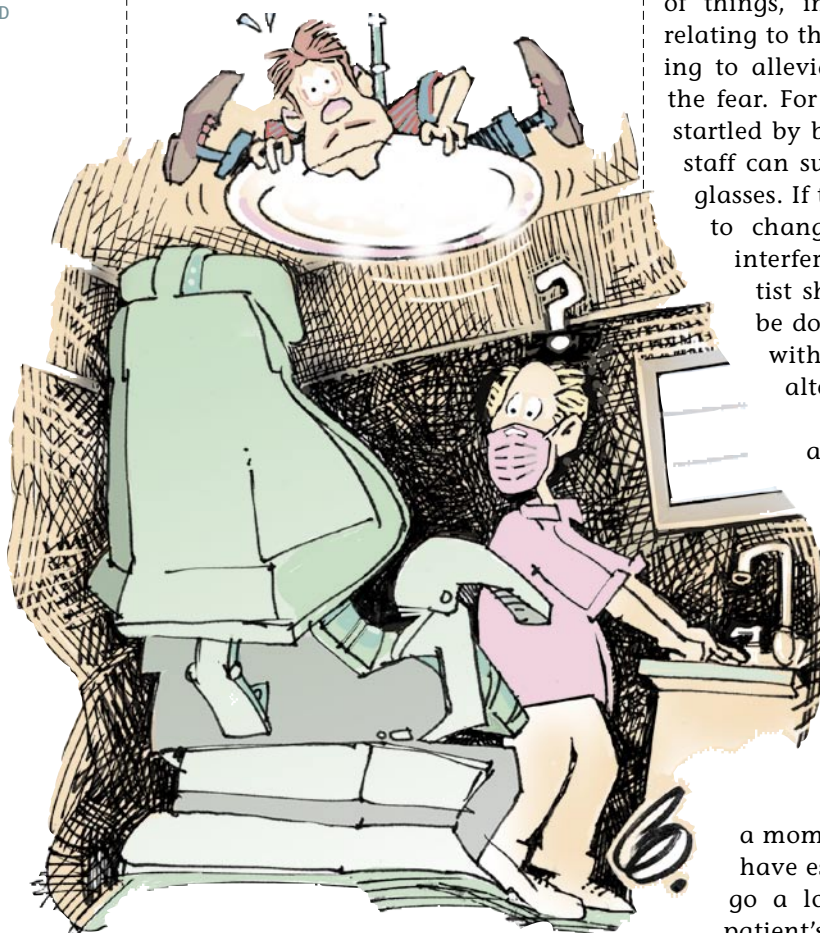
“Some fears are mild and tolerable while others are extreme and can create

severe physical reactions,” Ghauri wrote.

Ghauri said it is important to understand the source of the fear. A patient with excessive levels of anxiety might focus on feelings of losing control and not being able to speak as someone works in the mouth. Other fears include the smell of burning teeth, gagging, the potential use of needles, blood, and pain.

The most important thing a dentist and his or her staff can do to address a patient's fears is to remain nonjudgmental and approach the issue with compassion and understanding. To that end, Ghauri recommended a number of things, including asking questions relating to the patient's fears and working to alleviate some of the causes of the fear. For example, if the patient is startled by bright lights, the dentist or staff can suggest he or she wear sunglasses. If the patient asks the dentist to change something that would interfere with treatment, the dentist should explain why it can't be done and work cooperatively with the patient to find an alternate solution.

Adequate reading material, including information on various dental procedures, in a well-appointed and comfortable waiting room is key to reducing anxiety, Ghauri said. Additionally, prior to starting a procedure, it may be beneficial to establish hand signs the patient can use to indicate he or she needs a moment. Just knowing that you have established such system can go a long way toward easing a patient's mind.



Find Out What's Behind That Fuzzy-looking, Black Tongue

Often, dentists are the first to diagnose and treat oral reactions, especially since some responses can occur with any medicines used excessively or in combination with drugs, including herbs and vitamins.

The mouth can react differently to drugs and those reactions can vary in significance, said Scott S. DeRossi, DMD, lead author of a recent study that appeared in the March/April issue of *General Dentistry*, the Academy of General Dentistry's clinical, peer-reviewed journal.

"An adverse reaction depends on the drugs you use. Too much bismuth subsalicylate, for example, can turn your tongue black, but the reaction is temporary and harmless," said Eric Shapira, DDS, and an AGD spokesman. "Also, too much antibiotic usage can do the same thing and give you a black, hairy-looking tongue. And, any acidic type of medication can cause canker sores, including chewable vitamin C."

Other types of reactions are possible and some may be prevented. However, the dentist must be made aware of what herbs,



vitamins or drugs the patient is taking.

"Most of these reactions, however, cannot be prevented, but early recognition, appropriate treatments, and changing drug regimens can eliminate them," DeRossi explained. He also noted that, as the population ages and more drugs become available, patients can expect to encounter additional oral side effects from medications.

"A dentist can help, both in diagnosing drug interactions and in writing prescriptions that would be good to take in order to avoid side effects. Some side effects are not dangerous, and others are, depending on the extent of drug administered and the kind of drug that is used," Shapira said. "Don't forget that vitamins in excess become drugs and can cause serious damage and injury."

"An adverse reaction depends on the drugs you use."

ERIC SHAPIRA, DDS

Dan Hubig

Effective Communication Requires Good Listening Skills

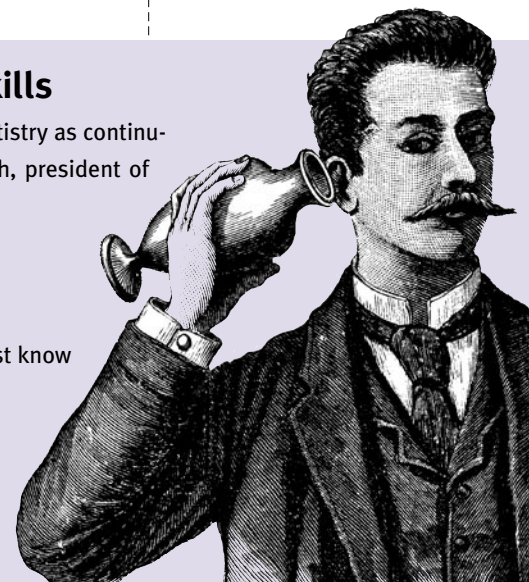
Possessing fundamental communication skills may be just as important in dentistry as continuing education and constantly sharpening one's technical skills, said Lorraine Guth, president of Motivations by Mouth in a recent issue of *St. Louis Dentistry*.

When communicating with patients, Guth recommended that dentists:

- Keep their sentences short. If patients want more details, they'll ask;
- Stay clear of preaching; watch out for the tell-tale "glazed-over" look;
- Recognize the most important aspect is proper questioning. Does the dentist know

how to ask the right questions? And,

- Avoid "auto answer" questions. Rather, begin a conversation and try to uncover the patient's real objectives. A request for "just a cleaning" may reflect uneasiness with the idea of an exam. Try to find out why. Does the patient fear an expensive procedure may be required or that something might be discovered?



"Volunteering was an experience of love, sharing and giving that has given us rewards beyond measure."



Oral Health Professionals, Volunteers Needed

Ever consider volunteering in Vietnam, taking the initiative in northern India, or helping in Nepal? The Himalayan Dental Relief Project, which runs eight dental clinics a year in those areas, is happy to assist.

The project is looking for 100 volunteers ranging from dentists, hygienists, and nondental personnel to treat an estimated 4,000 in Nepal, northern India and Vietnam.

