



How to Integrate CAMBRA into Private Practice

V. KIM KUTSCH, DMD; GRAEME MILICICH, BDS; WILLIAM DOMB, DMD;
MAX ANDERSON, DDS; AND ED ZINMAN, DDS, JD

ABSTRACT The traditional dentistry approach treated the disease with a limited surgical strategy aimed at removing carious lesions on teeth. Today, the dental profession is refocusing its efforts to include risk assessment with evidence-based diagnosis while also treating the biofilm component of the disease. While there is compelling science to support CAMBRA, there are fewer articles with practical direction regarding how to integrate CAMBRA diagnostics and treatment into clinical practice, which this article addresses.

AUTHORS

V. Kim Kutsch, DMD, is in clinical practice in Albany, Ore.

Graeme Milichich, BDS, is in clinical practice, Anglesea Clinic Dental Care, in Hamilton, New Zealand.

William C. Domb, DMD, is in clinical practice in Upland, Calif.

Max Anderson, DDS, MS, MED, is with Anderson Dental Consulting in Sequim, Wash.

Edwin J. Zinman, DDS, JD, is with the Law Offices of Edwin J. Zinman, in San Francisco.

A clinician's ability to successfully integrate any new methodology or technology into an existing dental practice may require a change in some, if not all, of the existing systems. The dentist-owner/manager who explains CAMBRA benefits (through education) to the dental office team will gain their support and facilitate a smooth transition. The authors examine the different requirements of each member of the dental team to successfully integrate caries risk assessment into an existing dental practice.

There is ample scientific research to support caries risk assessment as a prudent approach to treating, and more importantly, preventing dental caries. Successful implementation requires education and support of the dental team and subsequent education of patients about CAMBRA benefits.

Caries risk assessment, or the management of caries by risk assessment, represents an evidence-based approach to managing dental caries. A challenge for dental practitioners integrating new scientific implications into clinical practice is identifying the practical and strategic steps necessary to accomplish that task. Key tools that help the dentist and the dental team integrate CAMBRA into their existing practices are recommended.

Traditional dentistry has not always adequately controlled caries by its predominantly surgical approach. Only treating existing caries restoratively may not prevent a lifelong continuation of a chronic disease state that ultimately contributes to recurrent caries necessitating additional surgical interventions.¹ Consequently, a working group has re-examined our profession's approach to preventing and managing caries.² CAMBRA, caries

management by risk assessment, is a rationale that examines caries concentration in a particular patient, then plans a measured treatment based on the individual needs of the patient.³

In health, the oral biofilm is a diverse and complex community of about 400 different bacterial species in any individual patient. When desirable bacteria dominate the oral biofilm, there is a healthy equilibrium. This biofilm serves many positive functions, including balancing the demineralization-remineralization cycles of enamel, and standing as the first line of defense against pathogens.⁴ Cariogenic bacteria are known to be infectious and transmittable.⁵ Most children acquire these bacteria during the first few months of life from their primary caregiver. Typically these cariogenic bacteria represent less than 1 percent of the oral biofilm. However, under certain conditions, a healthy biofilm can be transformed into a diseased state. Cariogenic bacteria then thrive and proliferate into a much higher percentage of the biofilm.⁶

Caries risk factors — which include cariogenic biofilm, poor diet, saliva production, medications, absence of fluorides, and inadequate homecare — are summarized in Featherstone et al. in last month's issue.⁷ Metabolism of carbohydrates by cariogenic bacteria results in acid production. This lowers the pH of the biofilm, which inhibits many commensal organisms. When compounded with other risk factors, the acidic pH becomes the selection pressure that results in an overabundance of acidogenic organisms.⁸ Demineralization sufficient to cause cavitation is a sign of the underlying disease. CAMBRA examines the carious biofilm and its potential for releasing its variety of bio-acids that, unless neutralized, can eventually destroy tooth structure.

While it is important to restore

teeth, it is critical to address correcting the biofilm imbalance and other predisposing factors to be successful in treating the source of carious lesions. When restoring new cavities, we should be asking ourselves, "What am I doing to help the patient prevent more cavities from forming?" Appropriately, then, CAMBRA has been continually gaining ground in scientific research, dental education, and private practice.

CARIES MANAGEMENT
by risk assessment
represents a significant
change in mindset: how
we examine and prioritize
treating caries disease.

