JOURNAL OF THE CANADIAN DENTAL ASSOCIATION

# JCDA

May 2006, Vol. 72, No. 4

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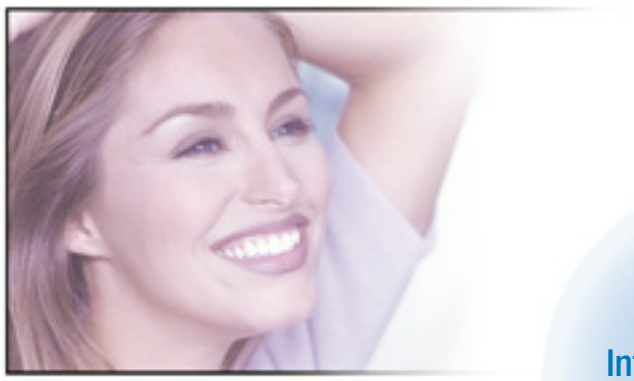
2. Al-Qunaien TA. The Effect of Whitening Agents on Caries Susceptibility of Human Enamel. Operative Dentistry, 2005.



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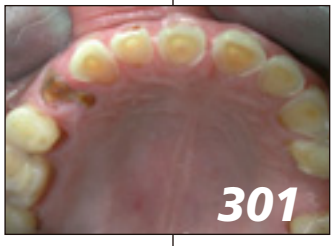


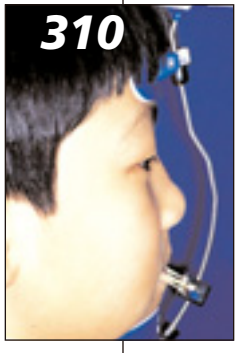

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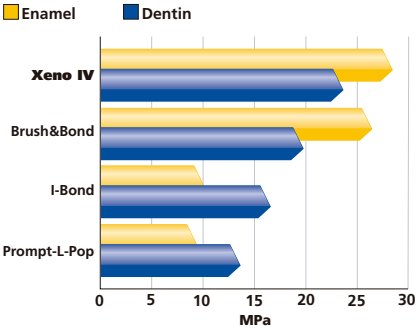


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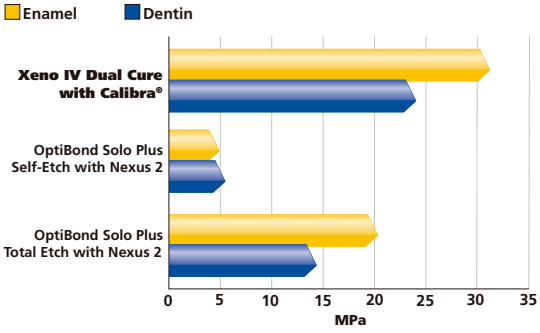


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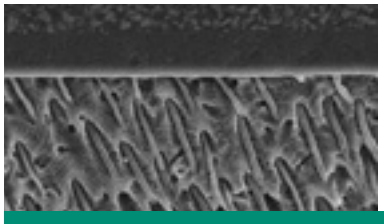

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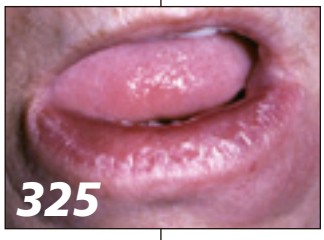


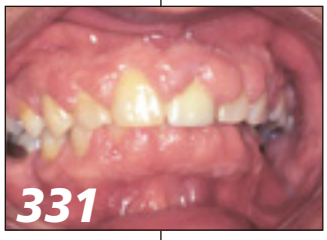


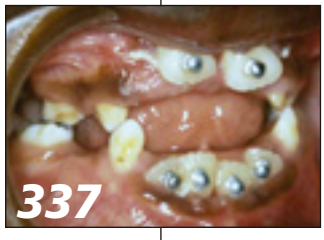




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Dr. John P. O'Keefe

# One Wall Worth Preserving

> "Dentistry must always walk the fine line between its legitimate roles as a business and a profession."

During a recent visit to Berlin, I was impressed with the city's strong sense of history yet striking modernity. New buildings are appearing as part of the construction boom that accompanied the city's reunification following the fall of the Wall. The coexistence of the "old" and the "new" makes Berlin at once a traditional and avant-garde city.

While I was window shopping there one Sunday, a particular shopfront caught my attention. Calling itself a Dental Wellness Lounge, this modern retail outlet had consumer oral hygiene products for sale in its window display. Beautifully modern dental operatories could be seen inside. Although the store was closed, I gathered that this was a dental "smile shop," primarily selling tooth whitening and oral hygiene services and products.

I found it interesting, given the overtly commercial nature of the dental lounge, that its immediate neighbour was an equivalent shop selling beauty and hair care products and services. Customers could very efficiently take care of their esthetic requirements by visiting these 2 establishments.

This smile shop concept reminded me of how dentistry must always walk the fine line between its legitimate roles as a business and a profession. I continue to hear rumblings from colleagues concerned that some members of our profession are projecting an image that is "too commercial." This concern about the excessive commercialism of dentistry was clearly articulated at a conference I attended in Chicago.

The 2-day meeting, organized jointly by the American Dental Association and the American College of Dentists, brought together leaders from many of the organizations that represent our profession in North America. The conference attendees identified manifestations of excessive commercialism that they are witnessing on a regular basis and that may be eroding the public trust in the profession.

Participants were asked to rate potential factors contributing to the commercialism of dentistry. Those ranked highest were: 1) society stresses financial success and a "me first" attitude; 2) traditional professional ideals are insufficiently emphasized; 3) debt from dental school adversely affects the professional behaviour of young dentists and promotes commercialism; 4) continuing education courses depict and promote dentistry as a commercial endeavour; and 5) practice management courses overly emphasize profit and business success.

Many were concerned that this commercialism discourse will have harmful consequences on dentistry's current position in society — one founded on being a science-based healing profession. Attendees bemoaned the fact that the public doesn't seem to place the same value on expertise as the profession does. As we move away from being a health care profession to providers of esthetic services, we will be pressured to operate more on our customers' terms rather than our own. This trend will entail a lowering of the value placed on being a "profession."

The meeting attendees proposed an action plan to counter the excessive commercialism of dentistry and to ensure that perceptions of the general public and policy makers toward our profession will not be irreparably tarnished.

Some notable recommendations included: creating realistic expectations for patients about what outcomes good dental care can provide; reinforcing the message that oral health is an important component of overall health; mounting a significant campaign to promote comprehensive oral health care; getting more young dentists involved in organized dentistry; increasing incentives for practising in underserved communities; advocating for increased reimbursement levels for underserved populations; and increasing expectations that dental care is based on scientifically grounded claims.

This is an ambitious agenda, but one that these leaders feel is necessary for the future of our profession. Like Berlin, dentistry has always adhered to the traditional and displayed a dynamism founded in entrepreneurship. I just hope that we don't tear down the wall separating us from excessive commercialism.

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1. Volpe AR, et al. J Clin Dent. 1996; 7 (suppl): S1-S14. 2. Data on file, Colgate-Palmolive Company. 3. Ayad f, et al. Clinical efficacy of a new tooth whitening dentifrice. J Clin Dent. 2002; 13:82-85. 4. Singh S, et al. The clinical efficacy of a new tooth whitening dentifrice formulation: A six-month study in adults. J Clin Dent. 2002; 13:86-90.
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Dr. Wayne Halstrom

# The Evolution Continues

> "The profession has a vested interest in the financial success of all of its members."

It's fair to say that no one grows up dreaming about becoming president of the Canadian Dental Association. Rather, it's an evolutionary process that begins with an initial involvement in organized dentistry and continues as your professional interests and experience grow. Now that my time as CDA president is here, I am both humbled and proud of being granted this opportunity.

Reflecting on the CDA presidents with whom I have served, I am struck by the enormity of the task ahead. No shoes will be larger to fill than those of Dr. Jack Cottrell — a most dedicated and capable leader. Dr. Cottrell served his profession through one of the most volatile periods in CDA history, carrying himself with a determination and dignity that earned him the endearing respect of his colleagues and friends.

My time in dentistry has been a roller-coaster ride. I practised for 20 years, then took a hiatus from dental activities to manage business interests before choosing to return to full-time practice. During this 5-year interval as a traditional "business person," I developed a special appreciation for the members of our profession. Being immersed in a world where integrity and forthrightness are little known commodities taught me to appreciate the high level of professionalism that exists in dentistry.

While I have always maintained that a healthy dental practice must also be a healthy business, the 2 are not mutually exclusive. Our practice environment is evolving. The financial pressures on our newly graduated dentists present special challenges. How long must one be an associate dentist before there is sufficient financial recovery from debt accumulated at school to actually start up or purchase an independent practice?

I believe the profession itself needs to become more involved in the future financial success of its new members. Poor or ineffective management of the financial affairs of newly graduated dentists will result in a smaller number of potential buyers of the practices owned by members approaching retirement. While this may be somewhat of a self-serving goal, the profession has a vested interest in the financial success of all of its members.

Financial success and business management go hand in hand. Dentistry has fought a long and successful battle against outside business interests becoming involved in the profession. Managed care, while the hallmark of practice models in many areas of the United States, has had no successful foothold in Canada. The problems that exist with the National Health Service for dentists in the United Kingdom are not found in this country. Avoiding these situations has not been a happy accident but can be traced back to our organizations supporting their members while promoting financial management and good practice performance.

Delivery of a suite of services that are tangible and useful to members is a primary goal of CDA. I believe these services should include those that allow senior members of the profession to play more of a mentoring role toward new members. For instance, the development of formal mentorship or business training programs at the local, regional or national level should be further explored. The debt load that our fledging dentists are harnessed with is real, but the knowledge and skills they need to manage this burden have yet to be acquired.

Having spent the last 8 years observing the CDA presidents who preceded me, I realize that the demands of the coming year are great. However, I look forward to the challenges. Being tasked with the responsibility of speaking for and representing Canadian dentists is a very special opportunity and one that I will not take lightly. The evolution of my involvement in dentistry continues and I am excited about the next part of the journey.

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# Dr. Wayne Halstrom: In Perfect Harmony

Dentists must wear several hats in the course of their day-to-day lives: health care professional, employer, counsellor, community leader and business owner, to name just a few. Such a variety of roles is indicative of how the modern dental practitioner must be able to adapt and adjust to the demands of the current practice environment.

CDA's new president, Dr. Wayne Halstrom of Lions Bay, British Columbia, knows what it means to wear many hats during a career. His impressive resumé is a testimony to the range of his talents — dentist, inventor, director, board member, managing partner, lead singer in a professional barbershop quartet. He is equally at ease in a white lab coat or a straw boater hat and red-striped jacket.

## A History of Involvement

Dr. Halstrom graduated from the University of Alberta in 1960, returning to the west coast to set up a private practice in North Vancouver. He joined the Vancouver and District Dental Society shortly thereafter, which led to his initial forays into committee work with the College of Dental Surgeons of B.C., where he became chair of the College's third-party payment committee.

An extensive involvement in the development of third-party payment plans in dentistry shaped the next 20 years of Dr. Halstrom's career. In 1969, he accepted the role of director of dental services with one of the largest non-profit health carriers in Canada, and was ultimately named chair of the board in 1990 and president in 1993.

Dr. Wayne Halstrom hugs his dog Chili before getting ready to tickle the ivories.

A founding member of the B.C. Dental Association, he rose up the ranks of organized dentistry, being elected to its first Board of Directors in 1999 and finally named president in 2003. That same year, he served simultaneously as president of BCDA and vice-president of CDA.

However, Dr. Halstrom's involvement in dentistry did not follow one continuous path. During a 5-year hiatus that began in 1979, he pursued personal business interests, becoming a managing partner in several real estate ventures in the U.S. and Canada before re-establishing his dental practice and returning to his beloved profession.

He believes that this first-hand experience in the business world was invaluable to the progression of his career. "I returned to dentistry with some business exposure that few of my contemporaries had," he explains. "It's part of the mosaic of who I am and a part of what I will bring to the role of CDA president."

Dr. Halstrom feels it is crucial that dentists reconcile the fact that they have responsibilities as both health professionals and business owners. "It is paramount that we focus on how to maintain healthy and economically successful practices that can be called, without shame, businesses," he says. "At every level of dentistry we must learn to manage our affairs as custodians of the very large business and employer that we have become. If you don't run your business properly, then your professionalism is going to have trouble surviving."

The future health of the 'business' of dentistry is closely linked to the profession's successful control of the transmission of claims. Dr. Halstrom speaks confidently on the subject, drawing on his experience from both sides of this issue. "Dentistry must ensure its position within the e-claims world and avoid having carriers dictate our business practices or impose costs on the transmission of claims," he urges. "ITRANS is the way forward and the profession must see this initiative through to

Dr. Halstrom enjoys a moment outdoors at his Lions Bay home.

its conclusion in order to maintain our professional independence."

## Collective Strength

Among the goals of his presidency, Dr. Halstrom wants to build upon the improved culture of communication that exists between CDA and its corporate and individual members. "We must work together to strengthen the relationships between all stakeholders. We need to put aside any regional differences and focus on making sure that we capitalize on the strengths that we have collectively," he says. "I hope that one of the defining characteristics of my presidency is that we continue to move in a positive direction to make the most of our collective efforts while focusing on our accomplishments."

When asked to identify other challenges that face Canadian dentistry, he notes the encroachment by the related professions on dentists' traditional scope of practice. "Management of this issue remains a paramount concern, as governing bodies all over the land are subject to increasing pressures from special interest groups," he explains. "How we position ourselves in the future will determine how successful the profession will remain."

Dr. Halstrom is acutely aware that the lifeblood of any association lies in attracting and maintaining the interest of new members joining its ranks. He feels that now more than ever, newly graduating dentists require support from the profession. "We have to provide leadership to our budding business people. They are coming out of school with debt loads that most practitioners don't appreciate or haven't been exposed to," he says. "We must increase our success in connecting with our new graduates, such as continuing to support CDA's Practice Development Program at our universities. We must identify our young dentists' needs, not our perception of their needs based on old attitudes, and proceed to help them achieve the success that was a part of the dream that led them to a dental career in the first place."

## A Fiddler and a Singer

Dr. Halstrom was initially drawn to the dental profession by a lifelong fascination with performing tasks that demanded digital dexterity. "Even as a child I was a fiddler and a fixer," he admits. "After my undergraduate degree, I chose dentistry as it seemed that a combination of working with my hands and a medical component would be satisfying. I felt this would serve both myself and my patients well over time."

This tendency to fiddle might also account for Dr. Halstrom's invention of an innovative oral appliance. As a lifelong snorer of legendary proportion, his nocturnal rumblings eventually began affecting his health and well-being (and that of his wife!). Dr. Halstrom was exhibiting the signs and symptoms of obstructive sleep apnea, and after a series of single-car accidents, the last of which was nearly fatal, it became clear that action had to be taken.

"When I was offered the treatment of either a ventilator or surgery to correct the problem, I rejected both options and turned my attention to figuring out what else could be done," he recalls. "I was excited about the possibilities of accomplishing treatment through a non-invasive, reversible technology and came up with the Halstrom Hinge precision attachment." This alliterative moniker refers to the working element that enables a patient to wear a jaw advancement appliance with comfort and safety. The device is now being used by patients all over the world.

While this invention would form the legacy of most, Dr. Halstrom cites his singing career as particularly memorable. He joined the "Model T Four" barbershop quartet as lead singer in 1961. The group was already accomplished in their hobby, but ventured into the commercial music business after he joined and continued well into the 90s. "We performed on the CBC and CTV television networks, enjoying appearances on *The Beachcombers* as well as a series called *Banjo Parlor*," he remembers. "We sang in a number of radio commercials for clients from coast to coast in Canada. But the most fun I had with this group had to be the recording of our album where, although unorthodox for an a cappella group, we were accompanied by a full orchestra," enthuses Dr. Halstrom.

Dr. Halstrom reveals that the true loves in his life are his wife, his children, his dog and the Pacific Ocean. "Arlene and I spend as much time as we can with our 7 children and 22 grandchildren." It seems that dedicated husband, father and grandfather are yet other hats that Dr. Halstrom wears with unmistakable panache.

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# Benzodiazepines and Oral Sedation: Clarification Requested

With respect to the "Point of Care" article on benzodiazepines for use as oral sedation in dentistry[1] published in *JCDA*, I would like to address several issues raised in the paper:

1. The article states that caution should be exercised "to ensure careful titration." One cannot titrate an oral sedative such as triazolam, as has been implied. Oral medications require time for absorption. Absorption varies amongst individuals, as does the rate of metabolism. If you titrate triazolam, how do you determine if the patient's blood level has peaked or is still increasing? How do you know how much additional medication is required? In 2002, the American Dental Association came out *against* titration of oral sedatives. Practitioners who adopt this methodology venture onto a slippery slope indeed.

2. Although the article deals with efficacies of oral sedatives, it doesn't fully describe methodology of usage. Stating that patients should be "monitored closely" does not explain what we are to monitor, what equipment is required to perform this task, what are the signs of looming trouble, etc.

3. Before administering a sedative, whether oral or intravenous, the practitioner should have recorded the patient's baseline vital signs. This is necessary to evaluate the patient's well-being during sedation and to determine whether he or she has recovered enough to be discharged. Giving a medication 30 minutes before the patient attends the dental office makes it impossible to establish a baseline.

4. When dealing with any sedative, the practitioner should be educated and experienced in dealing with potential adverse outcomes. This includes advanced cardiac life support, airway maintenance, administration of reversal agents and provision of supplemental oxygen. Administering any sedative without knowing how to deal with potential complications is irresponsible.

5. Finally, if you need to administer a reversal agent, the method of delivery would be intravenously, so why would you risk titrating an oral medication if you cannot establish an intravenous access?

*Dr. Mario M. Cabianca*
*Trail, British Columbia*

## Reference

1. Kelly C. Which benzodiazepine approaches the ideal for oral sedation in dentistry? [Point of Care] *J Can Dent Assoc* 2005; 71(11):832–3.

## Response from the Authors

The key objective of the "Point of Care" article on benzodiazepines[1] was to define the ideal benzodiazepine for oral sedation in dentistry, based on each of the drugs' properties. We stress that we made no attempt to provide a comprehensive account of oral sedation in dentistry, and we were subject to a limit of 500–600 words for this article.