Volunteers work in basic conditions in demanding and frequently exotic locales. Equipment includes portable dental units to provide exams, restorative care, and extractions. Hygienists will provide first-time teeth cleaning for children as well

as oral hygiene education. Nonmedical volunteers will assist in managing the patients, recordkeeping, charting, and helping with instruments.

The trip itself can be an adventure. One clinic serving the remote Nepal village of Khumjung required air travel from Katmandu via Thailand. Next, was a plane ride into the Himalayan village of Lukla, a famous trailhead for Mount Everest expeditions, followed by a four-day trek by way of yak to Khumjung, nestled at 12,500 feet.

"Volunteering was an experience of love, sharing and giving that has given us rewards beyond measure," said one project participant.

The 2006 dental clinics will be held in:

■ Katmandu, Nepal, serving charity schools, orphanages, and remote mountain locations. Participants can learn about the country and its people through tours. At the end of the clinic is a guided trek is available on the Everest Trail.

■ Central Vietnam where volunteers will work with their Vietnamese colleagues through the East Meets West Foundation partnership in outreach clinics in village schools. A cultural tour is available after the clinic.

■ Leh, Ladakh, India, serving Buddhist, Christian, Hindu, and Muslim children. At 11,000 feet in the Himalayas, this dental clinic is hosted by the local Lions Club. An optional trek and/or trip to the Taj Mahal awaits at the end of the clinic.

For information about the dates of the clinics and for more details, contact the Himalayan Dental Relief Project online at www.himalayandental.com or call (303) 858-9957.

Upcoming Meetings 2006

May 16-20	American Academy of Cosmetic Dentistry 22nd Annual Scientific Session, San Diego, (800) 543-9220.
May 22-27	Academy of Prosthodontics 88th Annual Scientific Session, San Francisco, www.academyprosthodontics.org .
Sept. 15-17	CDA Fall Session, San Francisco, (866) CDA-MEMBER (232-6362).
Oct. 16-19	ADA Annual Session, Las Vegas, (312) 440-2500.
Nov. 2-4	Hispanic Dental Association 14th Annual Meeting, Universal City, www.hdassoc.org or (217) 793-0035.
Dec. 3-6	International Workshop of the International Cleft Lip and Palate Foundation, Chennai, India, (91) 44-24331696.

To have an event included on this list of nonprofit association 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.



Milk Helps Build Strong Teeth and Promotes Oral Health

Justin Merritt, PhD; Fengxia Qi, PhD; and Wenyan Shi, PhD

ABSTRACT

A great deal of research into the benefits of milk consumption has gone largely under the radar for many decades. There is a wealth of studies both in the United States and abroad to suggest that milk consumption is largely anti-cariogenic when combined with a typical routine of oral hygiene. This effect can be mostly attributed to several factors: tooth remineralization, inhibition of bacterial colonization, and biofilm inhibition. These abilities have been studied in detail and are likely due to numerous proteins found in milk. An attractive feature of milk from the community health perspective is its widespread consumption throughout the world. For this reason, studies have been initiated to investigate the possibilities of using milk to deliver fluoride and antibacterial antibodies to high-risk populations worldwide. This review will focus on the various components of milk, which promote oral health, and will also discuss common approaches to improve upon the oral health benefits of milk consumption.

Section 1: A Brief Overview of Milk's Benefits for Oral Health

Got milk? Thanks to a plethora of high-profile milk mustaches, there is now widespread recognition of the benefits of milk for maintaining healthy bones. However, little has been described about the effects of milk on oral health. To obtain a comprehensive overview on the subject, the authors conducted an extensive survey of literature related to milk and oral health. With hundreds of research reports surveyed, the general consensus has indicated that milk provides numerous components associated with improved oral health.

Studies on the benefits of milk in caries control can be traced back more than

Authors / Justin Merritt, PhD, a research scientist, and Fengxia Qi, PhD, MS, an assistant professor, are both at the University of California Los Angeles School of Dentistry's oral biology department. Wenyan Shi, PhD, is a professor and chair of oral biology at UCLA School of Dentistry's oral biology department.

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50 years. Since then, a global research effort has been devoted to determining the relationship between milk or dairy product consumption and the prevention of tooth decay. Research suggests that the benefits of milk and related products can be traced to several principal factors: remineralization of the tooth, prevention of bacterial attachment to the tooth, and inhibition of bacterial biofilm formation ability. In addition to the most obvious beneficial factor, calcium, milk has also been shown to contain multiple proteins that serve a variety of functions important for oral health. For example, casein is a family of proteins, which comprise 80 percent of the milk protein. They can actually help to recruit calcium phosphates to demineralized surfaces on the tooth. Casein is also able to prevent the adhesion of caries-causing bacteria to the tooth surface as well. Besides casein, milk contains whey proteins, lactoferrin, lysozyme, and antibodies, which all serve to promote oral health via their interactions with various cariogenic bacteria.

These properties of milk have prompted some suggestions for its use as an artificial saliva for those suffering from xerostomia or hyposalivation.¹ It is well-established that those afflicted with the condition have a greatly increased risk for developing dental caries, in addition to suffering from many other discomforts. While milk offers many of the lubricating features of saliva, it can also provide some of the anti-cariogenic protection found in saliva as well. Animal studies validate the utility of milk for this purpose.² However, a well-controlled comparison of milk versus commercially available saliva substitutes is currently lacking.

Section 2: A Detailed Overview of Literature on the Benefits of Milk on Oral Health

Many health benefits of milk consumption have yet to incorporate themselves into the psyche of the general public, despite a wealth of supporting data.

This is especially true for the association of milk with maintaining oral health. There are numerous studies beginning as far back as the 1950s that have investigated the role of dietary milk consumption and caries experience in both animals and humans.³⁻⁵ Since that time, research has continued to develop into a more detailed analysis of dairy product consumption. Current research focuses largely on oral health issues related to specific types of dairy product consumption, analysis of bioactive compounds

These properties
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contained within milk, and even using milk as a delivery vehicle for anti-cariogenic agents. These studies have provided substantial evidence for the role of milk in promoting oral health.

Given the early association of milk consumption with reduced caries experience, numerous groups have probed the cariogenic potential of milk and other dairy products under the controlled laboratory setting using both *in vitro* and *in vivo* approaches. For example, using an *in vitro* caries model, it was shown by Bibby et al. that incorporating milk solids into laboratory cakes containing sucrose and starch reduced its capacity to promote the dissolution of enamel chips by lactic acid-producing bacteria, whereas, removing the milk component resulted in a higher caries rate.⁶ Animal studies have also shown a positive role of milk in the prevention of caries. Desalivated rats fed with a diet of either 2 percent milk or lactose-reduced

milk remained largely caries-free, which even suggested a possible application for xerostomia patients.²

Furthermore, a recent study in Brazil aimed at comparing the cariogenic potential of cow's milk versus several infant formulas found that cow's milk had the lowest cariogenic potential of the substances fed to Wistar rats infected with a high dose of *Streptococcus sobrinus*.⁷ A similar conclusion was also reached by a comparative study at the University of Rochester. Researchers found several commonly used infant formulas to be largely cariogenic in rats, whereas milk proved to be the least cariogenic.⁸

Further evidence from studies of infant and child beverage consumption has also supported the data found in animal studies. The data are especially striking when milk consumption is compared with children fed sweetened drinks. Invariably, milk consumption was associated with significantly lower proportions of mutans streptococci on the teeth.^{9,10} However, it should be noted that there is a general concern among pediatric dentists concerning the lactose content in milk. Since lactose is itself a fermentable sugar, certain conditions can favor caries formation from milk consumption. This is true for nursing or bottle-feeding mothers who feed continually for prolonged periods or bottle feed milk immediately before sleep.¹¹ Since sleeping with a bottle in the mouth can interfere with the protective action of saliva, any sugars, such as the lactose found in milk, are much more likely to promote caries than during typical consumption patterns.¹² Therefore, it is generally advised that bottle-fed children about to sleep should not be given any beverages containing sugars.