Implementation Strategies

While there are a number of valid scientific reasons to implement CAMBRA into private practice, including ethical, legal and standard of care issues, the most important reason is patient benefit, which is our primary obligation. CAMBRA conversion in private practice does not happen overnight. Caries management by risk assessment represents a significant change in mindset: how we examine and prioritize treating caries disease. Implementing CAMBRA affects all systems in the practice, from scheduling and fees to diagnostics, treatment, and patient education.

CAMBRA's goal is to educate and motivate patients to improve their behaviors and give them strategies to attain and maintain a healthy bio-balance in their mouth. Many patients will still

need restorative procedures. CAMBRA does not eliminate the need for lesion or tooth repair. However, other tactics may be introduced that reduce the number of restorative interventions when patients can be empowered to rebalance their own oral equilibrium and remineralize tooth damage. Then, depending on assessed risk factors, patients should be re-examined at reasonable frequencies to review potential changes in their risk factors. This can involve saliva testing, diet review, quantification of acidogenic bacterial levels, buffering capacity and the like. CAMBRA, in this sense, is a formalization of many techniques of caries control used by dentists for considerable time (refer to Ramos-Gomez et al., Featherstone et al., and Jenson et al., in last month's issue for details of the recommended procedures).

Being the Leader

First, the team leader is determined and this person must be very clear and realistic about the goals. The authors recommend the CAMBRA team leader provide written CAMBRA goals and methodology, and share them with the team. Goals should be concise, concrete, and easy for team members to understand and implement. Some goals may require the acquisition of new skills, knowledge, or materials. In the case of CAMBRA, it requires an understanding of the cariogenic biofilm, how to properly diagnose, treat, monitor, and measure treatment outcomes, i.e., CAMBRA courses for the dental team should be considered along with training videos and manuals. Standardized caries risk assessment forms are useful, along with some metric to gauge bacterial load. What antibacterials and/or remineralization products are available? What patient education materials are on hand?

Once the practice appreciates CAMBRA goals and benefits, it can design

the pathway from the present position to accomplish the future goal. As with any planning process, it is a good idea to establish a timeline with intermediate milestones. Deciding which team member is responsible for each step is important. Do not arbitrarily designate a person to do a step without education. Also, identify who will monitor and measure the progress on a timely basis. Consider implementing a reward system for both the intermediate process as well as final steps.

Identifying the challenges and barriers to accomplishing each milestone is also of great use:

- How much will it cost?
- What space will be necessary?
- What materials will we use?
- How long before we are able to implement CAMBRA for all patients?
- How will this affect all of the office systems already in place?
- Who will be doing the initial caries risk assessment?

Implementing CAMBRA is an opportunity for benefiting patients and our profession. Probably the greatest challenge is the paradigm shift in the dentist's mindset. Dentists were trained to drill first and ask questions later. They were instructed in the first week of dental school that dental caries is an infectious bacterial disease and then, instantly, a dental drill was placed in their hands. The practice of CAMBRA changes this approach to: Ask questions first; follow up with more questions; find out why you are drilling; figure out how to avoid drilling in the future; and then drill only what is minimally necessary. Finally, monitor and measure your treatment outcomes.

The Role of the Dental Team

CAMBRA can only be successfully integrated into a practice if the entire dental team understands and supports

this methodology. Like any other change in the dental practice, CAMBRA will not succeed without the support of the entire dental team. Peltier, Weinstein, and Fredekind discuss behavioral change in more detail in this issue. Communication and education are vital keys to success. The dentist should spend time with their team studying the scientific basis of dental caries and then focusing on the patient benefits of CAMBRA.

**CAMBRA CAN ONLY
be successfully
integrated into a
practice if the entire
dental team
understands and supports
this methodology.**

Staff meetings can be used to discuss the evidence and the approach to CAMBRA as the standard of care. One measure of success in this education process of your team is to end the session with a show of hands to "How many would like their own children or loved ones treated in this fashion?" If everyone raises their hand, then your next question should be "Why then shouldn't we treat all our patients the way we would treat our own loved ones?" Isn't this the type of practice you want to develop?

There are many resources for CAMBRA's scientific foundation. Previous issues of the *Journal of the California Dental Association* focused on this topic in February and March 2003, and are permanently archived in their entirety on the CDA Foundation Web site at www.cdafoundation.org/journal. PubMed is

also an excellent resource for articles on caries risk assessment. Additional information can be gathered by attending local or state C.E. programs focused on CAMBRA. Taking the entire dental team to these programs is an excellent opportunity to update the CAMBRA team.