Oral sedation is taught at the UBC faculty of dentistry and the Vancouver General Hospital department of dentistry in accordance with the guidelines on conscious sedation of the Association of Canadian Faculties of Dentistry and the "Minimal and moderate sedation services in dentistry standards" issued by the College of Dental Surgeons of British Columbia (CDSBC).[2]

In the Vancouver General Hospital Practice Residency Program, our patients are all adults, and they receive a single dose of drug for oral sedation. We err on the side of caution at all times when selecting an appropriate dose of benzodiazepine for our patients. If this single dose proves to be insufficient to achieve anxiolysis, then, in discussion with the patient, the dosage might be increased for any subsequent appointment. We do not provide an oral sedation service to children requiring dental care.

Dr. Cabianca refers to a technique whereby small incremental doses of a sedation drug (typically a benzodiazepine) are administered to achieve a comfortable level of sedation. This technique is advocated by some dentists, and strongly opposed by others.[3] We understand and respect the views of both groups, but in our clinics we do not dispense incremental doses of oral benzodiazepine to our patients.

Regarding Dr. Cabianca's second point, we emphasize that dentists have a duty to administer sedation only within the limits of their own knowledge, training, skills and experience. Furthermore, all practitioners using such sedation should receive appropriate training. CDSBC issues guidelines on monitoring patients under

Continued on p. 287

## Editor's Comment

*JCDA* welcomes letters from readers about topics that are relevant to the dental profession. The views expressed are those of the author and do not necessarily reflect the opinions or official policies of the Canadian Dental Association. *JCDA* reserves the right to edit letters for length and style. Letters should ideally be no longer than 300 words. If what you want to say can't fit into 300 words, please consider writing a piece for our Debate section.

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Letters
Continued from p. 285

oral sedation and the equipment required to achieve this.[2]

Wherever possible, we adopt non-pharmacological methods of anxiety management for our patients. In selecting patients for oral sedation, we adhere to the CDSBC guidelines. All patients undergo careful screening with a comprehensive medical history, including vital signs. The dose of an oral sedative used to induce minimal sedation can be administered to the patient in the dental office. We do this frequently for some of our patients. Alternatively, it can be administered at home when the dentist has determined that the patient requires an oral sedative to facilitate sleep the night before the dental procedure, or when the patient's anxiety is such that sedation is required to permit transport to the dental office.[2]

We agree with Dr. Cabianca that the dental practitioner should be trained in managing adverse outcomes of oral sedation. We both possess basic life support (CPR Level C) and advanced cardiac life support certification. In all of our clinics, we adhere to the CDSBC guidelines, which state that "all clinical staff must be trained in BLS (CPR Level C) and their duties in a dental emergency must be well defined."[2]

On Dr. Cabianca's fifth point, we acknowledge that, if indicated, flumazenil is administered intravenously. Furthermore, the Vancouver General practice residents do receive training in intravenous access and practice intravenous access regularly. The residents also rotate through the hospital's anesthesia program, which offers abundant experience of airway management.

*Dr. Christopher Kelly*
*Dr. Ian Matthew*
*Vancouver, British Columbia*

## References

1. Kelly C. Which benzodiazepine approaches the ideal for oral sedation in dentistry? [Point of Care] *J Can Dent Assoc* 2005; 71(11):832–3.

2. College of Dental Surgeons of British Columbia. Minimal and moderate sedation services in dentistry (non-hospital facilities). Available from: URL: http://www.cdsbc.org/pdf/Min_&_Mod_Sedation_Services_in_Dentistry_(Nov_2004).pdf (accessed February 2006).

3. Garvin J. The debate surrounding Oral Conscious Sedation. Available from: URL: http://www.agd.org/library/2005/jan/Garvin.asp (accessed February 2006).

## Photodynamic Therapy and Periodontitis

In February 2006, *JCDA* published a commentary by Dr. Debora Matthews that described Vancouver-based Ondine Biopharma's newly approved photodynamic disinfective therapy (PDT) for the adjunctive treatment of chronic periodontitis as "experimental."[1] As a basis for her remarks, Dr. Matthews pointed to a lack of published efficacy data.

I would like to provide an update on the subject. In March 2006, a study evaluating PDT was presented at the meeting of the American Association of Dental Research in Orlando.[2] This research compared pre- and post-treatment clinical attachment levels (CAL), probing depths (PD) and bleeding on probing (BoP) in patients with moderate to severe periodontitis. At 12 weeks post-treatment, PDT combined with scaling/root planning (ScRP) produced average CAL gains of 0.86 mm and PD decreases of 1.11 mm. These were statistically significant improvements over the effects of ScRP alone (CAL increase = 0.33 mm, PD decrease = 0.67 mm) over the same interval. Although statistical analyses for BoP changes were not reported, the frequency of sites showing BoP was appreciably lower for sites treated with PDT, especially at the 3- and 6-week post-treatment intervals. These last results are especially exciting in light of the high predictive value that a repeated lack of BoP has as a prognostic indicator for subsequent site stability.[3]

I wholeheartedly agree with Dr. Matthews that more research is needed. However, in the meantime, it is worth knowing that the recently reported in vivo results show significant therapeutic benefits from PDT when used as an adjunct to non-surgical periodontal therapy. The Periowave PDT device is newly available in Canada.

*Dr. Mike Rethman*
*Past director*
*U.S. Army Institute of Dental Research*
*Consultant*
*Ondine Biopharma Corporation*

## References

1. Matthews D. Photodynamic therapy and periodontitis — commentary. [News & Updates] *J Can Dent Assoc* 2006; 72(1):21.

2. Loebel N, Anderson R, Hammond D, Leone S, Leone V. AADR 35th Annual Meeting in Orlando. Non-surgical treatment of chronic periodontitis using photoactivated disinfection. *J Dent Res* 2006; 85(Spec Iss A):1150.

3. Armitage G. Periodontal diseases: diagnosis. *Ann Periodontol* 1996; 1(1):37–215.

## Response from the Author

As clinicians, we are bombarded daily with new materials, techniques and technology to use in our practice. Apart from presentations from sales representatives, how do we decide which ones to choose? Dr. Rethman's letter brings up several interesting points about how general dentists should approach new technology.

First, an abstract does not, in and of itself, constitute good clinical evidence. Several studies have shown that the results published in abstracts presented at research meetings are not always reflected in the final paper.[1] In fact, it is recommended that the results of several well-designed, double-blind, randomized controlled trials be taken into account before making a change in clinical practice[2] and deciding to use either new materials or technology.[2]

The second point of interest is the difference between statistical significance and clinical significance. The abstract by Loebel and others[3] reports that photodynamic therapy in conjunction with scaling and root planing, compared to scaling and root planing alone, resulted in statistically significant differences in clinical attachment levels and probing

depths. However, statistical significance does not always relate to clinical significance. A difference of 0.33 mm is not measurable in clinical practice, nor is it meaningful.

Even with well-designed clinical trials, the conclusions do not always accurately reflect the results. In this trial, for example, a reduction of bleeding upon probing with photodynamic disinfective therapy (PDT) was reported, even though no statistical analyses were done. There may be a number of reasons for this. However, a lack of analysis means any conclusions drawn from frequency data alone are not valid.

I am always looking for ways to better manage my patients, and that includes techniques and materials that pose fewer risks, have fewer side effects, are less expensive and take less time while being equally or more effective than how I currently practise. With that in mind, I look forward to further evidence that PDT in the treatment of periodontitis does all that it claims to do.

## References

1. Toma M, McAlister FA, Bialy L, Adams D, Vandermeer B, Armstrong PW. Transition from meeting abstract to full-length journal article for randomized controlled trials. *JAMA* 2006; 295(11):1281–7.

2. Sackett DL, Strauss SE, Richardson WS, Rosenberg W, Haynes RB. Evidence-based medicine: how to practice and teach EBM. 2nd ed. London: Churchill Livingstone; 2000.

3. Loebel N, Anderson R, Hammond D, Leone S, Leone V. AADR 35th Annual Meeting in Orlando. Non-surgical treatment of chronic periodontitis using photoactivated disinfection. *J Dent Res* 2006; 85(Spec Iss A):1150.

## Unique Software Problem?

I recently installed a software update for my office computer network and it is proving to be the absolute worst upgrade yet in over 15 years with the same dental software company.

The new version seems to be a fix for bugs caused by a previous software update — no great new features, no time- or cost-saving innovations, merely fixing the messy lock-ups and screen freezes that occur at the least convenient moments.

Despite upgrading the bulk of my office computer hardware last year, it appears that I now need to change another client computer. In fact, this particular part of my network was working fine before the upgrade. Coincidence? I think not.

When I sought assistance, the software vendor blamed the hardware. According to the rather terse and rude technical support, no other installation of this software, numbering in the several thousands, has had similar problems. On top of that, the software provider tried to charge me for this telephone diagnosis.

I understand the complexity of computer software–hardware interaction. However, I cannot accept the result I have obtained as the present configuration hinders the flow of my practice as opposed to facilitating it.

Looking at such computer issues from the standpoint of a dental patient creates a new perspective:

"Doctor, I can't chew my food with this expensive new bridge that you just placed."

"The bridge is perfect in every way. It must be a problem with the food that you are eating. If you upgrade your food to the latest models, I am sure that the problem will go away. No other patient has ever had this problem. By the way, please pay on the way out."

Would this patient be happy or accept the results? More importantly, would a dentist accept such a result or treat a patient this way? I see no reason to accept a less than usable product that costs a lot of money, and I will persist until I am happy with the results. I would like to know if anyone else has experienced similar issues with their dental computer software or if I am indeed the only one with these problems.

*Dr. Brian Waters*
*Toronto, Ontario*

## Erratum

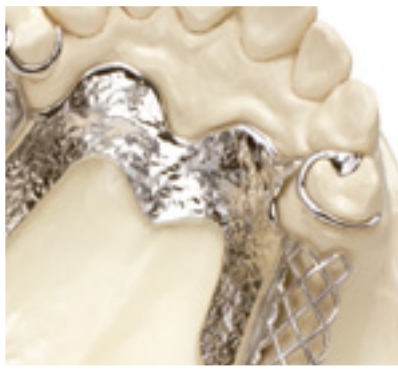
An incorrect dollar figure appeared in the "Practice management FAQs" article on page 123 in the March 2006 *JCDA*.[1] The sentence should read:

"If the office increased both production and collections by 10% after implementing a bonus system, the office would have 20% of $50,000 or $10,000 to distribute amongst team members."

*JCDA* regrets the error and has amended the electronic version to reflect the change.

## Reference

1. Marinovich J. Practice management FAQs. [Business of Dentistry] *J Can Dent Assoc* 2006; 72(2):121–3.



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# Long-term pain management tool?


## Current Canadian Consensus Report on dentin hypersensitivity recommends

### a long-term approach to management, with desensitizing toothpaste as first-line treatment.†

The Report recognizes that the pain of sensitive teeth can be recurrent and that ongoing management and treatment are key to staying pain-free. An ongoing regimen of twice-daily brushing with desensitizing toothpaste like Sensodyne® is recommended as an efficacious, inexpensive and non-invasive first-line treatment for pain prevention.

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†Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity. Canadian Advisory Board on Dentin Hypersensitivity. *J Can Dent Assoc* 2003;69(4):221-226.

*Project Dentin Sensitivity - October 2005 report (telephone survey). Camelford Graham Research Group Inc.



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# CDA Wrestles with Education Issues

CDA Board members involved with the Mega Issue Working Group (l. to r.): Dr. Peter Doig of Dauphin, Manitoba; Dr. Deborah Stymiest of Fredericton, New Brunswick; and Dr. John A. (Jack) Scott of Edmonton, Alberta, chair of the working group.

A re-examination of the current models of dental education in Canada was one of the more radical recommendations proposed in a recent CDA discussion paper on the future of dental education.

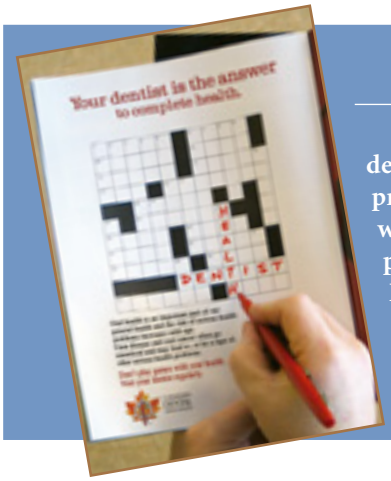
The current crisis in dental education continues to play a prominent role in CDA's high-level discussions. At the CDA Board of Directors meeting in February, the results of the paper were presented and discussions focused on how CDA can address education issues such as the funding of the faculties of dentistry, tuition costs and academic shortages.

To help answer the education question, CDA convened a Mega Issue Working Group, chaired by CDA Board member Dr. John A. (Jack) Scott. The working group sought input from the deans of the 10 faculties of dentistry, as well as representatives from the Canadian Dental Regulatory Authorities Federation (CDRAF) and various CDA committees, including the Government Relations and Public Advocacy Committee, the Committee on Dental Academia, the Council on Education, the Committee on Specialists Affairs and the Committee on Student Affairs.

The current crisis in education materialized when government funding for post-secondary education decreased. This forced dental schools to raise tuition and resulted in high student debt loads. Faced with significant financial concerns upon graduation, fewer dentists now choose to return to the university setting to pursue a teaching or academic career.

Such realities were exposed when CDA conducted a self-reported study at the University of Saskatchewan. This informal survey revealed that on average, fourth-year dental students carried bank-administered credit line debts of approximately $94,000 and government-administered loan debts of approximately $80,000. These same students expected to carry, on average, a total debt from all sources of $154,000 upon graduation. These levels of student debt will likely affect future professional decisions in terms of the location and type of practice that new graduates will pursue.

CDA's Committee on Dental Academia will be asked to move forward and consider the recommendations from the discussion paper. One of the recommendations was to research, develop and present at least 2 new "templates" or models for dental education which could consider private dental education or cooperative arrangements among dental schools.




## Don't Play Games With Your Health

**CDA recently distributed a public awareness promotional tent card to member dentists as part of its National Oral Health Month activities. CDA invited the provincial dental associations to participate in developing this in-office resource, which reinforces the importance of oral health in relation to overall health and promotes the primacy of the dentist with an emphasis on seniors' oral health. Participating associations included their corporate logo on the cards.**

**The 'crossword puzzle' graphic is also available in poster format. To request a poster or tent card, contact CDA at 1-800-267-6354 or by email at posters@cda-adc.ca.**

# Outstanding Service to the Profession Recognized with CDA Awards

*Each year, CDA recognizes individuals for outstanding service to the Association and for their contribution to the dental profession. This year's awards were presented at the CDA Awards Luncheon held on April 28.*

## Honorary Membership Award

Dr. Barry Dolman of Montreal, Quebec
Dr. Dennis C. Smith of Collingwood, Ontario

*Honorary Membership is CDA's highest award. It recognizes individuals who have made outstanding contributions to the art and science of dentistry, or to the dental profession, over a sustained period of time.*

## Distinguished Service Award

Dr. Robert (Mac) Balfour of Oakville, Ontario
Dr. Johann de Vries of Winnipeg, Manitoba
Dr. Robert Salois of Montreal, Quebec

*This award recognizes either an outstanding contribution in a given year, or outstanding service over a number of years.*

## Award of Merit

Dr. Paul O'Brien of St. John's, Newfoundland
Dr. David J. Sweet of Vancouver, British Columbia

*This award is given to an individual who has served in an outstanding capacity in the governing of CDA or who has made similar outstanding contributions to Canadian dentistry.*

## Oral Health Promotion Award

Halton Oral Health Outreach (HOHO) program at Burlington, Ontario
Dental clinic for Montreal street youth, University of Montreal

*This award recognizes individuals or organizations that have improved the oral health of Canadians through oral health promotion.*

## Special Friend of Canadian Dentistry

Ms. Michele Christl of Oral-B Canada

*This award is designed in appreciation and thanks for friendship and assistance to CDA.*

## Certificate of Merit

This award recognizes special service at any level of dentistry within the country, specifically those who have served in some capacity with a CDA committee, council, commission, task force, or long-standing service at the corporate or specialty section level. The following individuals were recognized in 2006:

Dr. Wade Abbott
Dr. Alykhan Adatia
Dr. Stephen I. Ahing
Dr. Christopher Allington
Dr. Jacques Auger
Dr. Richard Azzi
Ms. Sylvie Barbeau
Dr. Ariane Beaudet-Roy
Dr. Louise Beaudry
Col Scott A. Becker
Mr. Michael Brennan
Ms. Linda Carbone
Dr. Robert Charland
Ms. Johanne Côté
Ms. Dominique Derome
Dr. Louis Dubé
Dr. Denis Forest
Mr. Raymond Haché
Mr. Gilles Hamel
Dr. Nicholas Laliberté
Dr. Jonathan H. Lang
Dr. Judith Limoges
Dr. Patricia Liu
Ms. Johanne Longpré-Bouchard
Ms. Guylaine McCallum
Dr. Paul W. MacDonald
Dr. Mario Mailhot
Dr. Ahmad-Reza Noroozi
Dr. François Payette
Dr. Daniel Pelland
Dr. D'Arcy Pierce
Dr. André Prévost
Dr. Claude Raymond
Dr. Lon Riemer
Dr. Marc Robert
Dr. Sam Sgro
Col James C. Taylor
Ms. Marie Tétreault
Dr. Elizabeth A. Toporowski
Dr. Mark Venditti
Dr. Donald Walsh
Dr. Warrick Yu
Ms. Susan Ziebarth

*Look for more information on this year's CDA Award winners in the next edition of* JCDA.

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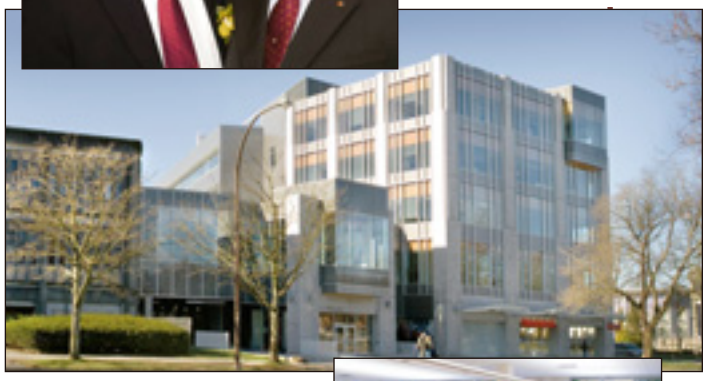
# New Oral Health Centre Opens at UBC

Dr. Edwin Yen, dean of the UBC faculty of dentistry, with Dr. Wayne Halstrom, new CDA president, at the Gala Opening Night in March.