Several recent studies from the United States and Europe have all associated milk or dairy product consumption with lower caries experience when combined with a normal routine of oral hygiene.¹³⁻¹⁵ In a study by Petti et al., they also noted a caries preventive effect from

milk consumption in a subgroup of their subjects that consumed high levels of sucrose.¹³ Much attention has also been given to the effects of cheese consumption. Studies suggest that not only does cheese have a cariostatic effect, but it exerts this effect by efficiently increasing the saliva and plaque concentrations of calcium.^{16,17} Additionally, this phenomenon has also been observed when cheese was consumed in a more typical fashion: as part of a mixed meal.¹⁸ Hard cheeses have even been suggested as a remedy to offset the effects of radiation caries in individuals experiencing xerostomia from neck cancer radiation therapy.¹⁹

While very few studies have probed the effect of milk on issues related to periodontal health, it was recently reported that in a group of Italian adolescent females aged 17 to 19, nutrition, specifically, milk consumption, could account for the differences in observed gingival health at the conclusion of the study. The authors of the study inferred that the increased riboflavin and calcium intake in the milk drinkers was a major contributing factor to the reduced risk of gingivitis.²⁰ Similarly, it was found from separate studies that a low dietary intake of calcium resulted in more severe periodontal disease, whereas increased calcium and vitamin D intake seemingly yielded protective effects against tooth loss.²¹⁻²³ Therefore, it should be quite interesting to further examine dairy product consumption in patients at risk for periodontal disease.

Given the numerous studies indicating milk and other dairy products as beneficial for promoting oral health, it is not surprising that there has been a large amount of effort devoted to determining the mechanisms associated with these benefits. Interestingly, a large volume of data has accumulated to suggest that milk and other dairy products contain numerous bioactive compounds relevant to preventing caries and are not simply calcium

delivery vehicles. These compounds are generally derived from the various proteins found in milk. By far, the most extensively studied group of these bioactive milk proteins is the caseins. This group of proteins also accounts for the largest percentage of milk proteins (80 percent).²⁴

Caseins actually comprise a family of proteins subdivided into the α/α_{s1} and α/α_{s2} , α , and κ -caseins.²⁵ These proteins are generally thought to have a positive effect on cariogenesis via two mecha-

A large volume of data has accumulated to suggest that milk and other dairy products contain numerous bioactive compounds relevant to preventing caries and are not simply calcium delivery vehicles.

nisms: prevention of demineralization and inhibition of bacterial attachment and/or biofilm formation.

The protective properties of casein against demineralization were demonstrated in an intraoral caries model using sodium caseinate, α_{s1} casein, and a tryptic digest of α_{s1} casein (TD-casein). Supragingival plaque was inoculated onto bovine enamel chips that were treated with either a 3 percent sucrose + 3 percent glucose-salt (wt/vol) solution, or the same solution with the addition of 2 percent sodium caseinate (wt/vol). After 10 days of exposure, the chips incubated with the addition of sodium caseinate showed no evidence of subsurface enamel demineralization as determined by microradiography and microdensitometry.

In the author's next experiment, the enamel chips were exposed to the sucrose-glucose sugar solution six times per day for 10 days and given a treatment

of either a 2 percent (wt/vol) solution of sodium caseinate, α_{s1} casein, or TD-casein. Similarly, all three forms of casein were found to be protective against subsurface enamel demineralization and both α_{s1} casein and TD-casein were shown to be incorporated into the enamel plaques. It was suggested that protection from demineralization was mediated by the ability of casein to incorporate into the plaque and thereby increase plaque calcium phosphate concentration as well as to create a buffering capacity derived from the various phosphorylated residues within the protein.²⁶

In a follow-up study by the same investigator, the ability of a tryptic digest of casein to remineralize enamel lesions was investigated. This digested form of casein, known as casein phosphopeptide, CPP, was able to stabilize amorphous calcium phosphate and, therefore, stimulate the remineralization of subsurface lesions in the enamel by maintaining a local high concentration gradient of calcium phosphate. After a 10-day period of remineralization in the presence of 1 percent (wt/vol) CPP + calcium phosphate, sectioned enamel lesions were analyzed by microradiography and microdensitometry and found to have an average of 63.9 percent replacement of the lost mineral within the lesions.²⁷

Thus, it seems that the anti-caries effect of added casein is largely dependent upon the ability of casein or casein fragments to localize a high concentration gradient of calcium phosphate into the plaque structure where it can prevent, or even reverse the process of demineralization.

In addition to its capacity to alter caries progression, several other studies have demonstrated the ability of various caseins to modulate the ability of bacteria to initiate caries as well. In a study of *S. mutans* attachment to saliva-coated hydroxyapatite beads, it was shown that incubation with milk or κ -casein effectively prevented *S. mutans* from attaching



to the beads.²⁸ A later study by the same group found that hydroxyapatite beads carried in the mouth had altered salivary pellicle formation on the beads as a result of either milk or κ -casein rinses.

Again, bacteria were found to be inhibited in their ability to attach to these beads in the presence of milk or κ -casein. It was suggested in this study that the attachment defects could be mediated by alterations in pellicle formation as a result of exposure to these proteins.²⁹ Pellicles formed in the presence of milk and κ -casein were also able to inhibit the glucosyltransferase activity of *S. mutans*, which could yield an additional mechanism to prevent adherence and/or biofilm formation as well.^{29,30} In a similar study, *S. sobrinus* attachment to the tooth surface was also found to be potentially inhibited by casein derivatives.^{31,32} Additionally, *in vivo* studies using a rat model of caries, challenged with a cariogenic diet, plus multiple milk proteins, demonstrated a 73 percent to 80 percent reduction in the numbers of *S. sobrinus* in rats that consumed milk proteins containing casein. This resulted in the inhibition of both advanced dentinal fissure and smooth surface caries lesions.³³ Peptide derivatives of casein have even been shown to prevent oral actinomyces attachment to erythrocytes by inhibiting their hemagglutinin activity.³⁴ Therefore, it seems that casein not only aids in preventing demineralization, but it may also play an active role in inhibiting the pathogenic potential of a diverse array of oral bacteria.

Despite the wide spectrum of activity associated with casein or casein derivatives, a study by Grenby et al. suggested that one of the main caries protective effects of milk may actually not even reside in the casein fraction of milk. Using typical enamel demineralization tests, the authors examined the ability of milk fractions removed of the lactose, fat, and casein-associated components, and found that the remaining material

was still largely protective against demineralization. Further analysis revealed that the activity was associated with two particular fractions enriched for the presence of proteose-peptone, which are minor components of the whey proteins in milk.³⁵ Further analysis of the remaining fractions confirmed the findings of a previous study in which it was suggested that milk also has a mineral component that can aid in the prevention of buccal and sulcal caries in rats.^{35,36}

In those areas that are both remote and economically disadvantaged, milk fluoridation may be the only realistic option to lower caries incidence on a community-wide scale.