Once the team understands and supports the goal, each member can contribute to the road map design by identifying how CAMBRA will impact their responsibilities and what changes are needed. This will create some new challenges, as team members evaluate how they can incorporate more services into a limited amount of time. In many offices, the majority of the CAMBRA education, risk assessment, bacterial testing, and treatment monitoring occurs in the hygiene operator. This may place new demands on the duties and scheduling of both the hygienist and dental assistants. Every practice will solve these changes as appropriate for the individual practice. Many of these issues are discussed by Gutkowski et al. in this issue of the *Journal*.

It is important during the implementation to have frequent feedback and evaluate successes or delays. Having the entire team solve these issues is critical for success. It is also important to share patient success stories as a group. Nothing takes the fear and dread out of changes like hearing about the differences we are making in patients' lives. Address and solve issues, but success comes from keeping the team focused on the goal. Since our goal is to ultimately improve the dental health of our patients, we need new benchmarks to measure our success. The dental profession has always used the "no cavities" as a gold standard for the measurement of health. But a patient with high risk factors and "no cavities" is in reality a patient with a disease that

hasn't manifested caries signs or symptoms yet. In addition, a patient that currently has "no cavities" doesn't necessarily mean they are at low risk for future caries.

Enlightening Experience

There is no substitute for a first-hand experience. The dentist should follow through the CAMBRA process as a patient in the office. Then, each team member should go through the process as well. This may be an enlightening experience for the individual team members, as they may personally discover unknown risk factors or risky bacterial loads. In a delicate bio-balance of dental health equilibrium, it may take only tiny changes to create serious issues in what otherwise appeared to be a healthy mouth.

Every dentist has had experience with the high-risk patient, young or old, with serious decay issues. And every practice has patients who have been decay-free for years. It's the group in between that represents the greatest diagnostic challenge. Patients who come along with little evidence of disease for long periods may suddenly develop multiple new cavities. These patients potentially benefit the most from CAMBRA. It is easy to identify the high-risk, high caries active patients, and also the low-risk, low caries active patients. However, the patients who are at risk with no apparent signs of the disease are the ones CAMBRA helps to identify and benefit with caries risk reduction.

At a staff meeting, the dental team should practice filling out the caries risk assessment forms and doing the bacterial testing. Each can practice how they will explain CAMBRA benefits to patients. Communicating new ideas comfortably and competently generally requires some practice and role play. It also presents an opportunity to practice answering the patients' fre-

quently asked questions as follows:

- Why do I get cavities?
- I brush and floss, doesn't that prevent any cavities?
- How do you determine my caries risk? Is the treatment expensive?
- If I have the caries disease, should other members of my household be tested too?
- Why hasn't anybody explained this to me before?

**THE PATIENTS WHO
are at risk with no
apparent signs of the
disease are the ones
CAMBRA helps to identify
and benefit with caries
risk reduction.**

Because CAMBRA is pretty straightforward and logical, the most frequently asked question seems to be "Why hasn't anybody told me this before?" The staff can give each other immediate feedback during the process. How did the experience feel? Was there enough information? Did it make sense? Was it comfortable? This scenario gives everybody a first-hand experience as a patient. It also gives everybody a chance to practice in a safe and comfortable environment the new language and communication skills that the changes will require. They will be more confident and the program will be more successful as a result of taking the time to practice.

There are numerous offices that have already successfully integrated CAMBRA into their daily practices. You don't have to necessarily reinvent the wheel. Contacting a CAMBRA colleague or join-

ing organizations that currently practice CAMBRA provides valuable information on what ideas helped the process and what hurdles the dental team overcame. Use established networks and resources such as the World Congress of Minimally Invasive Dentistry for support and advice.

- www.cdafoundation.org/journal
- www.first5oralhealth.org
- www.adea.org/DMS/Sections/default.htm
- www.aapd.org
- www.icdas.org
- www.midentistry.org
- www.wcmid.com

Educating the Patients

Once the entire team understands and is ready to implement CAMBRA, it is time to educate your patients. A personal letter explaining the CAMBRA benefits is a great way to break the news to everybody at the same time. Put it in your newsletter or on your Web site and advise your patients to look and learn. Experience reported from a number of offices has shown that this is a very effective way to deliver detailed information because most patients do read your newsletters. Some practices have developed brochures explaining CAMBRA. These are mailed with a cover letter to the patient base. Also provide patients with a brochure at the front desk when they arrive for their appointment. Explain the evolving change in the practice's progressive improvements with the latest scientific technology and caries studies. Let them know what to expect on their next visit. The more informed basic information you can provide in these formats, the less chairtime you will need to spend explaining CAMBRA to them.