**The University of British Columbia (UBC) faculty of dentistry held a gala and open house in early March to celebrate the opening of its new oral health facility. Nobel Biocare's $5 million dollar donation to UBC's faculty of dentistry was recognized by the new centre's official name, the Nobel Biocare Oral Health Centre.**

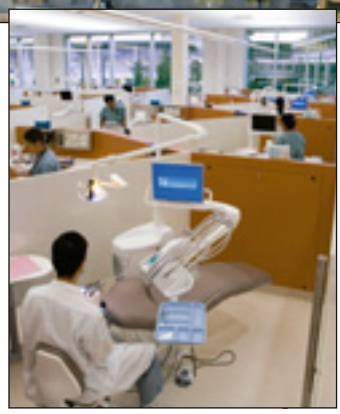
**"This generous support is a significant milestone in helping us provide a unique learning environment that will accelerate and enhance student learning while optimizing quality assurance for patient care," says Dr. Edwin Yen, dean of UBC's faculty of dentistry. "This technologically integrated facility makes UBC a leader in dental education."**



The Nobel Biocare Oral Health Centre at UBC's Point Grey (Vancouver) campus.

**The centre is a state-of-the-art teaching and research facility, equipped with unique "smart" chairs, co-designed with input from UBC faculty members, and advanced chair-side technology that can store patient information for treatment planning and follow-up visits. The dental equipment manufacturer Planmeca supplied the specialized operatory chairs and technology.**

**Located at the corner of Wesbrook Mall and University Boulevard at UBC's Point Grey (Vancouver) campus, the centre occupies 3,510 square metres of the David Strangway Building. The new facilities increase operatory space from 80 to 144, including 18 enclosed operatories for special procedures.**



UBC students using the equipment in the new operatories.

**The centre will be open to patients in September 2006 and is expected to receive more than 35,000 visits per year. The faculty of dentistry currently has 250 graduate, undergraduate and dental hygiene students. The first groups of students are now using the new equipment as part of their clinical simulation modules.**

**For more information about the Nobel Biocare Oral Health Care Centre, visit www.dentistry.ubc.ca/newclinic.**

# Australian Journal Compiles Guide on Medications in Dentistry

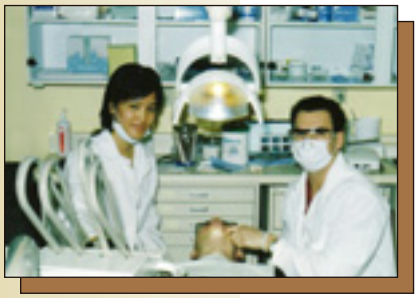
The *Australian Dental Journal* (*ADJ*) recently published a supplement devoted to medications used in dentistry. The *ADJ*'s December 2005 edition featured review papers that examined such topics as prescribing practices in analgesia, topical medications, systemic medications and antibiotics.

Members of the Australian Dental Association's Special Purpose Committee on Drugs and Therapeutics organized the papers. Some of the group's findings challenge current dental practice in the prescription of antibiotics and analgesics.

"The articles in the *ADJ* supplement are of exceptional quality and are a great way for Canadian dentists to review these important topics that their Australian peers have so carefully prepared," says Dr. George Sándor, associate professor and director of the graduate program in oral and maxillofacial surgery and anesthesia at the University of Toronto.

**The entire supplement can be accessed online at http://www.ada.org.au/_MedSup.asp.**

# A Clinic Like No Other



Students at the dental clinic examining a Montreal street youth.

In the fall of 2001, 2 students at the University of Montreal's faculty of dentistry decided to create a program that would promote oral health among the city's street youth. This population, larger than most people realize, generally has poor dental hygiene and inadequate oral health. As part of the students' directed study, they approached the local community health centre (CLSC) on Sanguinet Street, where a medical clinic for street youth was already established. At the clinic, nurses, doctors and psychologists work together for the health and welfare of a client group that doesn't have access to traditional dentistry. The 2 students therefore decided to offer their services to the clinic.

Encouraged by Dr. Denys Ruel, Dr. Daniel Kandelman, chair of the department of oral health at the University of Montreal's faculty of dentistry, established a partnership with the CLSC des Faubourgs (which is part of the Jeanne Mance Centre for Health and Social Services [CSSS]) to set up a dental clinic that would provide both preventive and treatment services to street youth.

After the students finished their directed study, 4 of their colleagues decided to continue their work, but this time by setting up a dental clinic with 2 relatively functional operatories. They were eventually able to obtain recurrent funding, and were joined first by Dr. Martin Chartier then by Dr. Germain Turgeon. A dental clinic dedicated to treating Montreal street youth was finally born.

"These four students worked hundreds of hours making posters to advertise the service, visiting community organizations, doing work in the street, locating used equipment, obtaining funding and starting a clinic with very few resources," says Dr. Ruel, lecturer and clinical instructor.

In 2003, the dental clinic won the University of Montreal's Forces award, the Government of Quebec's Forces Avenir award and the American Dental Association's Student Excellence Award. In 2006, the clinic was honoured with CDA's Oral Health Promotion Award for its work promoting oral health.

Almost 20 students from the University of Montreal's faculty of dentistry have worked at the clinic since it was established, and it appears certain that the torch will continue to be passed to new students in the coming years. The current team has seen and treated more than 1,000 young people. Students are given a unique opportunity to become acquainted with the management, administration and organization of a public dental health project. The dentists involved continue to help the students promote the clinic and obtain funding.

The clinic receives funding from the University of Montreal faculty of dentistry, the Jeanne Mance CSSS, the QDSA (Quebec Dental Surgeons Association), Quebec's Department of Health and Social Services and a number of other foundations. Finding new sources of funding is a never-ending job. Used equipment needs regular repairs and dental supplies run out quickly as the demand for services is so great.

"Our students are showing more and more interest in the clinic. Engaging them in a community activity and having them get to know clientele that is different from the one found at the university is an essential part of their academic training," says Dr. Ruel.

Adds Dr. Kandelman: "We hope to train dentists who will be better able to serve poor and marginal populations. The clinical experience we offer is unlike the one taught at the faculty, due to the complexity of the cases, the difficult working conditions, and the special medical conditions and high-risk behaviour associated with this client group."

## Medical Devices Require Appropriate Licence

In January, Health Canada's Medical Devices Bureau issued a notice to remind dentists about the authorization and licensure requirements of medical devices used in Canada.

Manufacturers must obtain a licence from the Therapeutic Products Directorate before legally selling or advertising most dental instruments, materials and equipment in this country. Similarly, importers or distributors of these products are not permitted to sell unlicensed medical devices.

It appears that Health Canada has been made aware that some manufacturers may be advertising medical devices for sale during the licence application process. This practice contravenes the federal agency's *Medical Device Regulations*.

The advisory recommends that health care practitioners or facilities avoid purchasing or importing medical devices without confirming if an appropriate medical device licence has been obtained.

This information can be found through the Medical Device Licensing Service website. The site allows you to search using several methods, including looking up a company name or the name of the device. Additionally, you can also determine if and when a medical device has been prohibited for use in Canada.

### Related Resources

Therapeutic Products Directorate notice
http://www.hc-sc.gc.ca/dhp-mps/md-im/activit/announce-annonce/dental_md_dentiere_im_let_e.html

Medical Device Licensing Service website
http://www.mdall.ca/

Health Canada's Medical Devices homepage
http://www.hc-sc.gc.ca/dhp-mps/md-im/index_e.html

**To access the websites mentioned in this section,** go to May's *JCDA* bookmarks at www.cda-adc.ca/jcda/vol-72/issue-4/index.html.

## OBITUARIES

**Adirim, Dr. Herbert J.:** Dr. Adirim of Toronto, Ontario, passed away on February 12. He graduated from the University of Toronto in 1968.

**Billingsley, Dr. Clifford T.:** Dr. Billingsley of White Rock, B.C., passed away on February 1, 2005.

**Foley, Dr. Emmett F.:** Dr. Foley of Orleans, Ontario, passed away on February 10. He graduated from Dalhousie University in 1965.

**Fox, Dr. Edward:** A 1951 graduate of McGill University, Dr. Fox of Vineland, Ontario, recently passed away.

**Leblanc, Dr. Adélard:** A 1951 graduate of the University of Montreal, Dr. Leblanc of Beaconsfield, Quebec, passed away recently.

**Mullen, Dr. William J.:** Dr. Mullen of Moose Jaw, Saskatchewan, passed away on February 27. He graduated from the University of Toronto in 1950.

**Nixon, Dr. Milford:** Dr. Nixon of Mackenzie, B.C., passed away on December 22, 2005.

**Norman, Dr. Manning:** Dr. Norman of Ottawa, Ontario, passed away on March 7. He graduated from the University of Toronto in 1957.

**Rosengart, Dr. Klaus E.:** A 1968 graduate of the University of Alberta, Dr. Rosengart of Chemainus, B.C., passed away on December 21, 2005.

**Shankman, Dr. L. V.:** A 1939 graduate of the University of Toronto, Dr. Shankman of London, Ontario, passed away on November 25, 2005.

## Pierre Fauchard Academy Awards Ceremony in St. John's

The Pierre Fauchard Academy (PFA) Canadian 2006 Awards Luncheon will be held in St. John's, Newfoundland, on Friday, August 25. Program highlights include Dr. Burton Conrod of Sydney, Nova Scotia, receiving the Academy's Distinguished Service Award, the installation of the new PFA Fellows and honouring the Student Clinician Participant Scholarship recipients. Pfizer Consumer Healthcare is co-sponsoring the event.

Those wishing to attend should contact Dr. Barry Dolman by **June 1** as on-site reservations cannot be accommodated.

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*This month's feature of THE DENTAL ADVISOR is taken from the May 2005 issue, Vol. 22, No. 4.*

*THE DENTAL ADVISOR evaluates and rates dental products and equipment by objective clinical and laboratory protocols. The publication consists of clinical evaluations, comprehensive long-term evaluations, product comparisons and specialty reports. To subscribe, please call 734-665-2020.*

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# Update: Flowable Composites

In recent years many manufacturers have introduced flowable composites, often marketed alongside more viscous, all-purpose composites. Flowable composites have less filler, in some instances 25% less, than all-purpose composites. Less filler results in a product that many clinicians feel offers better adaptation to cavity walls when used under packable composites.

Flowable composites are syringeable, can be placed precisely and cured incrementally. Their physical properties allow clinicians to use these products successfully to repair crown margins and ceramic fractures. When selecting a flowable composite, it is important to consider radiopacity. When using the flowable material as a liner under a more traditional composite or under a packable

## THE DENTAL ADVISOR Recommends:

***Tetric Flow (98%), Palfique Estelite LV (96%), 3M ESPE Filtek Flow (94%), Heliomolar Flow (94%), Admira Flow (93%), GrandiO Flow (93%)***

98%

***Tetric Flow***
(Ivoclar Vivadent)

96%

***Palfique Estelite LV***
(Tokuyama Dental)

94%

***Heliomolar Flow***
(Ivoclar Vivadent)

93%

***GrandiO Flow***
(VOCO)

composite, a radiolucent flowable material may be mistaken for recurrent decay. Flowable composites with higher radiopacity, however, are less translucent, which may produce an undesirable esthetic outcome for Class V applications.

Difficulties with flowable composites are most often encountered when the product is misused in large restorations or in areas where occlusal forces will cause rapid premature wear. Additionally, because flowable composites are associated with high polymerization shrinkage, it is important to incrementally place and cure them. With a greater availability of shades and improved physical properties, flowable composites will remain part of the armamentarium of most restorative dentists.

### Applications

- Conservative Class I restorations
- Facial composite veneers
- Coverage of enamel hypoplastic defects
- Small carious pits and fissures
- Cervical abfraction lesions
- Cervical caries
- Root surface caries
- Repairs of crown margins
- Sealants

### *Other Featured Products*

***Flow-It ALC***
(Pentron Clinical Technologies)

### Advantages

- Easy to place
- Good adaptation to small, narrow areas
- Low modulus of elasticity for use in abfraction lesions
- Good polish

### Disadvantages

- High polymerization shrinkage
- Lower strength – not good for large restorations
- Poor wear resistance
- Greater susceptibility to staining

## Clinical Notes

- Shade selection should precede tooth preparation as the tooth may become desiccated with isolation
- Use a total-etch or self-etch bonding agent
- Most useful shades – A1, A2, A3, B2, C3
- Finishing sequence – gross reduction with flame-shaped diamonds, 16-fluted finishing burs, abrasive-impregnated rubber finishing cups
- Polish with polishing paste
- When restoring isolated pits or fissures, flowable composite can be used with air abrasion and sealant to complete the restoration ■

| Product | Company | Shades | Fluoride Releasing | Radiopaque* | Delivery System | Cost/ml, $ | Rating |
|---|---|---|---|---|---|---|---|
| **3M ESPE Filtek Flow** | **3M ESPE** | 6 | Yes | Yes | Syringe | $37.85 | **94%** |
| **4 Seasons Flow** | **Ivoclar Vivadent** | 8 | Yes | Yes | Syringe | $23.90 | **91%** |
| **Admira Flow** | **VOCO** | 7 | No | Yes | Syringe, unit dose | $22.45 | **93%** |
| **ÆLITEFLOW** | **Bisco** | 13 | No | Yes | Syringe | $10.66 | **92%** |
| **ÆLITEFLOW LV** | **Bisco** | 2 | No | Yes | Syringe | $10.66 | **na** |
| **Esthet.X Flow** | **DENTSPLY Caulk** | 7 | Yes | Yes | Syringe | $27.55 | **92%** |
| **Flow-It ALC** | **Pentron Clinical Technologies** | 26 | Yes | Yes | Syringe | $8.45 | **92%** |
| **Flowline** | **Heraeus Kulzer** | 9 | Yes | Yes | Syringe | $21.53 | **88%** |
| **GRADIA DIRECT Flo** | **GC America** | 7 | Yes | Yes | Syringe | $23.13 | **na** |
| **GRADIA DIRECT LoFlo** | **GC America** | 7 | Yes | Yes | Syringe | $23.13 | **na** |
| **GrandiO Flow** | **VOCO** | 10 | No | Yes | Syringe | $29.48 | **93%** |
| **Heliomolar Flow** | **Ivoclar Vivadent** | 7 | Yes | Yes | Syringe | $26.73 | **94%** |
| **Palfique Estelite LV** | **Tokuyama Dental** | 5 | No | Yes | Syringe | $19.76 | **96%** |
| **PermaFlo** | **Ultradent** | 9 | Yes | Yes | Syringe | $12.50 | **91%** |
| **Tetric Flow** | **Ivoclar Vivadent** | 12 | Yes | Yes | Syringe, unit dose | $23.86 | **98%** |
| **Venus Flow** | **Heraeus Kulzer** | 14 | Yes | Yes | Syringe | $21.50 | **na** |

**Products have various levels of radiopacity.*

***EDITORS' NOTES:*** *Only products evaluated by THE DENTAL ADVISOR are eligible for listing as a recommended product. Table information provided by manufacturer. Costs are listed for comparison only and are not used to calculate the ratings; all costs shown in U.S. dollars.*

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06-81 03/06

# Using Composites to Restore Worn Teeth

**David Bartlett,** *BDS, MRD, PhD, FDSRCS (Rest Dent), FDS RCS (Ed)*


*This month's "Clinical Showcase" article was written by Dr. David Bartlett, a speaker at the 2006 FDI Congress. Dr. Bartlett will be participating in a symposium on tooth wear and abrasion sponsored by GlaxoSmithKline on September 24. His session is titled "The role of erosion in toothwear: etiology, prevention and management."*



The treatment of tooth wear caused by erosion, abrasion and attrition is complex and demanding in terms of both the dentist's time and cost to the patient. The main complication is that teeth with severe wear have short clinical crown height, which makes conventional treatment extremely challenging. In general practice, using restorations to increase the vertical dimension of worn teeth is both reliable and predictable.[1] Considerable research and clinical evidence exist to support the use of composites to restore worn anterior teeth.[2–4] After stable occlusion has been achieved, the composite can be maintained by polishing and repairing, or it can be replaced with crowns.

This article illustrates the steps in restoring worn dentition.

## Wear on Palatal Surface of Upper Incisors

In this series of 3 clinical cases, the wear was limited to the palatal (lingual) surfaces of the upper incisors and the composites were used for the definitive restorations.

In the first case, the cause of tooth wear was a combination of erosion and attrition (**Figs. 1a** and **1b**). This typical appearance was caused by the patient holding acidic drinks in the palatal vault. The exposed dentin was not sensitive. Composite restorations were placed on the palatal surfaces to replace the worn

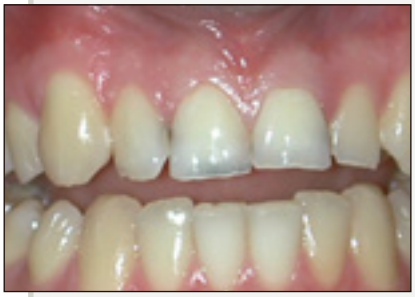

**Figure 1a:** Worn anterior teeth have translucent incisal edges.

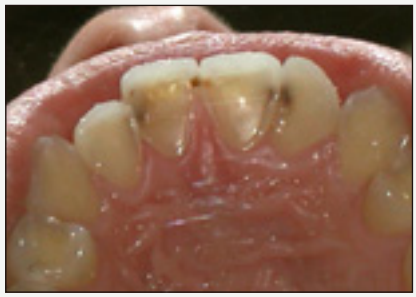

**Figure 1b:** Tooth wear was caused by a combination of erosion and attrition. Carious lesions are also apparent; they were treated conventionally.

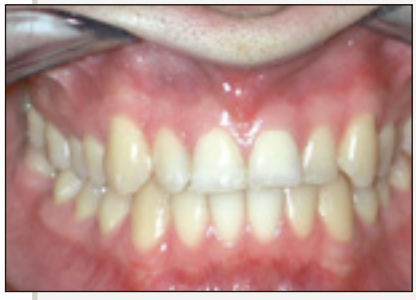

**Figure 1d:** The composites have restored the appearance of the anterior teeth.

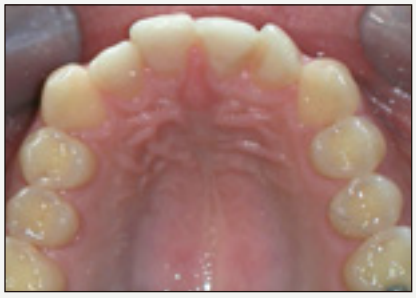

**Figure 1c:** Composites were placed on the palatal surfaces to replace the worn tooth tissue.

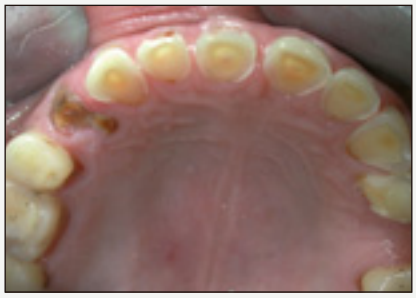

**Figure 2a:** Severe wear of the upper anterior teeth was caused by regurgitation of gastric contents into the mouth secondary to gastroesophageal reflux.