Other minor protein components of milk may also yield, as yet, unidentified oral health benefits. Milk contains the iron-chelating protein lactoferrin, which has been previously shown to have activity against *S. mutans*.³⁷ Interestingly, a portion of the bovine lactoferrin protein was recently shown to be responsible for inhibiting the attachment of *S. mutans* to salivary agglutinin and thus may aid in the prevention of tooth colonization.^{38,39} This inhibitory activity was shown to be due to a competition for binding to salivary agglutinin, and was independent of the iron-chelating activity of lactoferrin.^{38,39} Milk also has a small amount of lysozyme, which is the same antibacterial agent found in tears and saliva.²⁴ While there are currently no studies that have suggested a protective role for these proteins during milk consumption, it would be interesting to determine whether these proteins have the ability to induce changes in bacterial plaque populations.

Beginning in the 1950s, it was suggested that milk could also be used as a vehicle for delivering anti-cariogenic substances.⁴⁰ Specifically, it was suggested that fluoride salts be added to milk in order to augment the benefits of proper oral hygiene. At that time, fluoride was not a typical additive to public drinking water and, presumably, the ubiquity of milk consumption would have proven useful to increase the amount of fluoride in the diet of the average citizen.

According to a report by the Centers for Disease Control, by the year 2000, 65.8 percent of the American population served by public water systems received optimally fluoridated water. Therefore, the need for widespread fluoridation of milk has waned in the United States.

In contrast, in many parts of the world, especially in rural areas and economically deprived regions, milk fluoridation is still pursued as a viable alternative to large-scale water fluoridation. This option has been actively investigated by the World Health Organization to lower the caries incidence in poorer populations with a high-caries burden. In a study aimed at assessing the efficacy of milk fluoridation in Bulgarian school children, it was found that children participating in the program for five years had a DMFT index that was 79 percent lower than those who did not.⁴¹

A 21-month trial of fluoridated milk in Beijing, China, also reported a highly significant reduction in the DMFT scores of kindergarten-age participants.⁴² In those areas that are both remote and economically disadvantaged, milk fluoridation may be the only realistic option to lower caries incidence on a community-wide scale. In Codegua, Chile, a large program was initiated through the National Complementary Feeding Program to include fluoridated powdered milk in the diets of preschool children of various age groups. At the termination of the program four years later, the DMFT indices of the 3- to

6-year-old age group had dropped by 72 percent and the proportion of caries-free children in the community had risen from 22 percent to 48.4 percent.⁴³

Interestingly, the authors surveyed the same community several years after the conclusion of their previous study and found that caries prevalence had increased to a level equivalent to the control community which had not received any fluoride supplements.⁴⁴ Clearly, there was a marked deterioration in the oral health of this community in the absence of continued supplemented milk consumption.

The potential benefits of fluoridated milk have also been investigated in the laboratory setting as well. Using a rat model of caries, two separate studies have determined that fluoridated milk is a very effective means for caries prevention.^{45,46} Interestingly, a study by Banoczy et al. found that fluoridated milk was even more effective than fluoridated water in reducing caries experience.⁴⁶ In addition, the utility of fluoridated milk has been well-supported by *in vitro* experiments of enamel demineralization and has even been demonstrated to alter proportions of plaque streptococci as well.⁴⁷⁻⁴⁹ Therefore, for both practicality and efficacy, it seems that using milk as a means to deliver fluoride into the diet is quite effective and, in some instances, may be the best available option.

Another alternative use of milk has been to deliver antibodies that offer protection from cariogenic bacterial species. Rat studies in the 1970s first investigated the possibility of immunizing pregnant animals against *S. mutans* in order to enrich the milk with anti-*S. mutans* antibodies for the benefit of the offspring (passive immunization). The results indicated that the ingested IgG and IgA antibodies were indeed protective against caries.^{50,51} Given the promising results of these early studies, recent research has focused on immunizing cows in order to deliver this same

protective benefit to milk consumers. This strategy provides promise since it would not require genetic manipulation of cows and would only change the specificity of the antibodies that are already found in milk.

One approach has been to simply immunize cows with specific bacterial species and allow antibody formation against a whole slew of antigens present on the bacterial surface. This approach has been tested using *S. mutans* as well

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as *S. sobrinus*. In both instances, it was found to elicit protection from bacterial colonization and stimulated phagocytosis by human leukocytes.^{52,53} Other studies have chosen to immunize in a more defined manner, which has the potential advantage of enriching for those antibodies that would theoretically affect specific virulence properties of a cariogenic species. This strategy has been tested by simply injecting cows using specific proteins derived from *S. mutans*. Two of the most heavily studied proteins used for this purpose are the cell surface protein antigen (PAC) and the glucan synthesizing enzyme glucosyltransferase I. Antibodies from immune milk directed against these proteins have been shown to inhibit the colonization ability of *S. mutans* as well as reduce its biofilm-forming capability in *in vitro* studies, animal models, and even in limited human trials.⁵⁴⁻⁵⁶

From a production perspective, one of the major concerns for large-scale

passive immunization is whether the antibodies in immune milk have a shelf life that permits reasonable protection for the intended lifetime of the product. This was tested by adding anti-streptococcal antibodies to ultra-high temperature-treated toddler's milk and testing antibody efficacy after storage for two months at various temperatures. It was reported that after two months of storage, the titers of these antibodies did not decrease at any of the tested storage temperatures and all provided protection from bacterial colonization.⁵⁷

Interestingly, using passive immunization with immune milk has also been investigated for other oral diseases, such as oral submucous fibrosis, with promising results.⁵⁸ Furthermore, it should also be feasible to use this same strategy to inactivate known periodontal pathogens as well. Undoubtedly, this approach will be investigated in the future if immune milk becomes a common item on grocery store shelves.

With the current abundance of beverage choices available to the consumer, it is not surprising that such a familiar item as milk can be taken for granted. This has not been the case for the scientific community however; as a great deal of attention has been devoted to milk studies for the past 50 years and still continues to this day. In fact, it is actually quite extraordinary to consider the scope and diversity of milk research conducted over the years. Perhaps in the near future, parents will recognize one more reason to promote milk consumption to the next generation: oral health. **CDA**

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Managing Caries in the 21st Century:

Today's Terminology to Treat Yesterday's Disease

Douglas A. Young, DDS, MS, MBA

ABSTRACT

Background. For more than a century, dentistry has been treating the disease of dental caries largely by restoring teeth. Research in the microbiological and chemical mechanisms of the caries process over the past two decades suggests a fundamental rethinking of solely using this type of treatment approach.

Methods. A clinician's understanding of how the field has advanced has been impeded by the inconsistent use of dental terminology. This article will focus on defining dental caries and its related terms.

Conclusions. The term "caries," although used very liberally in the field, should be further defined in its context of use to avoid confusion, until which time an accepted international terminology system is developed.

Practice Implications. Reducing or eliminating ambiguity in terminology used in managing dental caries is the first step in consistent diagnosis, detection, and finally treatment.

Traditionally, dentists have spent the majority of their careers learning to repair damage to teeth caused by the results (or symptoms) of the disease of dental caries. Newbrun, in 1989, clearly defined caries as a bacterial disease; "Dental caries, or tooth decay, is a pathological process of localized destruction of tooth tissues by microorganisms."¹ In the new caries management paradigm, sometimes called caries management by risk assessment or CAMBRA, the medical-based model emphasizes that carious lesions are due to an infection by odontopathic bacteria.