Also, the information you advise in the operatory will reinforce what they read earlier. A simple one-page description of the caries process designed for children and adults is included at the end

of the description of caries risk assessment by Featherstone et al. in this issue. Thus, chairtime can be effectively devoted to answering questions rather than beginning CAMBRA education at ground zero.

Provide the extra time for education and communication with the patients. Try to schedule and allow for the few more minutes it will require to explain CAMBRA to them, and always answer their questions. The benefit of having the entire team supporting the philosophy change is they will hear it from more than one person and tend to require less of the dentist's direct time in education. However, the most effective message still has to originate from the dentist. "This is how we are changing and here is why" is the doctor's obligation. A logical goal in the CAMBRA conversation with the patient is for them to understand that just treating their cavities will not prevent future disease. Also, cavities are only underlying signs and symptoms of the caries bacterial infection process. Patients need to understand that this biofilm infection must be diagnosed and treated as a disease process. They also need to learn and understand the concept of the balance between health and disease and the pathologic factors versus the protective factors. With proper educational background, patients should be able to help identify any changes in their risk reduction factors during future visits.

If the patients desire additional information, direct them to the CDA Foundation Web site at www.cdafoundation.org, or other cariology Web sites on the Internet. A couple of abstracts from PubMed are helpful to support particular ideas about caries risk assessment. Select the abstracts that convey the key points you want your patients to understand. Download these abstracts as document files, and then boldface and underline

the significant sentences you want to make sure they read and understand. The documents can be printed in Word format and given to the patient to take home. Your patients can forward CAMBRA from your Web site to other friends and family, which is a proven practice builder.

Internet-savvy patients may be interested in accessing PubMed directly. The more understanding and valid informa-

A LOGICAL GOAL
in the CAMBRA
conversation with the
patient is for them to
understand that just treating
their cavities will not
prevent future disease.

tion a patient has, the better is their capability to choose wise health care decisions for themselves. CAMBRA informed patients are great CAMBRA ambassadors who advise others of your improved and modern approach to caries control and prevention.

Undertreatment and Overtreatment Issues

Incipient lesions that do not penetrate through the tooth's enamel and into dentin are candidates for conservative, noninvasive therapy like remineralization, dental sealants, and other preventive measures. Restoring teeth without regard to caries risk and omission of the chemo-reparative and preventative phases of therapy is sometimes called *undertreatment* because patients are only getting the restorative phase of treatment.

Undertreatment occurs when a clinician systematically provides nontreatment or less-than-optimal treatment of existing pathology. This would include failure to diagnose the patient's caries risk status. The consequence of undertreatment is recurring caries and potential loss of more tooth structure and /or teeth. Previously, the rate of progression of dental caries made conservative decisions highly questionable. Today with the lower caries incidence and reduction in caries progression, surgical interventions need to be minimal in all but the most aggressive dental caries situations, the cavitation. In the CAMBRA paradigm, even a small cavitation is a very serious sign of caries imbalance. As part of their risk assessment protocol, dentists need to evaluate the frequency of recall for each patient. If the dental team has evaluated the patient as a high caries probability patient, then prophylactic preventive therapies and other principles identified in this journal should be implemented (Jenson et al. and Spolsky et al., previous issue). This reduces the possibility of undertreatment.

Overtreatment occurs when interventions are unjustified or too aggressive for the clinical situation. The goal of minimally invasive dentistry is to preserve the maximum amount of healthy dental tissues. An example of this conservative MID philosophy is the use of air abrasion, hard tissue lasers, or ultra-small burs to very conservatively clean or open a questionable fissure to "see what's in there" based on the ICDAS codes and the protocols outlined by Jenson et al. in last month's issue rather than blindly restoring the tooth with amalgam or composite. The consequences of overtreatment are well characterized as the "restoration/rerestoration cycle." Any cutting of tooth structure weakens the tooth and should be avoided if possible.

Proper Documentation

All five California dental schools practice and teach caries risk assessment or CAMBRA as a standard of care on patients treated in their clinics. Arguably, CAMBRA is the current standard of care. Standard of care debates are popular among dentists with everybody weighing in with opinions. The purpose of this paper is not to resolve those issues but rather to address current knowledge and science. When examining the risks and the benefits of practicing CAMBRA, implementing this philosophy into the dental practice reduces the caries risk for the patient and the legal risk for the dentist.