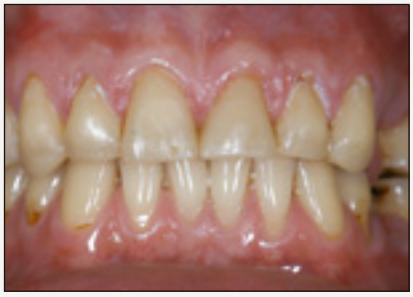

**Figure 2b:** Microhybrid composites have been added to the buccal and palatal surfaces of the upper anterior teeth to increase the vertical dimension.

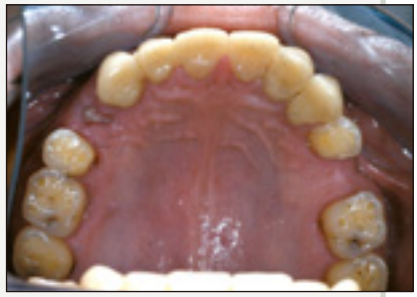

**Figure 2c:** Palatal view shows microhybrid composites bonded directly onto the eroded anterior teeth.

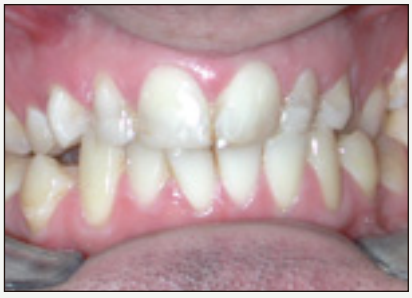

**Figure 3:** Composites on the upper anterior segment, shown 5 years after initial placement, have been maintained by polishing and repair.

tooth tissue (**Fig. 1c**). This increased the vertical dimension and separated the posterior teeth. Reversal of alveolar compensation resulted in overeruption of the posterior segment and some intrusion of the anterior teeth. About 3 months later, however, the occlusion had stabilized, and the intercuspal position on the anterior teeth had returned to normal (**Fig. 1d**).

In a second patient, severe wear of the upper anterior teeth (**Fig. 2a**) was related to regurgitation of gastric contents into the mouth secondary to gastroesophageal reflux disease. In patients with this condition, the gastric juices (which have a pH of about 1) may cause severe erosive wear of the palatal surfaces of the upper anterior teeth. Microhybrid composites were added to the buccal and palatal surfaces of these teeth to increase the vertical dimension (**Figs. 2b** and **2c**). The carious upper bicuspid was extracted at a later time and replaced with an implant. Because the erosion was localized to the palatal surfaces of the upper anterior teeth, there was no need to restore the occlusal surfaces of the posterior teeth. The initial increase in occlusal vertical dimension led to separation of the posterior teeth; as in the previous case, alveolar compensation was reversed, and the occlusion stabilized. Normally, reversal of alveolar compensation occurs over 3 or 4 months, more quickly in younger people.

As seen in the third case, composite restorations placed on the upper anterior segment can be maintained by polishing and repairing as required (**Fig. 3**) and may last for many years.

## Generalized Wear

Sometimes, the dentition exhibits more generalized wear (**Fig. 4a**). In the case illustrated here, the wear was classified as regurgitation erosion caused by gastroesophageal reflux.[5] Regurgitation of the gastric contents had resulted in erosion of both enamel and dentin on the palatal surfaces of the upper teeth[6] (**Fig. 4b**); the wear on the lower arch was less severe (**Fig. 4c**). The significant loss of tooth structure meant that, without elective endodontics, there would be insufficient support for conventional crowns. However, the dentist determined that an increase in vertical dimension would produce sufficient interocclusal space for restorations without further need for occlusal reduction; as such, this procedure would conserve tooth tissue.

Since the tooth wear was generalized, restorations were needed on both the anterior and the posterior teeth. The increase in vertical dimension was planned using a diagnostic wax-up mounted on a semiadjustable articulator (**Fig. 4d**). There was enough height of the palatal tooth tissue that crown lengthening was not required. The planned shape of the anterior teeth (on the basis of esthetic considerations) determined the increase in height of the posterior teeth. Patients with tooth wear typically adapt to the change in tooth shape over time, so increases in vertical dimension during restoration pose a further adaptive challenge. In this case, as in the others presented here, it

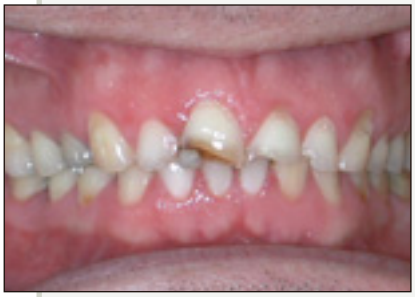

**Figure 4a:** Preoperative appearance of anterior teeth with generalized wear. There is some loss of the incisal edge of the upper anterior teeth.

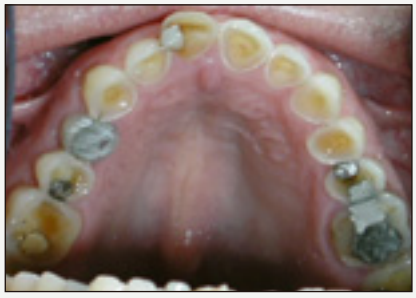

**Figure 4b:** Significant erosion of the palatal (lingual) surfaces, caused by regurgitation of gastric contents, is evident. The shape and pattern of this wear is typical of dental erosion.

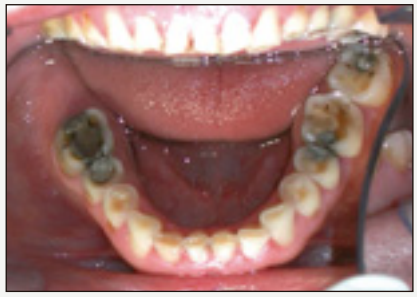

**Figure 4c:** The wear on the lower arch is not as severe as that on the upper arch.

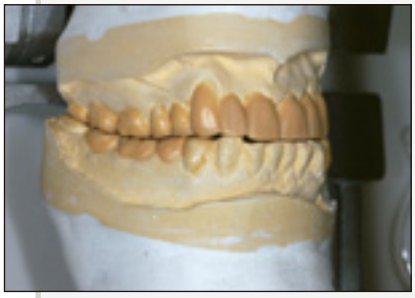

**Figure 4d:** The increase in vertical dimension is planned with a diagnostic wax-up mounted on a semiadjustable articulator. The shape of the anterior teeth (which will determine the increase in height on the posterior teeth) was planned at the same time.

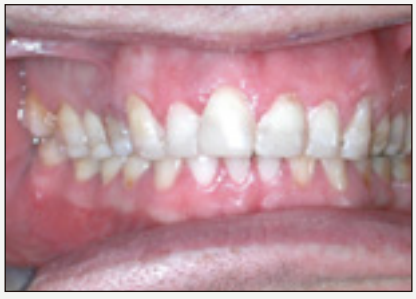

**Figure 4e:** Composites are placed on the anterior and posterior maxillary teeth. The contacts on the teeth are adjusted to ensure even contact in the new intercuspal position.

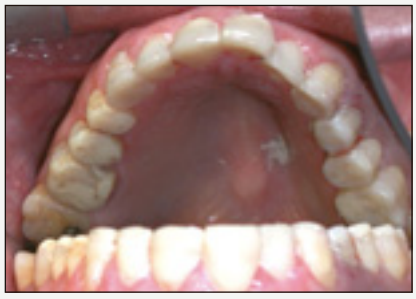

**Figure 4f:** Clinical photograph taken 3 years later shows several fractures. It was decided to convert the restorations to metal ceramic crowns.

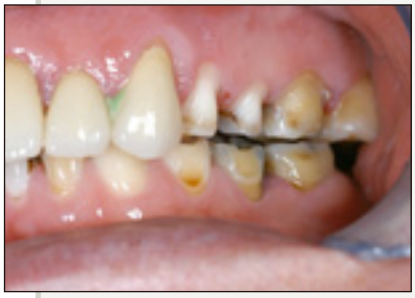

**Figure 4g:** The anterior teeth were crowned first, to establish anterior guidance; the posterior teeth were prepared a few weeks later.

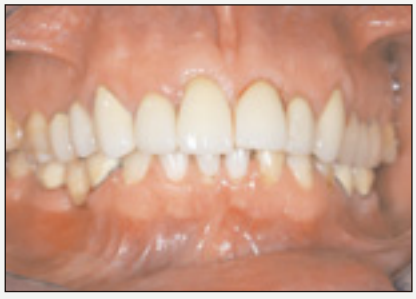

**Figure 4h:** Clinical photograph taken 4 years after the patient's initial presentation with tooth wear.

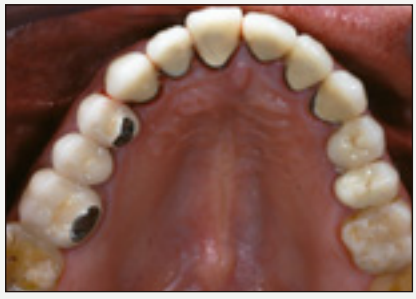

**Figure 4i:** Final result of restoration of the upper arch.

was anticipated that the planned increase in vertical dimension would be well tolerated by the patient. There are no reports of loss of tooth vitality or mandibular dysfunction as a result of increase in vertical dimension.

Composite restorations were placed on the anterior and posterior maxillary teeth (**Fig. 4e**) to establish the vertical dimension and reshape the worn teeth. The increase in tooth height increased the occlusal vertical dimension. The occlusion was adjusted until the posterior contacts in the new intercuspal position were even. Adjustments were made to the composites at chairside. If such restorations prove durable, they can be considered long-term restorations, as described above.

In this patient, the composite restorations remained functional for about 3 years. Once they started to deteriorate (**Fig. 4f**), the teeth were prepared for conventional restorations (**Figs. 4g** to **4i**) according to the occlusal scheme defined by the composites.

## Conclusions

These cases show that composite restorations can be used to restore worn dentition. In some cases, such as the first 3 cases illustrated here, the composites produce the definitive restoration and can be polished and repaired over a period of many years. However, if the composites fracture, the teeth can be restored with conventional metal ceramic crowns. The advantages of composite restorations are conservation of tooth tissue and delay in the placement of crowns (which is a destructive procedure); furthermore, the basics of the occlusion will be established by the time a decision is made to convert from composites to crowns.

## Practice Tips

The following tips are offered to assist in the restoration of worn or eroded teeth.

1. Use the dentin bonding agent carefully. Always follow the manufacturer's guidelines to maximize bond strength. Because tooth wear exposes significant amounts of dentin, the bond to this tissue is an important aspect of the restoration procedure.
2. Increase the occlusal vertical dimension by the amount of tooth lost. Use diagnostic wax-ups to determine tooth shape and then increase the amount of tooth tissue accordingly.
3. Before starting the treatment, warn the patient that his or her "bite" will change. This is particularly important when restoring anterior teeth with localized wear or erosion.
4. When adjusting the occlusion, ensure that there is even occlusal contact on the new restorations. The anterior guidance will be shared by more than one tooth.
5. If the teeth are worn to below 50% of original tooth height, consider crowns rather than composites.

## THE AUTHOR

***Dr. David Bartlett*** *is a reader and head of specialist training in prosthodontics at King's College London Dental Institute, London, United Kingdom. Email: david.bartlett@kcl.ac.uk.*

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6. Bartlett DW. The role of erosion in tooth wear: aetiology, prevention and management. *Int Dent J* 2005; 55(4 Suppl 1): 277–84.


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*The "Point of Care" section answers everyday clinical questions by providing practical information that aims to be useful at the point of patient care. The responses reflect the opinions of the contributors and do not purport to set forth standards of care or clinical practice guidelines. This month's responses were provided by speakers at the FDI World Dental Congress, which will be held September 22–25 in Shenzhen, China.*


QUESTION 1

## When should referral for a root coverage procedure be considered?

### Background

In recent years the roles of esthetics and patient comfort have become increasingly important in dentistry. Paralleling this development, the role of root coverage procedures to treat gingival recession has gained more importance in periodontics. Gingival recession and its corollary, root exposure, may result in several undesirable sequelae, including compromised esthetics; root sensitivity; loss of root structure because of abrasion, abfraction or caries; and compromised plaque control. Resin-bonded restorations are often used to treat these conditions but are less than perfect. They often lead to additional (iatrogenic) recession, do not restore normal gingival architecture and do not facilitate optimal plaque control by the patient. Furthermore, these restorations require periodic replacement, which inevitably results in the removal of additional tooth structure.

Clearly, a more biologically acceptable and desirable outcome in terms of enhancing esthetics, minimizing the risk of further recession, treating dentinal hypersensitivity and arresting the loss of additional root structure would be restoration of the lost gingival tissue. Certainly any procedure that mitigates the risk of further recession is desirable. Predictable coverage of exposed roots is possible in well-defined clinical situations, and several different treatment modalities can be employed with good success.

### When to Choose Root Coverage

The decision to treat gingival recession with a periodontal approach typically involves the following 2 considerations:

- Is root coverage desirable?
- Is root coverage achievable and predictable?

The answer to the first question involves a careful review of the patient's chief concerns such as esthetics and sensitivity, difficulty maintaining plaque control, presence or absence of root pathology, restorative and orthodontic considerations, and the practitioner's evaluation of the likelihood of further recession. If the patient is experiencing symptoms associated with gingival recession or is unhappy with the appearance of his or her gums, root coverage may be indicated (**Box 1**). Alternatively, root coverage may be indicated where there has been loss of tooth structure, where the remaining gingiva appears thin and prone to further recession or where recession makes routine oral hygiene procedures difficult.

**Box 1** Indications for root coverage and gingival augmentation

| |
|---|
| Sensitivity |
| Progressive recession |
| Esthetic considerationss |
| Preparatory to prosthetic or orthodontic treatment |
| Conservation of tooth structure |
| Facilitation of oral hygiene |

The answer to the second question lies largely in a classification developed in 1985 by Miller, who outlined the conditions under which complete or nearly complete root coverage could be expected and the conditions where only partial root coverage could be expected (**Table 1**). The critical factor in predicting root coverage was the height of the adjacent interproximal bone. According to Miller, where no interproximal bone loss has occurred, complete root coverage can be expected, whereas only partial coverage can be anticipated where interproximal bone loss has occurred (**Figs. 1** and **2**).

Once the dentist has determined that root coverage is desirable and possible for a patient, the

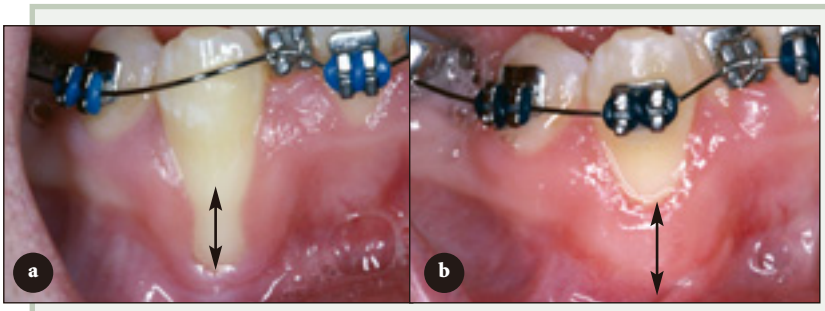


**Figure 1:** a. Class I recession treated with a graft of subepithelial connective tissue. b. Note that complete root coverage has been obtained and the width of keratinized tissue has increased.

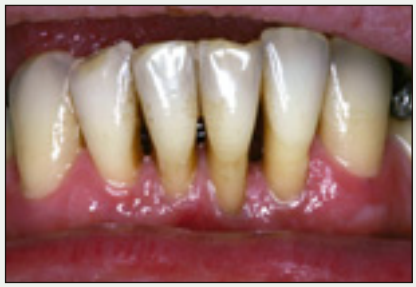

**Figure 2:** Class III and IV recessions. Limited or no root coverage can be expected in this situation. If recession is continuing or Class V restorations are planned, a procedure to augment the gingiva should be considered.

**Table 1** Miller classification of gingival recession

| Classification | Characteristics | | Anticipated root coverage |
|---|---|---|---|
| | Interproximal bone | Recession | |
| Class I | Normal levels | Coronal to mucogingival junction | Complete root coverage possible and predictable |
| Class II | Normal levels | Apical to mucogingival junction | Complete root coverage possible and predictable |
| Class III | Loss of height | Apical to interproximal tissue levels | Partial |
| Class IV | Lower levels | At the same level as interproximal tissue | None |

patient's medical suitability for undergoing a minor periodontal procedure should be assessed. Basic dental care should be completed, including prophylaxis, caries control and any necessary endodontic treatment. Final restorations and especially full-coverage restorations or restorations extending onto the root surface should be delayed until after the root coverage procedure is complete. Areas affected by abrasion, abfraction, erosion or caries can be covered using root coverage procedures, provided existing restorations or caries have been removed and provided the areas of recession meet Miller's criteria. Furthermore, where the gingiva is very thin or where keratinized tissue is absent or minimal, the placement of full-coverage restorations or restorations impinging on the gingiva is likely to result in additional recession.

When root coverage has been achieved, recurrence of recession is very unlikely. Before contemplating restoration of exposed root surfaces, the dentist should therefore consider the option of root coverage as a more biologically acceptable procedure with a predictable and stable long-term outcome.

## THE AUTHORS

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*Dr. Van Dyke's session at the FDI Congress, titled "Management of the host response to prevent and treat periodontitis," will be presented on Sunday, September 24.*

## Further Reading

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QUESTION 2

## An 8-year-old patient presents with an anterior crossbite and skeletal Class III malocclusion. How can I be sure that early orthopedic treatment will be successful?