Rather than solely treating symptoms by placing restorations, the focus becomes preventing and eliminating the bacterial infection, as well as other contributing pathogenic factors.²⁻⁵ In



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the traditional model, the profession has focused on restoring teeth that have been damaged by results of an infection by certain cariogenic bacteria, predominately mutans streptococci and lactobacillus.^{6,7} However, a recent landmark randomized clinical caries trial has demonstrated that restoring teeth alone does not eliminate the causative bacterial infection or significantly lower the future decay rate of individuals.⁸

Yesterday's Terminology Leading to Confusion

When the single-term caries is used to describe a multitude of situations or findings, and treatment strategies are based on these findings, significant confusion could result in misdiagnosis and treatment.² Figure 1 illustrates how many different meanings the term caries could have. Depending on the context of the term, it could lead to dramatically different outcomes. For example, when referring to radiographs, radiolucent areas on bitewing radiographs often are simply called caries. Yet, from a clinical decision-making process, it is the presence of cavitation, as well as the activity of the lesion, that needs to be assessed. However, to help a clinician make a decision about when to surgically restore an approximal surface, the extent of radiographic penetration must be compared and validated to studies calibrating radiography to cavitation, not histology.^{9,10} The radiographic findings, as well as activity, should then be confirmed by clinical examination of the patient. In other words, simply calling something caries on a radiograph does not always make it so.

Brown stain is also erroneously called caries. Studies indicate that as the tooth becomes microscopically more porous during the demineralization, it can pick up exogenous stain, yet little to no bacteria may be present.¹¹ In fact, staining in dentin can happen in the absence of cavitation as small mol-

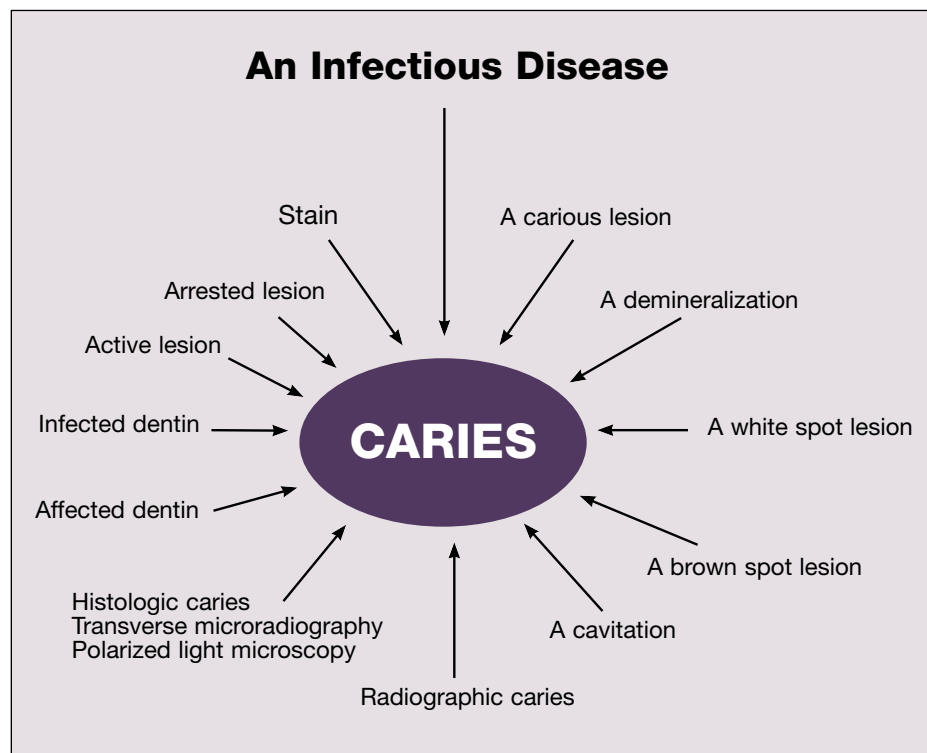


Figure 1. Defining caries. Caries is an infectious disease. All other terms describe the symptoms of the disease.

ecules can migrate into the diffusion channels of intact enamel, yet bacteria remains too large to fit into these small spaces. Similarly, the more porous areas tend to pick up caries detector dye on hard and stain-free dentin can result in unnecessary tissue removal.¹² Adding to the confusion, some state dental licensure boards define brown stain on the DEJ as caries, and if left, will most likely result in concluding that there was a failure to remove caries. Yet, a similar stain on other parts of the tooth, such as the pulpal floor, could be considered affected dentin. Without microbiological studies, using stain to determine whether the dentin is bacterially infected is clearly subjective at best and, at the worst, not supported by current science.

The dental explorer, at least in the United States, is frequently responsible for what is called caries. Despite litera-

ture to the contrary, the so-called stick or tug back of a sharp explorer is still used by clinicians and taught by some educators.^{13,14} The scientific argument against the use of an explorer was extensively reviewed by Stookey in 2005.¹⁵

As has been demonstrated, using the single-term caries is problematic. In the examples just cited, the single-term caries is unable to communicate the nuances between the radiographic appearance, clinical presence of stain, or even the stick of an explorer. Many educators and researchers are also guilty of adding to the confusion by not clearly defining or explaining the term caries in publications and oral presentations.⁹ Even when laboratory terms such as histologic caries, polarized light microscopy, and transverse microradiography are used in research manuscripts and oral presentations, the clinical relevance is rarely explained in

detail. For example, the fact that very small quantities of mineral loss measured by these laboratory procedures quite often have no clinical relevance when one has a patient in the chair trying to decide on when and if to restore a tooth surface. The use of the single-term caries, used to describe a variety of different situations leads to confusion. The lack of a common language to describe the temporal events of the caries process is a pitfall, and other systems and terminologies are being explored. One such system is the International Caries Detection and Assessment System, which proposes internationally accepted coding terminology to interpret both precavitated as well as cavitated stages of lesion formation.^{16,17}

Today's Terminology for Today's Management Strategies

Even though the disease of caries remains the same, today's science has dictated a new treatment paradigm; treating dental caries as an infectious disease. In February and March 2003, the *Journal of the California Dental Association* dedicated back-to-back issues to informing the profession of this paradigm shift.^{18,19} It included an extensive review of the science and terminated with a consensus statement of internationally known experts. Both of these journals are still accessible to the general public and can be downloaded at http://www.cdafoundation.org/news_journals.htm.

Dental caries is an infectious disease caused by mutans streptococci and lactobacillus, and is acquired by other humans. When these pathogens are exposed to dietary fermentable carbohydrates, these organisms produce small-chain acids that can diffuse into the tooth and dissolve tooth mineral. This chemical process is called demineralization.⁴ If the term caries is reserved to mean the infectious disease process

itself, then all subsequent changes to the tooth resulting from demineralization could be thought of as symptoms of the disease and not caries.

Many of these early changes are not visible to the naked eye. Early demineralization causes subsurface mineral loss, which eventually will refract visible light and appear as a white spot lesion.²⁰ If allowed to demineralize further, the mineral will become more porous and will pick up exogenous stain and appear as a brown spot lesion. The appearance and texture of the surface can often give clues of lesion activity.^{21,22} A dull and rough appearance often suggests that the lesion is in an active state of demineralization, and thus the term active carious lesion.

Just as acid was able to diffuse into the enamel and dissolve mineral, if the pH is first neutralized, the calcium phosphate, will eventually reach concentration equilibrium and can diffuse back into the tooth if conditions are right. This reversal of the demineralization process is called remineralization. Remineralization will occur if healthy saliva first neutralizes the acid, raising the pH, and provides the needed calcium and phosphate in solution to diffuse back into the tooth.⁴ The remineralization process is greatly enhanced by the presence of topical fluoride. In contrast to the dull and rough appearance of active demineralization, a remineralized surface will appear smooth and shiny, and can be considered as a sign of an inactive or arrested carious lesion. Another surface characteristic, which may be helpful in assessing activity on the dentin and cementum, is color. For example, a root or dentinal surface will appear tooth-colored to tan when actively demineralizing, and will turn to a dark brown to black color when arrested or remineralized. Thus, the demineralization and remineralization process can be thought of as nothing

more than a simple reversible chemical reaction that can be manipulated by the clinician to favor remineralization by simply manipulating the risk factors of the patient (caries management by risk assessment).