Practicing CAMBRA requires proper documentation. In the patient's chart, the dentist should have a standardized caries risk assessment form (Ramos-Gomez et al., Featherstone et al., previous issue), and then routinely include diagnosis, any bacterial testing or monitoring, treatment recommendations, treatment outcomes and recare plans. It is important to record accurately, simply, and routinely to make sure all chart entries are consistent. If the patient declines caries treatment in addition to any restorations, it is important to record that patient declination in the chart notes as well. The patients should be making their treatment decisions with a fully informed consent. Consequently, education about the benefits of CAMBRA is now required for an adequate informed consent, explaining CAMBRA ABCs, which include alternatives, benefits and consequences of non-CAMBRA implementation.

There are numerous forms available to record your assessment results as previously noted. The authors suggest keeping things as simple as possible. The forms presented for children age 0-5 years by Ramos-Gomez et al. and those for

age 6 and older Featherstone et al. in the previous issue are the most scientifically validated to date. The choice of forms is not as important as having a form. This decision might best be made with your team, getting their input on which form would work best. It is best to separate the special situation for children age 0-5 from children age 6 through adult.

FOCUSING ON
caries damage when
CAMBRA
does not intervene
stops short of
reversing
the carious process.

The Economics of Prevention

The dental profession has been a role model by promoting prevention via regular care and recare exams. One of the issues surrounding prevention has been the economics. Most insurance contracts have coverage for preventive care designed for those who are at minimal or moderate risk. Some patients are reluctant to spend their own money on preventive services. Consequently, the majority of traditional dentistry has been focused on restorative rather than chemo-reparative and preventive care. Focusing on caries damage when CAMBRA does not intervene stops short of reversing the carious process.

Historically, the third-party systems and our own patients developed a priority on restorative procedures because dental caries was pandemic and validated risk assessment tools were not available.

While sealants and fluoride treatments were sometimes covered, the focus has too often disregarded preventive treatments. Insurance companies (and employers who negotiate the plans) and patients are willing to pay for a filling, but not the full chemotherapeutic therapy necessary to deal with the bacterial infection and/or to remineralize/repair white spot lesions and most importantly to prevent the next carious lesion from developing. Amidst this environment, the ADA Current Dental Terminology book for 2007/2008 contains a new CDT code for fluoride varnish as a therapeutic treatment for the moderate- to high-risk caries patient. While in the past the dental profession was in a situation where there is little or no apparent value placed on many preventive procedures, there is promising progress with new fee codes being added by third-party payers.

"Why won't my insurance pay for this?" can be a common complaint from patients. And, if insurance won't pay for preventive efforts, some patients reason that perhaps suggested preventive procedures are unnecessary.

CAMBRA From an Economic Standpoint

CAMBRA has a number of procedures associated with it that have direct related fees and fee codes already in place. In the CDT 7, in addition to the normal prevention codes for prophylaxis and fluoride applications there are codes for:

- D 0425: Caries Susceptibility Testing
- D 0415: Bacteriology Studies
- D 0145: Oral Evaluation Patient <3 years, Counseling Primary Caregiver
- D 1206: Topical Fluoride Application for Therapeutic Measures Moderate to High-risk Caries Patient

Medical insurance might cover some of the diagnostic tests such as salivary flow and buffer-

ing capacity measurements.

Some practices include the caries risk assessment as part of the normal oral exam, but additional procedures represent new and separate fees. The medical approach to treating dental caries usually involves behavioral counseling directed at risk factors, followed by a protocol of antimicrobial oral care products and some remineralization strategies and materials. The monitoring of ongoing treatment and outcomes requires additional bacteriology testing. These separate fees will supplement restorative care fees.

While the income generated with the CAMBRA procedures and materials is low in comparison to high-end cosmetic procedures, nonetheless practicing CAMBRA does generate sufficient revenue to justify it from a business model. What is most important is that every single person in the office is absolutely committed to helping their patients become healthy and stay decay-free. What value does that represent to the patients? Everybody must be comfortable with charging patients a fee commensurate with the service provided. Your office must appreciate how important your counsel is to your patients. Patients can be comfortable with your CAMBRA-related fees once you help them understand what value they are receiving. So what if a patient's insurance contract will not reimburse for specific important services? Many will not cover implants, veneers and other cosmetic procedures. Do we avoid presenting these procedures? Do patients decline having them done? Perhaps another analogy helps connect with your patients. Advise that you don't have tire insurance, but when your tires wear out, do you replace them for the safety of your entire family?