### Background

Patients with Class III malocclusion who present with an anterior crossbite and mild to moderate maxillary deficiency can be treated successfully with protraction headgear or face mask therapy.[1–3] The dental and skeletal effects of such appliances include advancement of the maxilla by 2–4 mm over an 8- to 12-month period, correction of the anterior crossbite, proclination of the maxillary incisors, downward and backward rotation of the mandible, improvement of the facial appearance and more harmonious lip relationships.[4–6] Early treatment of such patients can prevent progressive, irreversible soft-tissue or bony changes; eliminate centric occlusion/centric relation discrepancies; prevent abnormal incisal wear; minimize excessive dental compensation due to the skeletal discrepancy; and improve lip posture, facial profile and self-image during children's growth years.

The factors associated with success in intercepting a Class III malocclusion include good facial esthetics, presence of an anteroposterior functional shift, mild skeletal disharmony, convergent facial type, young age (i.e., growth remaining), symmetric condyle, no familial prognathism and good cooperation.[7]

### Predicting Mandibular Growth

One of the reasons that clinicians are reluctant to render early orthopedic treatment for Class III patients is the inability to predict mandibular growth. Patients who undergo early orthodontic or orthopedic treatment may need surgical treatment at the end of the growth period. The ability to predict mandibular growth early in life can therefore help clinicians to plan for future orthodontic care or the need for surgical treatment. Bjork[8] used a single cephalogram to identify 7 structural signs of extreme mandibular rotation during growth: inclination of the condylar head, curvature of the mandibular canal, shape of the lower border of the mandible, width of the symphysis, interincisal angle, intermolar angle and height of the anterior lower face. Discriminant analysis of long-term results of early treatment identified several variables that had predictive values. Franchi and others[9] found that inclination of the condylar head, the vertical maxillomandibular relationship and the width of the mandibular arch could predict the success or failure of early Class III treatment. Ghiz and others[10] found that the combination of position of the mandible, ramal length, corpus length and gonial angle predicted successful outcome with 95% accuracy but predicted unsuccessful outcome with only 70% accuracy. We propose the use of serial cephalometric radiography and a growth treatment response vector (GTRV) analysis to predict excessive mandibular growth. The GTRV ratio can be calculated from the following formula:

$$\text{GTRV} = \frac{\text{horizontal growth changes of the maxilla}}{\text{horizontal growth changes of the mandible}}$$

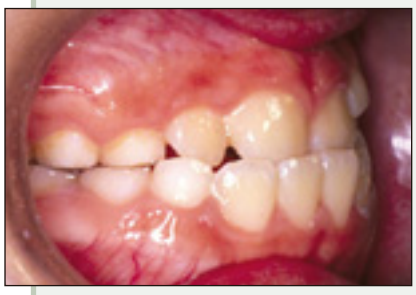

**Figure 1:** An 8-year-old boy who presented with Class III malocclusion and an anterior crossbite.

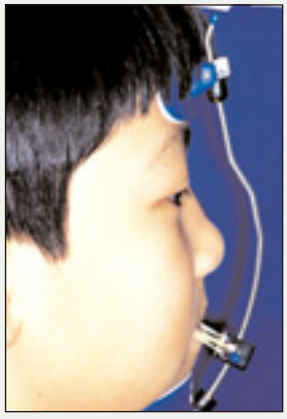

**Figure 2:** The patient was treated with a banded expansion appliance and a protraction face mask.

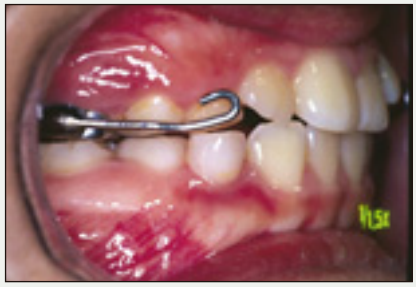

**Figure 3:** The degree of overjet improved after 8 months of treatment with the protraction face mask.

Normally, the mandible outgrows the maxilla each year by 23% and the GTRV ratio for individuals with Class I skeletal growth pattern is 0.77. A ratio smaller than 0.77 indicates greater horizontal mandibular growth and the likehood that the patient will need surgery.

In a study of patients with Class III malocclusion, the mean GTRV ratio was 0.49 ± standard deviation 0.14 (range 0.33 to 0.88) for patients who were successfully treated with protraction headgear and 0.22 ± 0.10 (range 0.06 to 0.38) for patients whose treatment was unsuccessful.[11] Clinicians can use the GTRV ratio to determine whether a Class III malocclusion can be camouflaged successfully with orthodontic treatment or if surgical treatment will eventually be necessary.

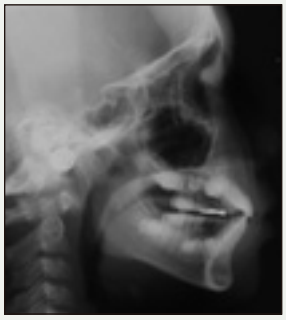

**Figure 4:** Post-treatment lateral cephalometric radiograph after 8 months of treatment.

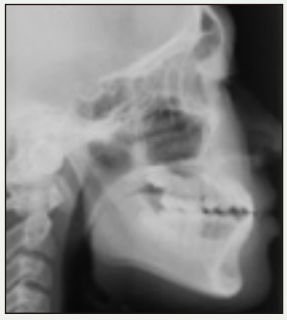

**Figure 5:** Lateral cephalometric radiograph obtained 7 years after completion of the face mask treatment.

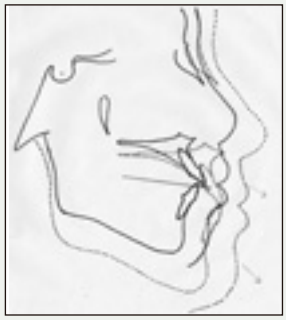

**Figure 6:** The radiographs obtained at 8 and 15 years of age (Figs. 4 and 5, respectively) are superimposed to measure height growth of the maxilla and mandible and hence to determine the growth treatment response vector ratio.

**Figure 1** shows an 8-year-old patient with a skeletal Class III malocclusion and an anterior crossbite. The patient was treated for 8 months with a maxillary expansion appliance and protraction face mask (**Fig. 2**). A positive overjet was established after 8 months of treatment (**Fig. 3**). **Figure 4** is the post-treatment cephalometric radiograph of the patient. The patient was followed until age 15 for growth analysis. **Figure 5** shows the cephalometric radiograph of the patient at age 15. The 2 radiographs were superimposed (**Fig. 6**) to measure the growth changes and thus calculate the GTRV ratio. The calculated ratio of 0.9 indicated that this patient had parallel growth of the maxilla and mandible during the observation period and that future surgical treatment may not be warranted. For this patient, the clinician could elect to initiate comprehensive orthodontic treatment to camouflage the malocclusion.

## Conclusion

The use of serial radiographs and GTRV analysis may help clinicians to predict excessive mandibular growth in patients with Class III malocclussions and decide whether to camouflage the malocclusion or proceed with surgery.

## THE AUTHOR

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*Dr. Ngan's session at the FDI Congress, titled "The biologic basis for early treatment," will be presented on Sunday, September 24.*

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QUESTION 3

# How can I recognize and manage salivary hypofunction in children?

## Background

Salivary hypofunction and associated xerostomia are usually recognized when they occur in adults, especially elderly people and those receiving certain types of medications. However, this condition is not usually considered in children, probably because those affected may not appear xerostomic and may even drool. Yet salivary hypofunction does not refer solely to diminished flow rate; it also encompasses decreased buffering capacity and lower levels of salivary constituents, especially proteins.

Although reductions in the quantity of saliva may be responsible for oral problems such as difficulties in eating and speaking and changes in the sense of taste, xerostomia is highly subjective, and unstimulated saliva flow may fall below 50% of its normal value before symptoms are observed.[1] Many children with special needs may drool because of poor oral motor function, but this does not rule out the possibility of salivary hypofunction. Furthermore, children with oral motor dysfunction have reduced salivary clearance rates and may even store food in the buccal sulci.[2] Therefore, reported symptoms and apparent flow rates are poor indicators of salivary hypofunction, and a thorough clinical examination is essential. Infection, trauma, neoplasia, radiation therapy and medications may all be responsible for salivary hypofunction. The condition may also be developmental and can be present in children with various syndromes such as hemifacial microsomia, Treacher Collins syndrome and other anomalies of the first branchial arch. Recent research has associated salivary hypofunction with other conditions, including velocardiofacial syndrome (VCFS),[3] Prader-Willi syndrome and ectodermal dysplasia.

## Saliva as a Risk Factor for Caries

The causes of tooth decay are of course multifactorial and include such environmental factors as dietary habits and oral hygiene methods. However, salivary function has important effects on oral health, and many patients with salivary hypofunction have rampant dental caries (**Fig. 1**).

When rampant dental caries are diagnosed in a child, the parents are often told that the problem is dietary, which frequently leads to feelings of guilt. Although diet is undoubtedly the culprit in many cases, there are also many children who continue to have very high rates of caries despite changes to their diets and oral hygiene practices. This suggests that clinicians should consider the possibility of other contributory factors.

Salivary hypofunction in children is often diagnosed by the pattern of caries. Although many of these children belong to special needs groups, salivary hypofunction may also affect otherwise healthy children. In a recent audit of records for children who underwent salivary scintiscanning in Sydney, Australia, one-third of those with confirmed salivary hypofunction had VCFS and one-third had a range of other medical conditions, but the remaining third had no contributory medical history.

It is also of interest that salivary hypofunction, in particular a reduction in salivary proteins, has been associated with malnutrition.[4] Many children with early childhood caries are below their ideal body weight and may be malnourished.[5] It would therefore be worthwhile to investigate the possibility of a link between early childhood caries, malnutrition and salivary hypofunction.

Thus, we should perhaps be thinking more

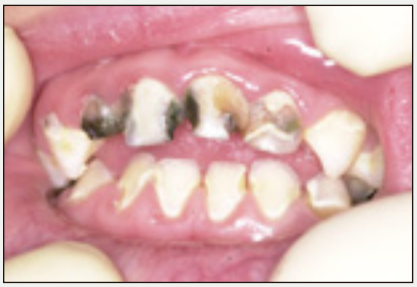

**Figure 1:** Extensive incisor caries in a child with velocardiofacial syndrome.

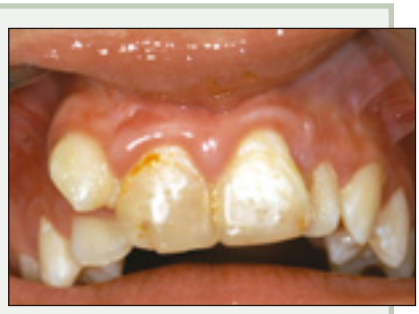

**Figure 2:** Cervical carious lesions in a child with thick, mucinous and bubbly saliva.

about the role of saliva in children with a high risk of caries and including methods of saliva stimulation in their preventive regimens.

## Danger Signs

The following signs may help to identify children in whom salivary hypofunction may be a significant factor contributing to their risk of caries.

### Pattern of caries, including caries at abnormal sites

- Severe and rapid carious breakdown of mandibular incisor teeth
- Incisal and cuspal caries
- Marked cervical and smooth-surface demineralization and caries

Caries at any of the above-mentioned sites are *always* associated with a very high rate of caries. Mandibular incisal caries in particular may be associated with aplasia or hypofunction of the submandibular glands.

### Nature of the saliva

- Frothy, bubbly or thick (**Fig. 2**)

### Progression of caries

- Progressive and rapid carious breakdown, despite intensive preventive advice and regimens
- Increased rate of loss of noncarious tooth tissue by erosion

### Soft-tissues changes

- Dryness of the vermillion border of the lip and oral mucosa
- Fissuring and loss of filiform papillae of the tongue

### Other factors

Salivary flow rate alone is a poor indicator of salivary hypofunction. Flow rate can be affected by a number of factors, including body position, degree of hydration and circadian rhythms; furthermore, the accurate measurement of flow rates in children is extremely difficult.

As already mentioned, many children with poor oral motor function may drool, leading to the impression they have too much saliva. In contrast, however, such children may have a prolonged sugar clearance time, which together with a preference for soft food (to reduce chewing) may significantly increase the risk of caries.

## Preventive Measures

When routine preventive measures appear to be failing, the following additional actions may help to slow or arrest carious breakdown.

### *Modify the Diet*

The clinician should strongly reinforce the need to reduce or eliminate snacking and the consumption of sugared, carbonated and caffeinated beverages. In particular, discourage frequent sipping of sugared drinks and encourage consumption of water to maintain hydration. Make sure the child's teacher is informed, so that a bottle of water may be taken into the classroom.

Lip balm or petroleum jelly should be applied regularly, especially at nighttime.

### *Prevent Demineralization and Promote Remineralization*

For older children and adolescents, encourage daily use of a fluoride mouth rinse (0.05% NaF) or a high-fluoride toothpaste such as Colgate 5000 ppm.

Custom trays for nighttime application of fluoride gel (1.23% neutral NaF) to the mandibular arches can be particularly useful in cases of lower incisor caries.

Younger children at risk of fluorosis should be seen regularly (at least every 3 months) for application of a fluoride varnish.

Recommend the daily use of remineralizing agents, such as the casein phosphates (casein phosphopeptide and amorphous calcium phosphate or CPP-ACP). These products are marketed in the United States and Canada as Prospec MI Paste (GC America) and have been shown to have powerful remineralizing effects. Recent research also suggests a synergistic remineralizing potential when these products are used with fluoride.[6]

### *Stimulate Salivary Production*

Encourage the regular use of sugarless gums, especially those containing xylitol, to stimulate saliva and reduce the acidogenic potential of plaque.[7] CCP-ACP is also available in a sugar-free gum, marketed as Recaldent (GC America).[8]

### *Improve Oral Hygiene*

Recommend intermittent use of chlorhexidine gel (0.2%) for chemical control of plaque, and encourage regular tooth-brushing and flossing.

### *Undertake Restorative Management*

Seal fissures in molars soon after eruption with a glass ionomer sealant.

If restorative treatment is required, use fluoride-releasing materials whenever clinically feasible, as part of the caries-control strategy.

### *Perform Regular Recall*

Set appropriate recall intervals, taking into account the risk of caries. See high-risk children at

least every 3 months to monitor the progression of caries and compliance with preventive regimes.

In severe cases and those with no response to preventive measures, refer the child to an appropriate specialist for further investigation.

## THE AUTHOR

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*Dr. Hibbert's session at the FDI Congress, titled "Oral medicine and pathology in children: what to look for and how to manage the common and uncommon," will be presented on Monday, September 25.*

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# Why Do We Need an Oral Health Care Policy in Canada?

A presentation to the Access and Care Symposium, University of Toronto, May 4, 2004

***James L. Leake,*** *DDS, MSc, FRCD(C)*

**Abridged Version**

The complete article can be viewed in the electronic version of JCDA at www.cda-adc.ca/jcda/vol-72/issue-4/317.html

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This article has been peer reviewed.

Canada, a country ranked consistently at the top of the list of desirable countries in which to live, has earned an international reputation for its social values and the translation of those values into high-quality education and social and health care delivery systems. This paper provides information on the financing, organization and delivery of oral health care services in Canada and contrasts the current situation with past promises and the potential demonstrated by medicare and alternative models of dental care delivery.

In Canada, access to health care is seen as a right of citizenship, not something that should be determined by an entrepreneurial market. Promises to include dental care in the universal, publicly funded medicare system have not been realized and, over the last 20 years, the share of dental care costs paid through public funding has continued to fall. Dentistry is still delivered mainly by private practitioners, who are paid on a fee-for-service basis by many payers. Severe inequities in oral health and in access to oral health care persist and may even be increasing. As of May 2004,

THE DENTAL CARE DELIVERY SYSTEM HAS, IN MANY WAYS, CEASED TO BE CONSIDERED HEALTH CARE AND APPEARS TO BE CONTINUING TOWARD A MARKET-DRIVEN SERVICE.

- the dental care delivery system has, in many ways, ceased to be considered health care and, in spite of Canadian values and the profession's social contract, appears to be continuing toward a market-driven service available to those who can afford it;
- the increasing costs of dental insurance and the disparities in oral health and access to care threaten the sustainability of the current system;
- the legislation that allows the more affluent insured to receive tax-free care and requires all, including the poor, to subsidize that tax expenditure is socially unjust;
- unless an alternative course is set, dentistry will lose its relevancy as a profession working for the public good, followed by further erosion of public support for dental education and research and ever-widening gaps in oral health;
- however, never in our history have we had the opportunity presented by the overall high levels of oral health, the vast human resources, national affluence and funds already allocated to oral health services to allow us to consider alternatives.

Groups, including the Canadian Dental Hygienists Association, support the development of public programs to meet the needs of Canadians. Similarly, the Canadian Dental Association's (CDA) brief to the Romanow Commission concluded with these words:

> What is required is an all-encompassing approach that considers all of the elements, and builds a system for oral health care that embraces us all.

CDA's call to build such a system can serve as the ultimate goal. However, one of the first steps has to be the establishment of revised models of prevention and care delivery that reach out to those who do not now enjoy oral health and access to oral health care.

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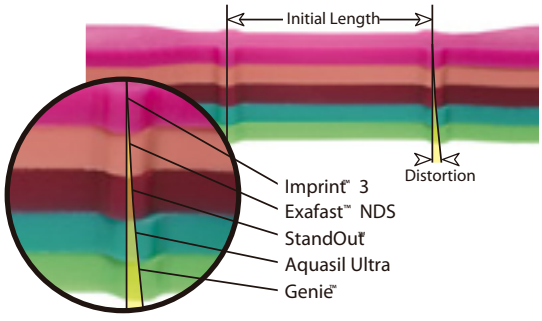


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# Oral Health Care in Canada — A View from the Trenches

A presentation to the Access and Care Symposium, University of Toronto, May 4, 2004

***Patricia Main,*** *BDS, DDS, DDPH, MSc, FRCD(C);* ***James Leake,*** *DDS, DDPH, MSc, FRCD(C);* ***David Burman,*** *DDS, DDPH, PhD*

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Most provinces have limited programs for welfare clients and children. Concern is increasing over the effect of lack of access to oral health care on the oral health, and hence general health, of disadvantaged groups. In May 2004, a national symposium was held in Toronto to raise awareness of the need to improve access to care and oral health services.

**Purpose:** In preparation for the symposium, key informants across Canada were canvassed for their perceptions of oral health services and their recommendations for improving oral health care delivery. This paper reports the results of that survey.