Summary

Although at times it is tempting to take the easy route and describe terms in **Figure 1** by simply saying caries, patients can be better served by clear universal communication in describing what is seen. More precise terms can better describe the temporal characteristics and activity of this dynamic disease process whereas the single-term caries cannot. This is increasingly more important when treating dental caries as an infectious disease, which includes prevention and chemical reversal of precavitated lesions, as well as early detection and minimally invasive restorative techniques for cavitated lesions. Dental caries may be the same old disease dentistry has labored to treat for centuries; the pathological and chemical events remain the same. However using precise terminology rather than the single-term caries will support appropriate patient care and will help eliminate confusion as well as reduce the chance of undertreatment and overtreatment. **CDA**

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Practice Management

Why an Attorney Cannot Represent Both Sides of a Practice Sale

Patrick J. Wood, JD, and Jason P. Wood, JD

ABSTRACT

This article is designed to point out select problems dentists may encounter when two or more dentists in a transaction seek to have the same attorney represent all of their interests.

Most dentists have very little business interaction with lawyers during their career. As a result, many of them feel that on those occasions where they need legal representation, they can utilize just one attorney, even when it involves a transaction with two or more parties who may have adverse interests.

Even some lawyers fail to recognize the potential conflicts that can arise in what appear to be simple transactions. Of course, not every transaction requires that each side be represented by an attorney. For instance, an attorney may ethically represent two dentists when forming a corporation where they will have equal ownership interests. By contrast, an attorney should never attempt to represent the buyer and the seller in a dental practice sale, because, whether they know it or not, the dentists' goals are in direct conflict with each other.

The following is a brief summary of some of the conflicts that occur in a simple dental practice sale transaction, but by no means is this article intended to cover every conflict that a

lawyer should recognize when asked to represent both parties in a transaction. They include:

Purchase Price. As many as half of all dental practice sales involve no broker, sales often being by the owner to his or her associate. In many of these instances, the parties will not have the benefit of a detailed broker appraisal and will contact an attorney to do the paperwork. If the attorney has a substantial background in dental practice sales and knows that the purchase price is significantly above or below the market rate, the attorney should disclose this even though the disclosure is directly adverse to one of the clients.

Tax Issues. The amount that is paid for a dental practice is required to be reported to IRS, and IRS regulations



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Practice Management

allow the parties to select from a variety of reporting categories that may benefit either the buyer or the seller.^{1,2} Generally speaking, the seller will want most of the purchase price allocated into goodwill, a category that allows the seller to pay the lower 15 percent federal capital gains rate on the amount allocated to goodwill.³ However, the buyer may only write off this amount over 15 years.⁴ By contrast, the buyer would like a significant amount of the purchase price allocated to supplies, a consulting agreement, and even to accounts receivable, as they can be written off in the first year.⁵ In addition, IRS rules currently allow a \$100,000 first-year write off on equipment, and any additional amounts allocated to equipment can be written off over five years.^{6,7} However, these latter categories subject the seller to ordinary income tax and significantly increase the seller's tax liability.⁸ At a minimum, the attorney should advise the clients of the significance of these allocation elections, and should try to get the clients to retain a qualified certified public accountant to separately advise them.

Redo Work. Often, a retiring dentist may be moving out of the area and won't want to be saddled with having to redo failed work. At times, the seller simply wants to narrow the window during which he or she will be responsible for redoing such work. By contrast, the buyer has paid a significant price for the dental practice's goodwill, and wants the selling dentist to redo the work or to pay the buyer to redo it in order to retain a satisfied patient. While there is generally a one-year statute of limitations on personal injury lawsuits, there is a four-year statute for breach

of a contract, and most insurance companies will pay for certain procedures no more than once every five years.^{9,10} How does the lawyer representing both the buyer and seller properly counsel them in this situation?

Covenant Not to Compete. A properly drafted purchase agreement will contain a covenant prohibiting the seller from competing with the buyer post-closing. California law requires that the

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covenant radius.*

radius and the length of the covenant must be reasonable.¹¹ The selling dentist may plan on opening another practice in a nearby area, and the buyer may feel threatened and insist on a wide covenant radius. What should the attorney advise his clients who have conflicting goals? Frequently, the buyer will seek monetary penalties for violating the covenants, but who should advise the clients on what is reasonable?

Furthermore, if a violation does occur and the buyer seeks a restraining order, one of the prerequisites is that the buyer prove actual damages, which can be very difficult since the seller's patients generally will not cooperate

with the buyer or buyer's counsel.¹² A properly drafted covenant would contain a waiver of this requirement, but drafting such a waiver would be adverse to the seller's interest.

Covenant Not to Treat. In urban areas, most purchase agreements will have a 10-mile radius covenant area in which the seller cannot practice. The seller may be opening a practice just outside of this covenant area and will expect that some of the patients will either seek the seller out or will see the seller's business page or other advertisement and transfer to the new office. Any loss of patients will be harmful to the buyer, and the buyer should want to greatly limit the seller's ability to treat former patients at another location. While an absolute ban on treating the patients at another location is not enforceable, a prohibition on treating them within certain areas (larger than the covenant not to compete area) is permissible.¹³ How should the attorney advise the respective clients on the subject, particularly if the seller hasn't even raised it as a possibility? The attorney has a duty to anticipate situations, which, in his or her experience, may become a problem for one of the clients, and advise them appropriately. However, this attorney representing both sides is sure to offend the seller, whether or not the seller plans on opening another practice.

Contingencies. Most sellers want a simple transaction that will close quickly. Most buyers want to have ample opportunity to review books and records, charts, obtain a satisfactory lease, process and obtain a favorable loan, and have sufficient time in which to do so. There would typically be a

security deposit, which would be forfeited to the seller at the end of a contingency period so that the seller “knows” that the deal is likely to close. The buyer will try to push the contingency dates out as far as possible. What should the attorney representing both sides of the transaction advise?

Many dentists see dual representation of the buyer and seller as a way of saving money. Since the interests of the buyer and seller in many instances are diametrically opposed, how can an ethical attorney truly represent both sides of a deal when their best interests may be in direct conflict?

In most cases, the California State Bar limits an attorney where such conflicts exist. For instance, under California Rules of Professional Conduct, at Rule 3-310, a lawyer is not allowed to accept representation of more than one client in a particular matter where the interests of the clients potentially conflict without the “informed written consent of each client.”¹⁴ Furthermore, if, during the course of representation, it becomes apparent that the interest of the clients actually conflict, the attorney must again obtain an informed, written consent from each client.¹⁵ The key element in this rule is that the client must give an informed, written consent, specifying the nature of the conflict. However, it is almost impossible for a dentist to give an informed consent when so many different conflicts can arise in a simple dental practice sale. More importantly, if the attorney isn’t even familiar with the few examples mentioned in this article, how well are the parties interests being represented?

It may seem attractive to a buyer and seller to hire just one attorney in a

dental practice sale, particularly when they usually think it’s just a “simple transaction,” or because they are getting along very well during this “courtship.” However, like so many courtships, differences later develop, and if the purchase document was drafted by one attorney trying to serve two masters, one or both of the masters would likely resent such dual representation when a real problem arises.

Since the interests of the buyer and seller in many instances are diametrically opposed, how can an ethical attorney truly represent both sides of a deal when their best interests may be in direct conflict?