CAMBRA fees may result in significant monthly revenue as the process is integrated completely into the practice. And much

of CAMBRA does not require the presence of the dentist for data collection. Patients who finally manage to stabilize themselves with CAMBRA interventions often then decide to undertake more complex and financially productive restorative procedures, including elective procedures once necessary restorative treatment is reduced or eliminated. What experienced CAMBRA practices are discovering is that the real reason behind why patients don't have expensive tooth replacement treatment done is because they don't feel confident in it lasting. They have had a lifetime of chronic misery with dental caries, and the whole process seems a mystery. Most of these CAMBRA practices report an unanticipated increase in revenue from previously declined treatment knowing treatment will last.

Another consideration in the economics of practicing CAMBRA: direct referrals from the practice's existing patients. For many patients, CAMBRA is a life-changing experience. They change from continuous cavities and problems to being decay-free for the first time in their lives. When patients appreciate and understand the biofilm component of dental caries and experience first hand how to finally control the disease, they want everybody they know to experience the same benefits. Word-of-mouth referrals have led to patients traveling hours just to locate a dental office that practices CAMBRA.

The last economic consideration is often the unspoken fear that dentists are putting themselves out of business. What if your patients really didn't develop new cavities, what would you do? On the other hand, what if every patient in your practice stopped developing new single surface lesions and you could focus on complete restorative care? If your patients decided to have ideal restorative dentistry done, would you have enough time left in your career even to accomplish that?

Conclusion

Many private practices began practicing CAMBRA a few years ago, when there was a wealth of scientific information and not much practical implementation tips or advice. There were no validated forms; there were no validated treatment regimens for treating the bacterial biofilm disease. This was uncomfortable territory for CAMBRA initiating dentists. For a century we have had a one-size-fits-all approach to disease: Surgically remove the cavity, regardless of location, size, or nature, and replace it with an amalgam restoration. Now, every patient must have their risk assessment evaluated individually. Every patient is unique. Treatment will need to be custom-designed for that individual patient at the present time. Then, we must continue to monitor each patient to prevent even a low-risk patient becoming a high-risk patient tomorrow.

Rome wasn't built in a day. Integrating a significant methodology change in a dental practice requires some time and effort. The key is to keep the changes as simple as possible, break it down to small logical sequential steps, and keep the dental team involved in the process. The CAMBRA approach, philosophy, and treatment will continue to evolve and change as more data is gathered over time, but certainly this represents the best standard of care today. Weighing the risks versus the benefits of CAMBRA for your patients, it is virtually all benefit. It all boils down to doing the right thing for your patient. How would you want to be treated based on what you now know?

Between the direct economic benefit and the new patient referrals, CAMBRA more than supports itself from a business model. The additional revenue from the increased restorative and elective treatments gained by caries reduction adds significantly to the average practice. From

a purely economic standpoint, CAMBRA is dentistry's best kept secret. But, finances aside, the most important reason to implement CAMBRA is for the patient's best interest. There is no greater reward than making a significant difference in a patient's life through improved dental health that lasts a lifetime. We owe this to our patients and our profession. ■■■■

REFERENCES

1. Fejerskov O, Kidd E, Dental Caries: The disease and its clinical management. Blackwell Munksgaard, Oxford UK, 2003.
2. Featherstone JD, Adair SM, et al, Caries management by risk assessment: consensus statement April 2002. *J Calif Dent Assoc* 31(3):257-69, March 2003.
3. Young DA, New caries detection technologies and modern caries management: merging the strategies. *Gen Dent* 50(4):320-31 July-August 2002.
4. Marsh PD, Host defenses and microbial homeostasis: role of microbial interactions. *J Dent Res* 68:1567-75, 1989.
5. Florio FM, Klein MI, et al, Time of initial acquisition of mutans streptococci by human infants. *J Clin Pediatr* 28(4):303-8, Summer 2004.
6. Marsh PD, Dental plaque as a biofilm and a microbial community - implications for health and disease. *BMC Oral Health* 6(Suppl 1):S14, 2006.
7. Fontana M, ZeroDT, Assessing patients' caries risk. *J Am Dent Assoc* 137(9):1231-9, September 2006.
8. Bradshaw DJ, McKee AS, Marsh PD, Effects of carbohydrate pulses and pH on population shifts within oral microbial communities in vitro. *J Dent Res* 68:1298-1302, 1989.

TO REQUEST A PRINTED COPY OF THIS ARTICLE, please contact V. Kim Kutsch, DMD, 2200 14th St., SE, Albany, Ore., 97322.