**Method:** A questionnaire was constructed to address problems facing agencies with responsibility for meeting the oral health care needs of people receiving government assistance, the underhoused and the working poor. The survey was sent to 200 agencies, government and professional organizations. Data from the returned questionnaires were entered into a Statistical Package for the Social Sciences database and analyzed. Responses from Ontario were compared with those from the rest of Canada; those from government organizations were compared with others; and responses were compared by cultural background of clients and by type of organization.

**Results:** In assessing the positive aspects of oral health care, 84% of respondents agreed that public programs are useful and 81% felt that dentists offer good care. However, 77% disagreed that preventive care is accessible and that access to dentists and dental specialists is easy. More Ontarians than others thought there were few alternative settings for care delivery (95% vs. 83%) and that the poor feel unwelcome in dental offices (83% vs. 70%). The issues most commonly identified were the need for alternative delivery sites such as community health centres where service delivery could be affordable, accountable and sustainable; the need for oral health to be recognized as part of general health; regulatory issues (e.g., expanding practice opportunities for non-dentist oral health care providers and removing restrictions on other dental health professionals in providing basic care to the financially challenged); and training.

**Discussion:** The survey helped to identify access and care issues across the country. More Ontario respondents felt that they had fewer services now than 10 years ago, perhaps because Ontario had been well supplied with dental care options, but has seen programs for social assistance recipients and within-hospital training programs eroded. Other provinces that may have had fewer dental services in the past reported little change; however, they also identified the need for more programs and better access to care. There was considerable agreement that lack of access to dental care services is an important detriment to the oral and general health of many Canadians. Respondents generally thought that dental health was isolated from general health.

All issues and comments were provided to attendees at the national Access and Care: Towards a National Oral Health Strategy Symposium. The access and care issues were compared with those identified through other current initiatives, such as the National Oral Health Strategy (2004), the Canadian Dental Association's response to the Romanow Commission, and those identified by the Conference Planning Committee. There was considerable agreement and overlap among these initiatives in terms of the oral health issues facing Canadians — particularly the poor and disadvantaged.


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§Whole-mouth mean modified gingival index (MGI) scores
¶A randomized, 6-month, controlled, observer-blind, parallel-group clinical trial conducted according to ADA Guidelines; n=237 healthy subjects with mild-to-moderate gingivitis evaluable at both 3 and 6 months. Subjects rinsed twice daily for 30 seconds with 20 mL at least 4 hours apart. Based on home use.
**In a survey of 1000 adult Canadians, selected to be representative of the Canadian population.
††Rinse full strength with 20 mL for 30 seconds twice a day.

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# Teaching the Use of Resin Composites in Canadian Dental Schools: How Do Current Educational Practices Compare with North American Trends?

***Christopher D. Lynch,*** *BDS, MFD RCSI;* ***Robert J. McConnell,*** *BDS, PhD, FFD;*
***Ailish Hannigan,*** *BSc, PhD;* ***Nairn H.F. Wilson,*** *BDS, MSc, PhD, FDS, FDGP(UK), DRD*

**Abridged Version**

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The placement of resin composites in posterior teeth is now a common procedure in dental practice. However, surveys of dental school education have found that the teaching of posterior resin composites lags behind trends in general practice.

**Purpose:** The aim of this study was to investigate current teaching of the placement of posterior resin composites in Canadian dental schools and to compare trends in teaching with those in the United States. This study complements other investigations in which we examined teaching of the use of posterior resin composites in dental schools in the United States, Ireland and the United Kingdom.

**Methods:** A questionnaire was distributed by email to the faculty member in each of the 10 dental schools in Canada with responsibility for teaching the operative dentistry curriculum, including the placement of posterior resin composites. The results of this survey are presented in 2 sections: current practices in the teaching of posterior resin composites in Canadian dental schools and comparison of these findings with contemporary practices in U.S. dental schools.

**Results:** Responses were received from each of the 10 dental schools, giving a response rate of 100%. The teaching of posterior resin composites has increased since an earlier survey in the late 1990s. All schools reported that they teach the placement of resin composites in occlusal and 2-surface occlusoproximal cavities in premolars and permanent molars. Nine schools teach the placement of 3-surface occlusoproximal resin composites in premolars and molars. Seven of the 10 dental schools teach the use of rounded internal line angles for posterior resin composite restorations; 6 schools teach bevelling of proximal box margins for occlusoproximal resin composite restorations. Seven of the 10 schools teach a total-etch technique when restoring cavities involving the middle third of dentin (moderately deep cavities); 3 schools teach the use of a glass-ionomer cement base in this situation. There appears to be more teaching and clinical experience of posterior resin composites in Canadian dental schools compared to U.S. dental schools. Canadian dental students place more posterior resin composite and fewer silver amalgam restorations than U.S. dental students. In contrast with U.S. dental schools, however, Canadian dental students were not exposed to such newer forms of technology as light-emitting diode (LED) curing lights.

**Conclusions:** The teaching of posterior resin composites has increased in Canadian dental schools in recent years. Although this increase exceeds that noted in U.S. dental schools, there is diversity of teaching with respect to some principles of posterior resin composites, in particular, design features of cavities and the management of operatively exposed dentin. The challenge to those responsible for dental school curricula is to ensure that graduating students are best prepared to address the expectations of the modern clinical practice of dentistry.

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# The Oral-B CrossAction Manual Toothbrush: A 5-Year Literature Review

***MaryAnn Cugini,*** *RDH, MHP;* ***Paul R. Warren,*** *LDS*

**Abridged Version**

The complete article can be viewed in the electronic version of JCDA at www.cda-adc.ca/jcda/vol-72/issue-4/323.html

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The design of the modern conventional manual toothbrush can be attributed to Dr. Robert Hutson, a Californian periodontist, who in the early 1950s developed the multitufted, flat-trimmed, end-rounded nylon filament brush that became known as the Oral-B manual toothbrush. The trademark Oral-B emphasized that this was an oral brush, designed to clean all parts of the oral cavity, not merely a toothbrush. Flat-trimmed conventional toothbrushes based on the original Oral-B design have good plaque-removing capability when used carefully. However, limitations in terms of patients' brushing technique and brushing time necessitated a radical change in bristle pattern to improve performance, especially at approximal sites and along the gumline.

## Rationale for Product Development

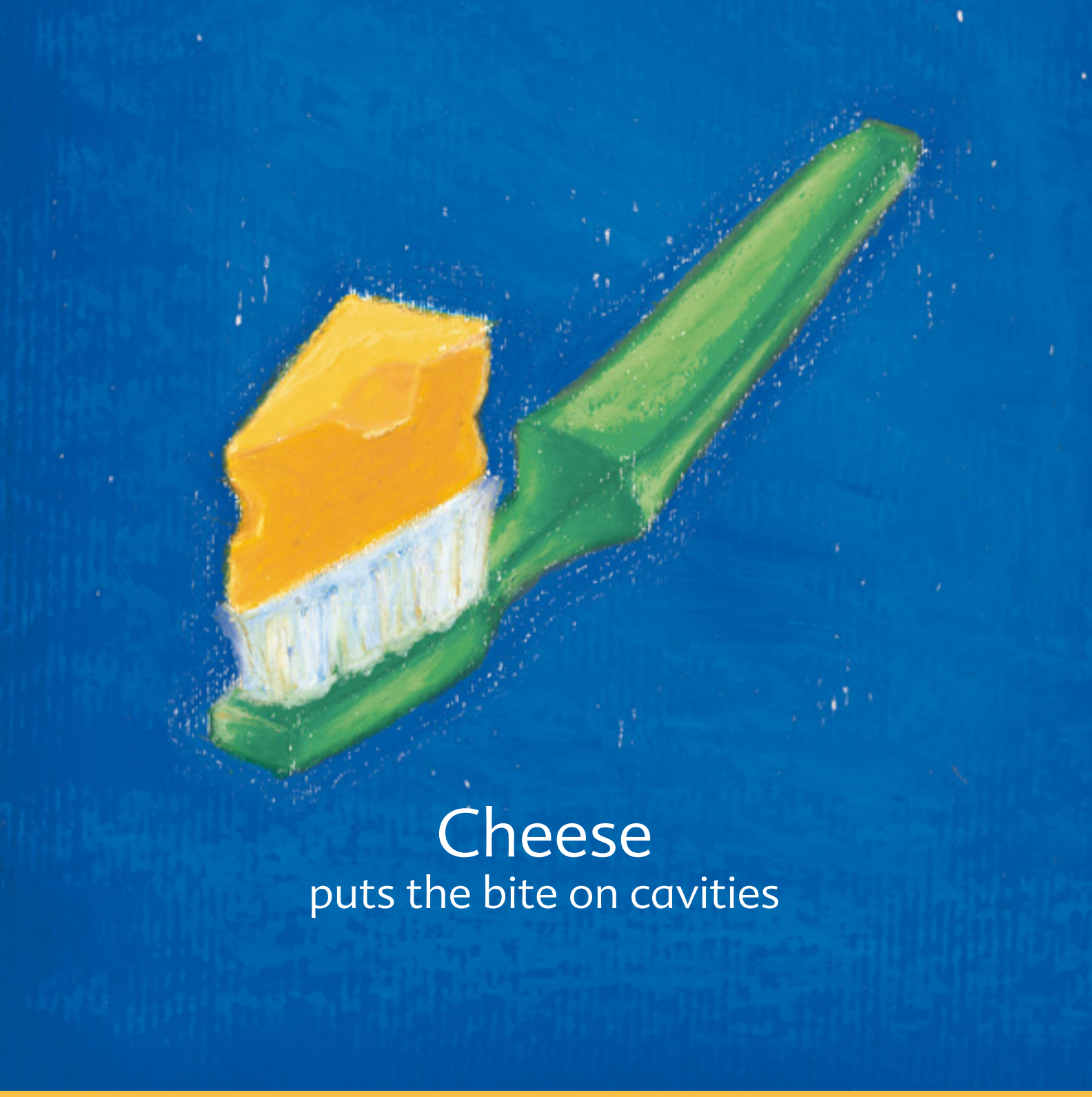
Detailed studies of the tooth-brushing process, using advanced scientific and ergonomic research methods, led to new toothbrush designs intended to maximize the efficacy of brushing efforts. These studies showed that the point of greatest interproximal penetration occurs when the direction of brushing changes; bristles angle back into the interproximal space, moving down and back up the adjoining approximal surface. These mechanics were further optimized on the basis of standardized evaluations of brush-design characteristics, including combinations of tuft lengths, insertion angles and tuft layout. With conventional vertical bristles these improvements yield limited benefits because only a few bristles are correctly positioned at the interproximal junction when the brush changes direction. Ultimately, a design with bristle tufts arranged at 16° from vertical along the horizontal brush head axis was identified, in which the maximum number of bristles operated at the optimum angle throughout the brushing cycle. This design was significantly more effective ($p < 0.001$) than others in terms of penetration (by 9.6%) and cleaning effectiveness per brush stroke (by 15.5%).

## Effectiveness

This discovery paved the way for a new toothbrush design with a unique patented array of tufts, which became known as the Oral-B CrossAction brush. This design was selected for extensive independent studies designed to evaluate plaque removal at the gingival margins and in the approximal areas and longer-term control of gingivitis, relative to current standard designs. In a series of studies (published in 2000), 14 single-brushing comparisons and 2 longer-term studies demonstrated the consistent superiority of the Oral-B CrossAction brush over the equivalent commercial standards. Since then, several additional studies have contributed further positive performance data for the CrossAction brush. Two of the studies demonstrated that plaque removal by this brush was superior to that of 15 other manual toothbrushes, and further investigations contributed similarly positive data. Longer-term data have confirmed superior CrossAction performance and the long-term benefits of improved efficacy, particularly for gingivitis.

## Discussion

Novel approaches to toothbrush design have produced a toothbrush that, when tested in a large number of clinical studies, has consistently met or exceeded established standards of efficacy. The literature contains a wealth of performance data on various toothbrush designs, but none of these designs shows the year-on-year consistency and reproducibility of the Oral-B CrossAction.



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**1.** Kashket S and DePaola DP. 2002. *Nutr Reviews* 60:97-103. **2.** Papas AS et al. 1995. *Am J Clin Nutr* 61(suppl):417S-422S. **3.** Jenkins GN and Hargreaves JA. 1989. *Caries Res* 23:159-164. **4.** Jensen ME. 1999. *Cariol* 43(4):615-633. **5.** Drummond BK et al. 2002. *Eur J Paediatric Dent* 3:188-194.

# Orofacial Granulomatosis: 2 Case Reports and Literature Review

***Adel Kauzman,*** *DMD, MSc, FRCD(C);* ***Annie Quesnel-Mercier,*** *DMD;*
***Benoît Lalonde,*** *DMD, MSD, FRCD(C)*

**Contact Author**

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## ABSTRACT

Orofacial granulomatosis comprises a group of diseases characterized by noncaseating granulomatous inflammation affecting the soft tissues of the oral and maxillofacial region. The most common clinical presentation is persistent swelling of one or both lips. It is important to establish the diagnosis accurately because this condition is sometimes a manifestation of Crohn's disease or sarcoidosis. This article describes 2 cases of orofacial granulomatosis, in one of which the condition was a manifestation of Crohn's disease. The diagnostic approach to and the treatment of orofacial granulomatosis are reviewed.

**MeSH Key Words:** Crohn disease/diagnosis; granulomatosis, orofacial; mouth diseases/diagnosis



Orofacial granulomatosis (OFG) comprises a group of diseases characterized by noncaseating granulomatous inflammation affecting the soft tissues of the oral and maxillofacial region.[1] This term, introduced by Wiesenfeld in 1985, encompasses Melkersson-Rosenthal syndrome (MRS) and cheilitis granulomatosa (CG) of Miescher.[2] MRS has been described as a triad of persistent lip or facial swelling, recurrent facial paralysis and fissured tongue.[3,4] CG of Miescher is characterized by swelling restricted to the lips.[5] According to Neville and others,[6] these 2 entities should not be considered distinct diseases and should both be included in the spectrum of OFG.

The precise cause of OFG is unknown.[7] Several theories have been suggested, including infection, genetic predisposition and allergy.[8–12] More recently, researchers have identified a monoclonal lymphocytic expansion in OFG lesions and have suggested it could be secondary to chronic antigenic stimulation.[13] It appears that cytokine production by the lymphocytic clone could be responsible for the formation of granulomas in these lesions.[14] However, an immunologic origin (cell-mediated hypersensitivity reaction) is favoured because of the presence of activated helper T lymphocytes expressing interleukin-2 receptors in these lesions.

The classic presentation of OFG is a nontender recurrent labial swelling that eventually becomes persistent.[15] This swelling may affect one or both lips, causing lip hypertrophy (macrocheilia).[16] The swelling is initially soft but becomes firmer with time as fibrosis ensues. However, the clinical presentation can be highly variable, making the diagnosis difficult to establish. For example, the recurrent facial swelling may affect the chin, cheeks, periorbital region and eyelids,[17] and, in rare cases, it may not be associated with lip hypertrophy. Intraoral involvement may take the form of hypertrophy, erythema or nonspecific erosions involving the gingiva, oral mucosa or tongue.[16,17] The diagnostic dilemma may be further complicated by the fact that OFG may be the oral manifestation of a systemic condition, such as Crohn's disease, sarcoidosis or, more rarely, Wegener's granulomatosis.[18] In addition, several conditions, including tuberculosis, leprosy, systemic fungal infections and

## Case 1

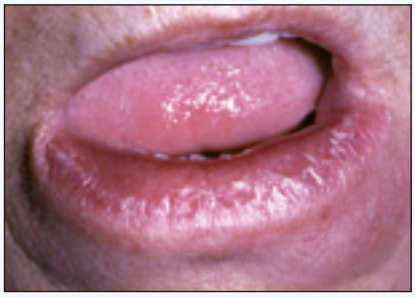

**Figure 1a:** Appearance of the lower lip at the time of presentation. Note the presence of bilateral edema and erythema of the chin.

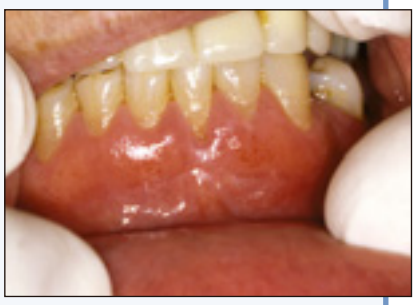

**Figure 1b:** Intraoral examination revealed diffuse swelling of the lower gingiva. The labial surface of the gingiva has a granular appearance with several petechiae.

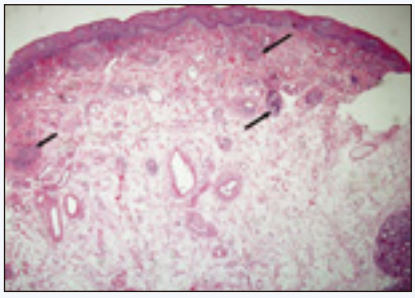

**Figure 1c:** Photomicrograph of the lip biopsy sample, showing diffuse edema of the connective tissue and mild fibrosis of the lamina propria. Several granulomas (arrows) are visible at this magnification, along with a perivascular inflammatory infiltrate. (Hematoxylin and eosin; original magnification × 4.)

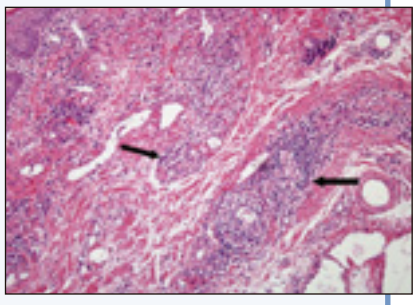

**Figure 1d:** Several noncaseating epithelioid granulomas with giant cells are visible in this photomicrograph (arrows). There is also slight dilatation of the lymphatic channels. (Hematoxylin and eosin; original magnification × 10.)

foreign body reactions, may show granulomatous inflammation on histologic examination.[7]

Crohn's disease belongs to the group of idiopathic inflammatory bowel conditions. It is characterized by granulomatous inflammation affecting any part of the gastrointestinal tract, from the mouth to the anus. It is especially common in young Ashkenazi or white adults and occurs with equal frequency among men and women. Although the cause of Crohn's disease is unknown, recent studies have suggested a multifactorial etiology in genetically predisposed individuals.[7] The *Nod2/Card15* gene is the first susceptibility gene to be implicated by several independent research groups in the pathogenesis of this disease.[19]

The initial clinical manifestations of Crohn's disease are recurrent abdominal cramps and chronic diarrhea. Signs and symptoms secondary to malabsorption appear next and include vitamin deficiencies, pernicious anemia, fatigue, weight loss and delayed growth (in children). Other complications may occur because of chronic, recurrent intestinal obstruction, the presence of adhesions or fistula formation. Some patients may have extraintestinal manifestations that require medical attention, such as erythema nodosum, uveitis, arthralgia and migratory polyarthritis. Patients with oral complaints can seek help from their dentist. These patients could suffer from linear and aphthous ulcers, chronic swelling of the lips (macrocheilia) or hypertrophy of the oral mucosa.[20] A "cobblestone" appearance of the oral mucosa is a common presentation.[20] The oral manifestations may appear before, after or at the same time as the intestinal complaints.[21] According to several authors,[6,20,21] a linear ulceration in the buccal vestibule surrounded by hyperplastic mucous folds is highly suggestive of Crohn's disease.