Adding insult to injury, the cost savings these two dentists are trying to achieve will pale in comparison to the expense each dentist will incur in litigation costs if a lawsuit is filed. Hence, dentists need their own counsel in most transactions, particularly dental practice sales. **CDA**

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 9. California Code of Civil Procedure Section 340 and California Code of Civil Procedure Section 340.5.

10. California Code of Civil Procedure Section 337.

11. California Business & Professions Code, Section 16601.

12. California Code of Civil Procedure, Section 526.

13. California Business & Professions Code, Section 16601.

14. California Rules of Professional Conduct, Rule 3-310; Cal. Jur. 3d (Rev) Attorneys at Law, Section 89, et seq.

15. California Rules of Professional Conduct, Rule 3-310; Cal. Jur. 3d (Rev) Attorneys at Law, Section 89 et seq.

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Dental Establishment Business Activity in California Counties at the Start of the Millennium

H. Barry Waldman, DDS, MPH, PhD

ABSTRACT

The Bureau of the Census reports for 2002 were used to develop business data for “average” dental establishments in each of the counties in California. On average, between 1997 and 2002, when compared to national information, the number of California statewide dental establishments increased at a greater rate, had a smaller resident population per establishment, reported lower gross receipts, had fewer employees, and paid lower salaries to employees.

In 2002, there were 17,724 dental establishments in California. Every five years, the Bureau of the Census requires a report from all businesses describing a series of economic and employment information. Definitions are maintained through the years in an effort to permit comparisons. An establishment is a single, physical location at which business is conducted or where services are performed. It is not necessarily identical to a company or enterprise, which may consist of one or more establishments. In addition, one or more practitioners may be present in an establishment.¹

The “average” dental establishment reported \$584,000 in business receipts and had 5.9 employees, each of whom was paid an annualized “average” salary of \$33,000 (Table 1). Employees may



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**Table 1****United States and California Dental Establishments With a Payroll: 1997, 2002¹⁻⁵**

	Number of establishments		Population per establishment		Gross receipts*	Average number of employees	Average salary per employee*
	1997	2002	2002	Change '97-'02	2002	2002	2002
California	16,387	17,724	1,993	+**	\$584	5.9	\$33
United States	114,178	117,812	2,444	+	604	6.3	35

* In thousands

** + Represents increase in population per establishment.

Note: Data include those establishments that are subject to federal income tax.

include dentists, dental hygienists, dental assistants, office staff, etc.

But no dental establishment is “average,” and wide variations exist among dental facilities in the different counties of the state. Keeping track of the evolving and contrasting economic dynamics of dental establishments provides needed information to monitor developments for the general profession and individuals practitioners. Results from the census bureau’s national, state, and county report on business activities (produced every five years, with specific information on numbers of establishments, gross receipts, employees and salaries) permit an analysis of evolving business trends. (Note: In order to protect the privacy of individual establishments, data are not published for businesses in counties with limited numbers of particular types of establishments.) Dental establishment data for California are available for 48 of the 58 counties (Tables 1 and 2).

Overall business receipt data for 2002 (published in May 2005) were used to develop information on “average” dental establishments in each California county, the state, and nationwide.

Throughout this report, the term “dental establishment” refers to those

facilities subject to federal income tax. Government agency programs (hospital and health department clinics) are not included. (Dental establishment business data also are available in the census bureau report for the metropolitan areas and some of the larger cities and communities in the state.¹) An earlier presentation in the *Journal of the California Dental Association* reviewed dental practice activities in the state using census bureau data for the early 1980s through the early 1990s.⁶

United States vs. California

Between 1997 and 2002, the number of dental establishments in this country increased by 3.2 percent, an increase of 3,634 sites. During the same period, there was an increase of 1,337 establishments in California, an increase of 8.2 percent. In 2002, there were 2,444 residents per U.S. dental establishment, compared to 1,993 in California. At the national and state levels, there were very limited increases in the number of residents per dental establishment since 1997. In California, there was an increase from 1,980 to 1,993 residents per dental establishment (Table 1).

National “average” gross receipts per dental establishment, \$604,000, was

greater than that of the “average” dental establishment in California, \$584,000.

Nationally, the average number of employees per dental establishment and annual salary per employee — 6.3 employees with an average annual salary of the \$35,000 — was greater than in California, 5.9 employees with an average annual salary of \$33,000 (Table 1). In terms of constant dollar, i.e. removing the effects of inflation, between 1997 and 2002, the average salaries for dental employees at the national and state levels did not keep pace with the rate of inflation.⁷

Number and Size of Establishments

In the decade between the early 1990s and 2002, there was an increase of 3,252 dental establishments in California. The number of smaller establishments, with less than five employees, increased by 10 percent in California. However, nationally, there was a decrease, -14 percent, of more than 8,000 smaller facilities. In terms of proportional representation, the smaller establishments in the state did decrease, mirroring the increasing share of dental establishments with greater number of employees (Table 3).

California Counties

Population per establishment

In 2002, the population per dental establishment ranged from almost 1,200 in Marin County and almost 1,300 in San Francisco County to approximately 4,500 in Imperial County, 4,700 in Calaveras County, and 7,000 in Yuba County (Table 2).

Gross receipts per establishment

Average gross receipts per dental establishment ranged from \$333,000 and \$334,000 in Del Norte and Yuba

counties, and \$383,000 in Siskiyou County to more than \$700,000 in Placer, Stanislaus, Sutter, and Tulare counties, and \$800,000 in Amador County (Table 2).

Number of employees

In 2002, there were more than 46,200 employees in dental establishments in California, 6.2 percent of the 750,000 dental employees throughout the nation. The number of employees per dental establishment ranged from 3.8 employees in Del Norte County and 4.6 employees in Yuba County to 10.5

employees in Tulare County.

The average establishment in 40 counties had between six and almost seven employees. The average establishment in Kern, Stanislaus, and Sutter had seven or more employees. The average establishment in Amador, Imperial, and Lassen counties had more than eight employees (Table 2).

Employee salaries

In 2002, annual salaries per employee ranged from \$18,000 in Del Norte County, and less than \$25,000 in Imperial, Lassen, Siskiyou, and Tehama

Table 2

California Dental Establishments With a Payroll By County: 2002¹⁻³

	Number of establishments	Population per establishment	Gross receipts*	Number of employees	Salary per employee*
Alameda	835	1,790	\$633	6.4	\$33
Amador	16	2,287	800	8.1	36
Butte	106	2,004	547	5.8	28
Calaveras	9	4,722	495	5.4	31
Contra Costa	565	1,752	657	6.4	35
Del Norte	8	3,488	334	3.8	18
El Dorado	88	1,880	657	6.4	31
Fresno	352	2,375	593	6.1	34
Humboldt	63	2,038	496	5.6	28
Imperial	33	4,524	568	8.3	24
Inyo	9	2,044	472	5.8	35
Kern	187	3,733	692	7.5	32
Kings	33	4,094	558	6.5	26
Lake	19	3,226	560	6.6	25
Lassen	9	3,789	697	8.2	21
Los Angeles	4,835	2,045	513	5.5	31
Madera	31	4,177	619	6.7	25
Marin	209	1,196	614	5.4	36
Mendocino	42	2,102	547	5.5	30
Merced	68	3,291	659	5.9	37

Table continues on Page 378

Business Activity



Table 2 continued

	Number of establishments	Population per establishment	Gross receipts*	Number of employees	Salary per employee*
Monterey	188	2,201	674	6.5	32
Napa	77	1,674	619	6.4	34
Nevada	57	1,684	518	5.7	26
Orange	1,883	1,572	534	5.4	33
Placer	175	1,562	704	6.2	35
Plumas	12	1,758	449	5.2	26
Riverside	575	2,926	655	6.1	33
Sacramento	638	2,042	681	6.3	37
San Bernardino	578	3,143	607	6.5	30
San Diego	1,501	1,962	581	5.7	34
San Francisco	613	1,286	566	5.0	34
San Joaquin	230	2,643	584	5.9	32
San Luis Obispo	123	2,076	598	6.3	28
San Mateo	447	1,592	611	6.0	33
Santa Barbara	240	1,701	559	5.6	31
Santa Cruz	145	1,786	648	6.6	34
Shasta	88	1,956	637	6.3	31
Siskiyou	22	2,027	383	5.0	23
Solano	183	2,249	692	6.8	34
Sonoma	285	1,651	641	6.3	31
Stanislaus	190	2,515	725	7.5	32
Sutter	44	1,877	763	7.0	36
Tehama	19	3,032	532	5.9	24
Tulare	120	3,193	760	10.5	37
Tuolumne	34	1,662	536	6.1	30
Ventura	397	1,985	545	5.8	32
Yolo	72	2,501	644	6.5	32
Yuba	9	6,967	333	4.6	29

* In thousands

Note: Data include those establishments that are subject to federal income tax.

Receipt and salary data have been rounded.

counties to \$36,000 and \$37,000 in Amador, Marin, Merced, Sacramento, Sutter, and Tulare counties. (Note: It should be emphasized, that “employees” include dentists in addition to other personnel.)

How's Your Practice Doing?

Now that one could have compared one's personal dental establishment data to those of other establishments in the same county, one should remember, there is no such thing as an “average” dental establishment. The particular requisites of

one's community determine business events in one's establishment, including employment patterns, employee salaries and the like. For example, gross receipts reflect practice activities, but based upon variations in practice overhead costs, they may not indicate practitioner income.

The continued monitoring of generalized dental establishment business activities beyond the confines of a single facility does provide an appreciation of developments that affect the profession in general and one's establishment in particular.

CDA

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Table 3

Distribution of Dental Employees by Size of Dental Establishment, California and the United States: 1991, 2002^{2,5}

Number of employees	California Number of establishments			United States Number of establishments		
	1991	2002	Percent change	1991	2002	Percent change
1-4	7,723	8,500	10.0%	58,013	49,846	-14.1%
5-9	4,881	6,305	29.2	36,744	45,997	25.1
10-19	1,586	2,453	54.7	10,155	19,002	87.1
20-49	255	430	68.6	1,317	2,785	111.5
50+	27	36	33.3	133	181	36.1
Total	14,472	17,724	22.4%	106,362	117,812	10.7%
Employee per Establishment	5.4	5.9		5.1	6.3	
Percent distribution of establishments						
1-4	53.4%	47.9%		54.5%	42.3%	
5-9	33.7	35.6		34.5	39.0	
10-19	10.9	13.8		9.5	16.1	
20-49	1.7	2.4		1.2	2.4	
50+	0.1	0.1		0.1	0.1	
Total	100%	100%		100%	100%	

Note: There are slight variations in the total number of establishments in various census bureau reports.



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A Chicken Story That's No Croc(k)



When the scientists
finally ran out of
adjectives, one of
them returned to the
mutant chick and
looked in its mouth.
Teeth! The thing
had teeth!

Back in New York, the executives of Imaginova are gathered around the board table celebrating the one-year anniversary of LiveScience.com. The journalistic essence of cool, *LiveScience* provides breaking science news coupled with in-depth and often irreverent feature stories that capture people's fascination with everything from technological innovations to space and nature images.

"They are getting scarcer than hen's teeth," lamented one of the guys.

"What is?" asked a notebook doodler, taking a sip from his triple-espresso double-latte with half milk and extra foam.

"Oh, coming up with scientific, but cool, innovative, but irreverent, rich and compelling, but wacko feature stories that will grab the attention of our intellectually curious, but adventurous audience demographic," explained the concerned staffer.

Enter Robert Roy Britt, *LiveScience* managing editor, a no-nonsense three-name journalist who recognized the hen's teeth reference as a challenge not to be denied.

In a trice, Bjorn Carey, *LiveScience* staff writer, is assigned a story so captivating, but

bizarre, so amazing, but incredibly cool that dentists the world over — except perhaps in Iraq and the Russian steppes — will be gathering in small places like where dentists gather to marvel at the revelation.

With the meringue sluiced off and some of the lines altered to make the right margins neater, this is essentially what Bjorn discovered:

■ Despite the fact that millions of children have grown up knowing that birds have teeth, thanks to the scientific accuracy of Warner Bros. and Disney's cartoonists, the fact is, they don't. But, wait!

■ Fifty years ago, a mutant chick was discovered to have severe limb defects. It died before hatching, so scientists went back to discovering that if they combined some common elements found around the house, like lard and attar of potrzebie, put them into attractive packages and labeled them with names like Rejuvenating Moisturizer, Fat Zapper Miracle Cream,

Continued on Page 401



Inducing chickens to do anything is an art in itself.

Continued from Page 402

Wrinkle Removing Advanced Crisco, and Celebrity Cellulite Eliminator, they could retail the stuff at \$75 an ounce to women dedicated to postponing the “My goodness, I-look-like-I’ve-slept-under-a-bridge-all- night look.”

■ When the scientists finally ran out of adjectives, one of them returned to the mutant chick and looked in its mouth. Teeth! The thing had teeth! Not regular cartoon Chiclet teeth, but more like crocodile dentition. A puzzlement.

Not so much to Mark Ferguson of the University of Manchester, who said that birds are the closest living relatives of the reptile. These early birds, called archosaurs, were well-equipped to get the worm as well as more substantial prey. This was about 300 million years ago, said Ferguson, who wasn’t alive at the time, so it could vary a few years either way.

The birds had mouths similar in shape to a reptile’s, but for reasons that are only clear to the Intelligent Design people, 80 million years ago, modern birds emerged with standard-issue bird beaks, causing them to lose their teeth, to say nothing of their standing as first-class carnivores.

John Fallon of the University of Wisconsin explained what happened. But unless you are into ornithological studies in a big way, you’d best skip this part. Suffice it to say, the discovery of the mutant chick and its teeth tickled the fancy of scientists who sharpened their imaginations and sat down to ponder.

What if the 80 million-year-old genetic pathway still existed in modern, healthy chickens pecking around happily under the watchful care of Tyson’s or Foster Farms?

By making “a few changes to the expression of certain molecules in the pathway,” *LiveScience* reported, the researchers were able to “induce tooth growth” in normal developing chickens. Inducing chickens to do anything is an art in itself. Outside of that one chicken on TV that could beat anybody three times out of five playing tic-tac-toe, the species is as dumb as a rock. How one would recognize a change in expression of a molecule, an entity given largely to deadpan responses, was probably on a need-to-know basis.

LiSci is not telling. The scientists reported the teeth looked like reptilian teeth. The whole thing supported their hypothesis — always a desirable goal when applying for new grants. Then they looked more closely at the big picture that included, but was not limited to, millions of free-range chickens having the temperament of land-based piranhas. Discretion became the better part of valor and they aborted the hatching process. Yay!

Cloaked in the usual scientific gobbledegook, the results are still scarcer than hen’s teeth to interested dentists who keep asking, “What’s in it for us?”

We have heard all the rumors of stem cell cloning teeth on mice, but have yet to see a practical application of this in our human patients. Unless the National Hockey League, an organization of edentulous bruisers with a treasury large enough to support lengthy strikes, develops a passion for action, another 50 years may slip by. Considering these guys are hugely intimidating as is, offering them an option of crocodile-like teeth as replacements may not be in society’s best interests.

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