Microscopic examination of the oral lesions associated with Crohn's disease reveals epithelioid granulomas with giant cell formation in 67% to 85% of cases.[20,22] In contrast, only 50% of intestinal lesions exhibit similar histological changes. The granulomas are identical with those seen in OFG and sarcoidosis. Therefore, these conditions must be distinguished clinically.

The diagnosis of OFG is made by histopathologic identification of noncaseating granulomas. Local and systemic conditions characterized by granulomatous inflammation must be excluded by appropriate clinical and laboratory investigations.[7,18] This article presents 2 cases of OFG, in one of which the condition proved to be a manifestation of Crohn's disease. The article outlines the diagnostic approach used to investigate a patient presenting with macrocheilia (lip hypertrophy) and discusses various therapeutic modalities used in treating OFG.

## Case Reports

### *Case 1*

A 63-year-old-woman was referred for investigation of lower lip hypertrophy of unknown cause. She described a recurrent swelling of her lip that had eventually become permanent. The swelling had begun a few months earlier and was not associated with any change in oral hygiene products or cosmetics. The condition had been treated

with penicillin and an antihistaminic without any appreciable results.

The patient's medical history included temporary facial paralysis following surgical excision of a benign parotid tumour 12 years earlier. The patient suffered from hypertension, which was controlled with diuretics. She reported no intestinal problems that would suggest Crohn's disease, nor did she complain of chronic fatigue. There was no history of tuberculosis.

The extraoral examination revealed no lymphadenopathy, and there was no sign of dysphasia. The lower lip was markedly edematous (**Fig. 1a**) with erythema of the chin. The lip was firm to palpation and slightly indurated. Intraoral examination revealed a diffuse swelling of the lower anterior vestibule. The gingiva in the area of the lower anterior teeth was erythematous and swollen, with a slightly granular surface (**Fig. 1b**). There were no appreciable changes on the dorsal surface of the tongue. The rest of the intraoral examination was unremarkable.

The clinical differential diagnosis included OFG, angioedema (idiopathic or hereditary), sarcoidosis, Crohn's disease and an allergic reaction. MRS was ruled out because the reported facial paralysis was presumably related to the parotid surgery and because the tongue appeared clinically normal. Chest radiography and a series of blood tests, including assessment of serum levels of angiotensin-converting enzyme, were requested. An in-depth gastrointestinal investigation did not appear justified in this case, since there were no signs of anemia or symptoms suggestive of Crohn's disease. A biopsy sample of the lower lip was obtained for histopathologic evaluation.

Microscopic examination of the biopsy sample revealed marked edema of the connective tissue (**Fig. 1c**). Several noncaseating epithelioid granulomas with multiple giant cells were identified (**Fig. 1d**). The granulomas were especially concentrated around vessel walls. A perivascular lymphocytic infiltrate with marked dilatation of the lymphatic channels was also noted. Ziehl-Neelsen, Gram, Grocott, periodic acid–Schiff (PAS) and PAS–diastase staining yielded negative results. Polarized light microscopy did not reveal any foreign bodies. The final histopathologic diagnosis was 'cheilitis granulomatosa'.

The results of patch tests, done (with both regular and dental series) to exclude an allergic cause, were negative. The results of the other investigations were also negative. Therefore, a final diagnosis of idiopathic OFG was made.

**Case 2**

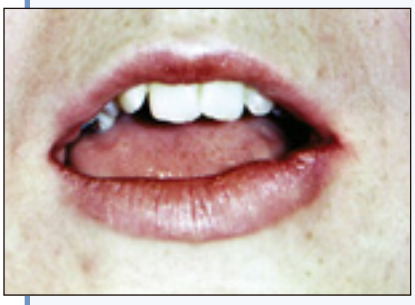

**Figure 2a:** The lower left lip is affected by diffuse edema; the affected area has a firm consistency. The right side does not appear to be affected.

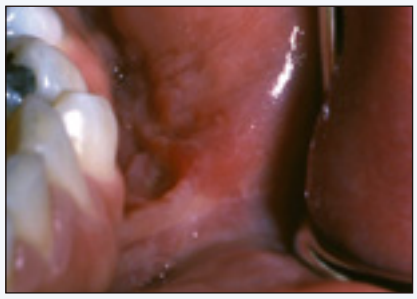

**Figure 2b:** A deep linear ulcer surrounded by folds of hyperplastic tissue is visible on the left side of the buccal vestibule.

Once the diagnosis was established, systemic corticosteroid therapy (prednisone 50 mg per day for 10 days) was started and was well tolerated. The lip swelling decreased, and there was a net reduction in the vestibular and gingival edema.

The labial edema recurred approximately 2 months after the systemic treatment. Intralesional injection of triamcinolone (40 mg/mL) was recommended. Four sites were infiltrated (0.25 mL or 10 mg per site). A close follow-up, shortly after the injections, showed reduction in lip swelling. Two weeks later, the patient stated that the appearance of her lip had returned to normal.

The patient's condition remained stable for approximately 4 months, after which the swelling reappeared. A new series of injections was carried out, which resulted in complete resolution of the signs and symptoms. At the most recent follow-up, mild swelling of the lower lip was noted, and a third series of injections was initiated. Again, this resulted in complete disappearance of the swelling.

***Case 2***

A 19-year-old woman was referred for treatment of multiple oral ulcers involving the buccal sulcus and persistent swelling of the lower left lip. These symptoms had been present for approximately 4 months. The patient suffered from chronic diarrhea and persistent fatigue and complained of occasional pain in multiple joints. She had previously undergone investigation for Crohn's disease (by a gastroenterologist), but the diagnosis had not been confirmed. There was no history of tuberculosis or facial paralysis.

Extraoral examination revealed no lymphadenopathy or signs of dysphasia. A prominent swelling involving the lower left lip was noted (**Fig. 2a**). Intraoral examination revealed a deep linear ulcer involving the lower left vestibule (**Fig. 2b**). A second, shallower ulcer was present on the right side. Both ulcers were surrounded by inflamed

and hyperplastic mucosal folds. The dorsal surface of the tongue appeared normal.

The clinical differential diagnosis included Crohn's disease, sarcoidosis and OFG. MRS and CG were considered less likely in this case. Because of the predominance of intestinal symptoms and the history of chronic fatigue, another gastrointestinal examination was recommended. Colonoscopy revealed sharply demarcated hyperemic areas in the terminal ileum with intervening mucosa of normal appearance (skip lesions). Deep, serpiginous linear ulcers imparted a cobblestone appearance to the mucosal surface. Superficial, punched-out aphthous ulcers were also noted. A clinical diagnosis of inflammatory bowel disease was made. Biopsy of the terminal ileum showed transmural inflammation and noncaseating granulomas with multiple giant cells. The final histopathologic diagnosis was Crohn's disease.

Systemic corticosteroid therapy was initiated. A few weeks later, the patient reported significant improvement of her intestinal symptoms. During telephone follow-up, the patient indicated that her oral lesions had reacted positively to the systemic treatment. Unfortunately, long-term follow-up to monitor the patient's condition and response to treatment was not possible.

## Discussion

The differential diagnosis of a persistent labial swelling includes angioedema (idiopathic or hereditary), sarcoidosis, Crohn's disease, OFG, CG and some specific infections (tuberculosis, leprosy and deep fungal infections).[23,24] Amyloidosis, certain soft-tissue tumours, minor salivary gland tumour, and Ascher's syndrome may also be included in the differential diagnosis.[15]

All of these conditions must be taken into account during the investigation of a patient with persistent lip swelling. The medical history and the results of the clinical examination help to direct the investigation. The biopsy represents an important step in establishing the correct diagnosis, especially if angioedema is not a favoured possibility. Upon microscopic identification of granulomatous inflammation, special stains are used to rule out deep fungal infections (PAS, PAS with diastase, Grocott) or specific bacterial infections (Ziehl-Neelsen, Gram). Polarized light microscopy is used to identify foreign bodies in the tissues.

Ancillary tests are ordered to assess whether a systemic disease is responsible for the granulomatous inflammation. Such tests might include chest radiography and assessment of serum levels of angiotensin-converting enzyme for sarcoidosis; complete blood count, erythrocyte sedimentation rate and serum levels of folic acid, iron and vitamin $B_{12}$ for Crohn's disease; and tuberculin skin test and chest radiography for tuberculosis. Gastrointestinal assessment is essential, especially in the presence of signs of anemia and intestinal malabsorption and symptoms suggestive of Crohn's disease (as with the case of the second patient described in this report). If the initial investigation does not confirm the diagnosis, a second assessment should be carried out, especially if the gastrointestinal signs and symptoms persist. The diagnosis of OFG is therefore a diagnosis of exclusion and is based on appropriate clinical and pathologic correlation.

The treatment of OFG is difficult, particularly in the absence of an etiologic factor. Treatment objectives are to improve the patient's clinical appearance and comfort. Although rare, spontaneous remission is possible.[1] The elimination of odontogenic infections may reduce the swelling in certain patients.[25] First-line treatment involves the use of local or systemic corticosteroids or both. Intralesional injections of triamcinolone 10 mg/mL is often used in the treatment of OFG.[26] Recently, higher concentrations of the drug (40 mg/mL) have been suggested. The higher concentration offers the advantages of reducing the volume of fluid injected, the administration of a higher dose and the maintenance of remission.[24] The side effects of local treatment are limited to skin atrophy and hypopigmentation.[24]

The use of systemic corticosteroid therapy[1,27] in treating OFG is limited because of the chronic, recurrent nature of the disease and the side effects associated with long-term use of these drugs. Results are often immediate with either local or systemic corticosteroid therapy. However, relapses are common, and long-term treatment may be required.[15] The first case reported here clearly illustrates the natural history of this condition and its response to treatment.

Other therapeutic measures have been reported in the literature, including hydroxychloroquine,[15,27] methotrexate, clofazimine,[27] metronidazole, minocycline[28] alone or in combination with oral prednisone, thalidomide,[29,30] dapsone and danazol. Cheiloplasty is used by some clinicians, especially in cases complicated by major lip deformation or inadequate response to local corticosteroid therapy.

The treatment of Crohn's disease involves the use of sulfasalazine and systemic corticosteroids. The steroids are used in managing acute phases of the disease, and sulfasalazine is used mainly for maintenance between active episodes. Corticosteroid-sparing agents, such as azathioprine, methotrexate and cyclosporine, are also used in certain cases. Metronidazole is sometimes considered. Surgery may be necessary to manage the complications of the disease and is also used in cases that do not respond to medical treatment.

The literature on OFG, MRS and CG shows an important problem in the classification of these entities. This is probably related to a lack of understanding of etiologic and pathogenic mechanisms. For example, some authors consider CG as an oligosymptomatic or monosympto-

matic variant of MRS,[15,16,25] whereas others suggest that these conditions are distinct entities.[5,27] Some claim that CG is a manifestation of sarcoidosis or Crohn's disease. Yet others consider OFG, MRS, CG, Crohn's disease and sarcoidosis to represent different manifestations of the same disease process.[1,31] We, like others,[27] believe that use of the term "OFG" in cases of noncaseating granulomatous inflammation has the advantage of describing a clinicopathologic situation without linking it to a specific disease entity. It is essential then to specify whether the condition is caused by a systemic disease or a local condition or if it is essentially idiopathic. Therefore, terms like "OFG in the context of sarcoidosis or in the context of Crohn's disease" and "OFG secondary to a chronic dental infection or to contact hypersensitivity" are recommended. A diagnosis of idiopathic OFG is made on the basis of negative results of a thorough investigation.

## Conclusions

Two cases of orofacial granulomatosis have been described, one of which occurred in the context of Crohn's disease. The differential diagnosis, investigation and treatment of these cases have been discussed. The authors recommend the use of standardized terminology when reporting such cases to identify epidemiologic, etiologic and therapeutic data. Use of standard terms should eventually lead to improvements in both therapeutic decision-making and patients' prognosis.

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*The authors have no declared financial interests.*

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# Extensive Papillomatosis of the Palate Exhibiting Epithelial Dysplasia and HPV 16 Gene Expression in a Renal Transplant Recipient

***Abdulrahman Al-Osman,*** *DDS, Dip Perio;* ***John B. Perry,*** *DMD, MSc, FRCD(C);* ***Catalena Birek,*** *DDS, PhD, FRCD(C)*

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## ABSTRACT

We report a unique case of extensive papillomatosis of the palate in a renal transplant recipient. The condition resembled inflammatory papillary hyperplasia; it exhibited severe epithelial dysplasia and concurred with generalized gingival hyperplasia. We document and discuss the probable multifactorial etiology of the lesions, including evidence for human papillomavirus (HPV) type 16 expression, as detected by in situ reverse transcription polymerase chain reaction. This report illustrates the need for careful clinical investigation and follow-up of immunosuppressed individuals presenting with apparently benign, common oral lesions.

**MeSH Key Words:** adult; papillomavirus, human; renal transplantation; tumor virus, infections/virology

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An increasing body of molecular–epidemiological evidence indicates that some types of oncogenic human papilloma virus (HPV) are associated with intraepithelial neoplasia. The causal relation between HPV 16 and subgroups of squamous cell carcinoma of the head and neck has been established,[1] and HPV 16 gene expression has been reported as frequent in distinct types of oral mucosal lesions, such as koilocytic dysplasia[2] (including lesions described as bowenoid)[3] and proliferative verrucous leukoplakia.[4] Nevertheless, a distinct classification of HPV-associated lesions according to unique histopathologic features or clinical behaviour is yet to crystallize. In some recurrent exophytic lesions suspected of being virally induced, such as that described by Brown and others[5] as atypical papillomatosis, HPV infection could not be detected despite state-of-the-art laboratory testing.

Here we illustrate a case of extensive papillomatosis of the palatal mucosa, concurring with general gingival enlargement in a renal allograft recipient. The microscopic features of an initial incisional biopsy of the palatal lesion were consistent with inflammatory papillary hyperplasia, but the excised lesion was found to harbour HPV 16 and to exhibit severe epithelial dysplastic changes.

## Case Description

A 45-year-old man was referred for periodontal consultation for generalized enlargement of the maxillary and mandibular labial gingiva. His history included hypertension, parathyroidectomy for hyperparathyroidism, papillary carcinoma of the thyroid gland and renal transplantation for end-stage renal disease. In the 5 years since transplantation, his medications consistently included immuno-

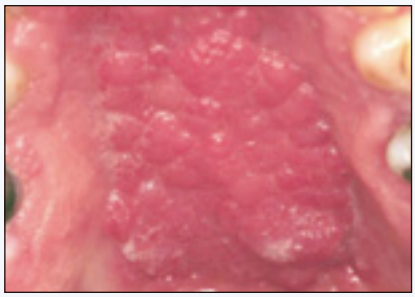

**Figure 1a:** The palatal lesion at the initial presentation.

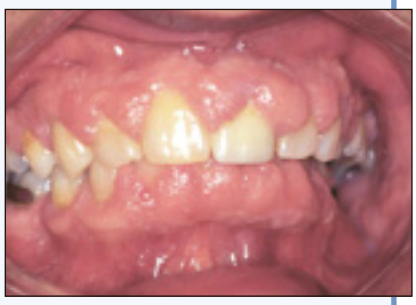

**Figure 1b:** Labial gingivae at initial presentation.

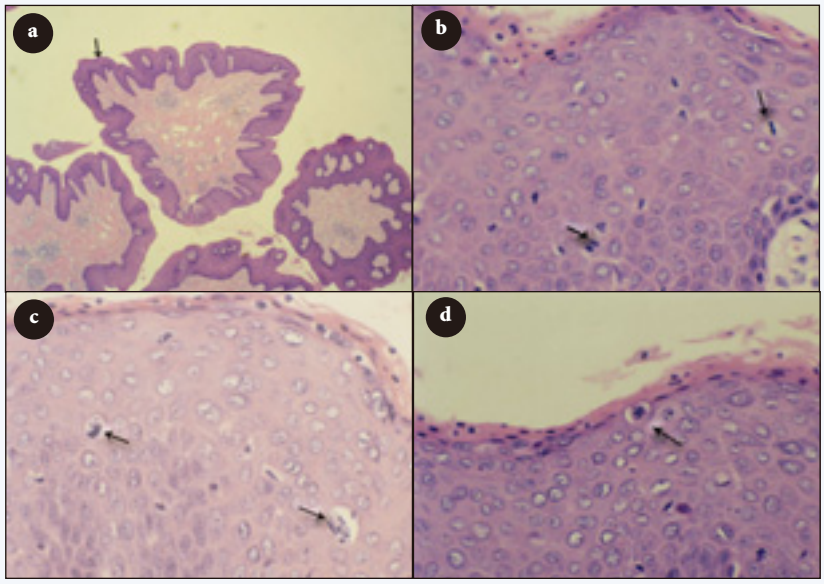


**Figure 2:** Photomicrographs of sections from the excised palatal lesion. **a.** The arrow indicates the epithelial area shown at higher magnification in images b to d. **b.** Note frequent mitotic figures (arrows). **c and d.** Note the distribution of atypical nuclei in the upper third of the epithelium (arrows).

suppressive drugs (cyclosporine, prednisone and azathioprine) and antihypertensive medication (nifedipine and furosemide). At the time of presentation, he was also taking ranitidine for the treatment of gastritis. He reported having smoked half a pack of cigarettes a day for 20 years and having consumed moderate amounts of alcohol.

Intraoral examination revealed generalized gingival enlargement, which appeared typical of that defined as drug-induced, as well as a diffuse, erythematous, papillated lesion of the hard palatal mucosa exhibiting a superficial, white pseudomembrane (**Fig. 1a**). The onset of the gingival lesion (**Fig. 1b**) was uncertain and its progression slow. According to the patient, the palatal lesion had been present for approximately 3 months and had been increasing in size. The patient had not worn a maxillary denture and his general oral hygiene was fair.

An incisional biopsy of the palatal lesion was performed. The microscopic features of the specimen were consistent with inflammatory papillary hyperplasia; they included typical architecture, pseudoepitheliomatous epithelial hyperplasia, the presence of densely collagenous subepithelial connective tissue and infiltration by chronic (predominantly lymphoplasmacytic) inflammatory cells. The superficial epithelium was colonized by fungal hyphae consistent with candidiasis. Initial treatment with topical nystatin cream caused the erythema to abate, but the palatal lesion persisted and continued to cause discomfort. The patient was referred to an oral maxillofacial surgery clinic, where the palatal lesion was excised by scalpel, and the palatal and labial maxillary and mandibular gingivae were recontoured by looped-wire cautery.

Microscopic examination of the excised specimen confirmed that the general architecture of the lesion was consistent with that of inflammatory papillary hyperplasia, but revealed a focal area exhibiting epithelial dysplasia, including frequent mitotic figures and atypical nuclei (**Fig. 2**) involving the full thickness of the epithelium. As the dysplastic features were reminiscent of HPV-associated bowenoid changes that we had observed previously,[4] HPV-typing by DNA in situ hybridization (with test probes for type-groups 6/11, 16/18 and 31/33/35), immunohistochemistry (with a genus-specific anti-HPV antibody), as well as reverse transcription polymerase chain reaction (with HPV 16 E6 gene-specific primers) were performed as described in detail previously.[6] Taken together, the test results confirmed the presence of HPV type 16 in the lesion. The results of in situ hybridization with the type-group 16/18 probe are shown in **Fig. 3**. As neither the clinical nor the microscopic features were consistent with Kaposi's sarcoma, testing for Kaposi's sarcoma-associated herpesvirus (KSHV) was not performed.

The patient was referred for further follow-up at a head and neck cancer treatment centre. By the second month post-surgery, the palatal excision site was almost completely healed with minimal papillomatosis still discernible (**Fig. 4**). The entire oral mucosa was normal in

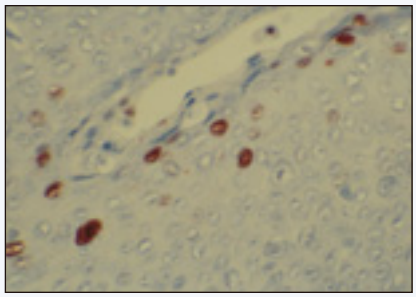

**Figure 3:** Positive staining revealed by in situ hybridization with the HPV type-group 16/18 probe.

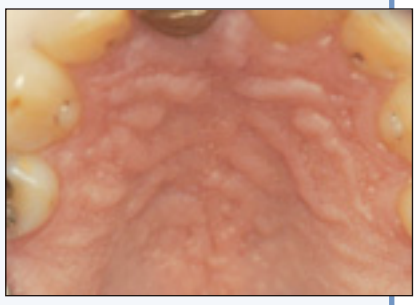

**Figure 4:** View of the palate in the second month after surgery.

appearance. The findings of indirect laryngoscopy were normal. At subsequent follow-up examinations (every 2–3 months for the following 2 years), no recurrence of the palatal lesion or neck lymphadenopathy was found on visual inspection or by palpation. The patient was lost for oral follow-up thereafter.

## Discussion

We document a case of in situ epithelial dysplasia–carcinoma presenting initially as inflammatory papillary hyperplasia. The clinical presentation and the general architecture of the biopsy specimens were congruent with the classical definition of inflammatory papillary hyperplasia of the palate, except that the most usual causative factors, i.e., ill-fitting dentures and poor oral hygiene, were absent.

The usual treatment of inflammatory papillary hyperplasia is surgical excision, complemented by antifungal therapy when fungal infection is identified as a cofactor. Mucocutaneous, HPV-associated wart-like lesions, including those of the gingiva,[7] have been treated with some success with the nucleotide analogue cidofovir; and immune-response modifiers, such as imiquimod, singly or in combination with antiviral agents, appear promising in the reversal of early intraepithelial neoplasias.[8] We considered, but did not carry out, antiviral therapy for our patient, as surgery yielded adequate clinical results.

In the case presented here, the laboratory findings were in keeping with our previous data suggesting that immunosuppressed individuals are at heightened risk of premalignant and malignant exophytic epithelial changes in oral lesion associated with HPV 16 infection.[6] Furthermore, the atypical nuclei seen in the excisional biopsy specimen were reminiscent of those reported previously in HPV-associated bowenoid dysplasia.[4]

A general propensity for oral epithelial neoplasia is apparent in immunosuppressed allograft recipients. One interesting example is reported by Regev and others.[9] We could not exclude the mere coincidental association between the diffuse papillary lesion and HPV 16 expression, as the presence of HPV is found in a significant proportion of normal biopsy specimens. Nevertheless, in light of our knowledge of HPV 16 oncogenicity and considering previous studies, it would be more reasonable to assume that HPV 16 gene expression in inflammatory papillary hyperplasia may induce intraepithelial neoplasia.

Further arguments in favour of a role for various types of HPV in the pathogenesis of AIDS-associated oral mucosal lesion are presented in a report by Anderson and others.[10] However, prospective molecular–epidemiological studies are needed to prove or disprove the potential role of HPV infection in progression to malignancy in oral exophytic lesions of immunosuppressed individuals. Furthermore, in the case presented here, one cannot dispute that cyclosporine, singly or in combination with nifedipine, contributed to the collagenous connective tissue buildup of the palatal lesion by contiguity with the gingival lesion as, individually, each of these drugs is known to induce gingival hyperplasia. Interestingly, HPV is frequently detectable in cyclosporine-induced gingival overgrowth in immunosuppressed transplant recipients[11]; therefore, HPV infection may be a cofactor in such cases. Unfortunately, in the current case, sufficient gingival tissue was not available for HPV testing, as the gingival lesion was reduced by cautery.

This case is presented not merely as an argument for the probable role of HPV infection in atypical papillary hyperplasia of the palate, but also as an example of the probable multifactorial etiology of concurrent exophytic lesions. Unfortunately, the patient was lost for long-term oral follow-up. Nevertheless, in transplant recipients, strict adherence to the principles of the management of the immunosuppressed, including "frequent oral health assessments for interception of emerging oral problems, maintenance, and reinforcement of good oral care,"[12] is imperative. In such cases, laboratory screening for HPV expression is essential, considering new emerging antiviral treatment modalities. The reporting of new cases would further demonstrate the need for careful clinical follow-up of organ transplant recipients presenting with apparently common oral lesions, and would contribute to the identification of appropriate target populations for anti-HPV vaccination.

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# Cleidocranial Dysplasia: 2 Generations of Management

***John Daskalogiannakis,*** *DDS, MSc, FRCD(C);* ***Luis Piedade,*** *BSc, DDS;* ***Tom C. Lindholm,*** *DDS, PhD;* ***George K.B. Sándor,*** *DDS, MD, PhD, FRCD(C), FRCS(C), FACS;* ***Robert P. Carmichael,*** *DDS, MSc, FRCD(C)*

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## ABSTRACT

Patients with cleidocranial dysplasia (CCD) commonly present with significant dental problems, such as retention of multiple deciduous teeth, impaction or delay in eruption of permanent teeth and, often, the presence of supernumerary teeth. Several approaches have been described for the management of such patients. We report 2 cases illustrating the shift in the management paradigm from edentulation and prosthetic replacement to orthodontically assisted forced eruption and fixed appliance orthodontic treatment combined with orthognathic surgery.

**MeSH Key Words:** cleidocranial dysplasia; malocclusion/prevention & control; orthodontic appliances



Cleidocranial dysplasia (CCD) is a rare disorder of autosomal dominant inheritance that causes disturbances in the growth of the bones of the cranial vault, the clavicles, the maxilla, the nasal and lachrymal bones and the pelvis. Patients with CCD usually present with shorter stature and frontal, parietal and occipital bossing of the skull. An increased interorbital distance may occur, with the bridge of the nose appearing wide and flat. Underdevelopment of the maxilla and relative mandibular prognathism are common.[1] The ability to approximate the shoulders anteriorly is related to clavicular hypoplasia and is the classic diagnostic sign of the disorder.[2]

Dental problems present the most significant manifestation of CCD; they usually include retention of multiple deciduous teeth, impaction or delay in eruption of permanent teeth and the presence of a varying number of supernumerary teeth.[1] Jensen and Kreiborg[3] have suggested that supernumerary teeth form as a result of activation of remnants of the dental lamina left unresorbed during odontogenesis. Crowding of the dental arches caused by these supernumerary teeth may play a role in arresting the eruption of permanent teeth or forcing them into ectopic locations. However, the contributory role of supernumerary teeth to the arrested eruption of permanent teeth is believed to be secondary to that of diminished bone resorption. In radiographic images of people afflicted with CCD, alveolar bone can appear striated and hyperostotic. Delayed or arrested eruption has also been attributed to lack of cellular cementum.[4] However, after histomorphometric analysis of 2 permanent teeth extracted from a person with CCD, Counts and others[5] concluded that there was no difference in the percentage of root covered by cementum between these teeth and others extracted from control patients.

In terms of dental management of CCD, several approaches have been reported over the years. The option of no treatment was common in the past.[6] Edentulation followed by provision of dentures has also been suggested.[1] Some regard this approach as too invasive, especially considering the extensive bone loss experienced after removal

## Case 1

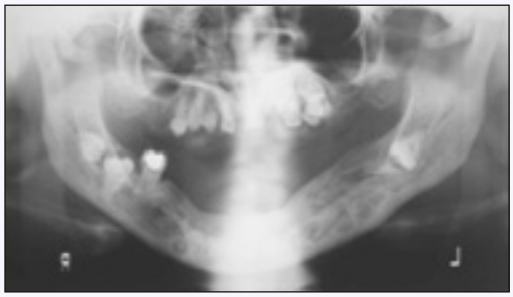

**Figure 1a:** Pretreatment panoramic radiograph.

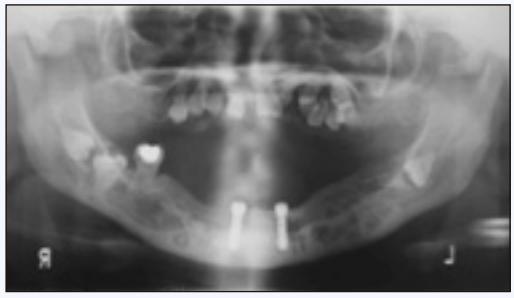

**Figure 1b:** Post-treatment panoramic radiograph.

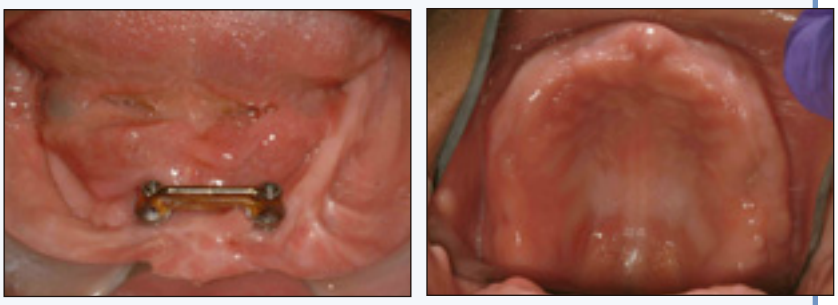

**Figure 1c:** Post-treatment intraoral views.

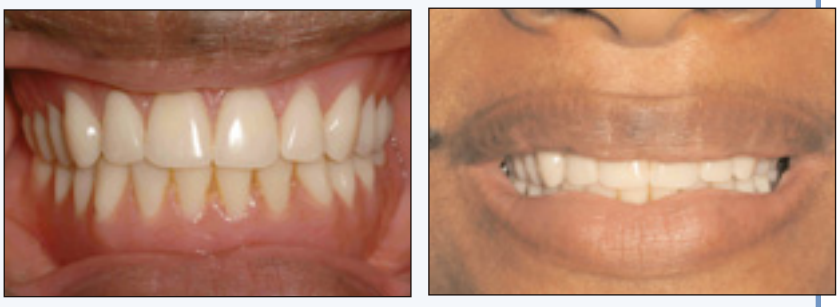

**Figure 1d:** Post-treatment frontal intraoral view of the prosthesis and "tooth-to-lip" relationship.

of teeth in a patient already deficient in alveolar bone. Pusey and Durie[7] suggested removal of only the erupted teeth and use of a removable prosthesis to minimize alveolar bone loss. However, subsequent eruption of retained teeth can require further surgery and modification of the prosthesis.[6]

The current "state-of-the-art" treatment involves a combination of orthodontics and maxillofacial surgery.[8–10] Our protocol involves timely extraction of deciduous teeth, staged surgical removal of supernumerary teeth, exposure of selected unerupted permanent teeth and orthodontic forced eruption. The process is usually carried out in stages, as teeth that are guided into their ideal position in the arch can subsequently serve as vertical stops to maintain the vertical dimension while the next group of unerupted teeth is exposed and bonded. Following alignment of all permanent teeth, any underlying skeletal discrepancy (most commonly a Class III skeletal malocclusion) can be corrected through orthognathic surgery after completion of growth.[8,11,12]

What follows is a report of the treatment of 2 patients with CCD, a mother and her son. The contrast between treatments of the 2 patients reflects the shift in the management paradigm over the span of a generation.

### Case 1

A 39-year-old woman with a history of CCD originally presented with the chief complaint of an ill-fitting mandibular complete denture. Most of her mandibular teeth had been removed at a young age and she had not been able to tolerate a lower denture since her teenage years. In the maxilla, however, the patient wore a denture comfortably. The only occlusal contact of the upper denture was with tooth 46. Multiple impacted teeth were present in the maxilla, whereas in the mandible, both third molars were horizontally impacted and tooth 47 was vertically impacted (**Fig. 1a**)

To minimize the risk of a pathologic fracture of the mandible, the deeply impacted mandibular molars were retained. Dental implants (solid screw, 4.1-mm diameter, SLA; Straumann, Waldenburg, Switzerland) were placed at sites 33 and 43 and a bar-retained overdenture was provided for the mandibular arch[13] (**Figs. 1b–1d**).

The patient has returned annually for 4 years. Her implants remain stable, there is no radiographic evidence of any marginal bone loss and the prostheses remain well fitting.

## Case 2

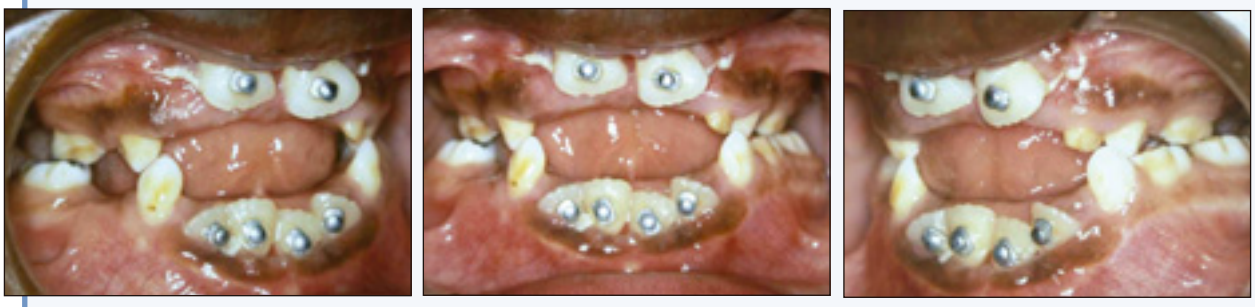

**Figure 2a:** Intraoral photos at the start of treatment.

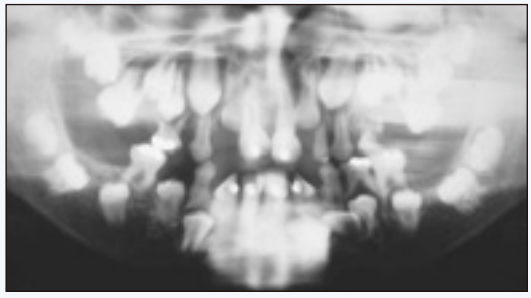

**Figure 2b:** Panoramic radiograph at the start of treatment.

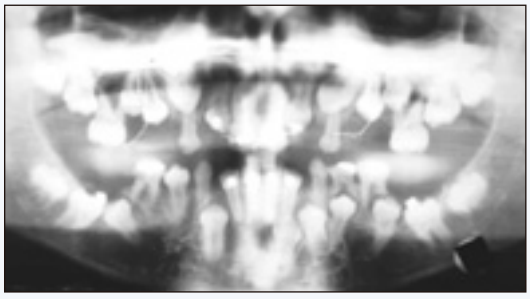

**Figure 2c:** Exposure of the maxillary lateral incisors and first premolars and bonding of neodymium–iron–boron magnets to the mandibular second molars.

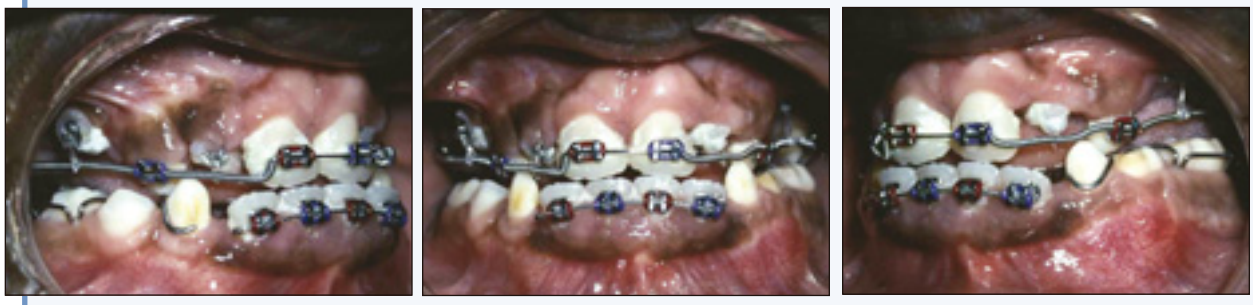

**Figure 2d:** A maxillary 0.016-inch by 0.022-inch stainless steel base arch is used to tie the exposed lateral incisors and first premolars with elastomeric thread.

## Case 2

The son of the patient described in Case 1 — an 8-year-old boy with CCD — initially presented to the orthodontic clinic at the Hospital for Sick Children with retention of multiple deciduous teeth and delay in eruption of permanent teeth. The maxillary central incisors and the mandibular central and lateral incisors were only partly erupted, and a severe anterior open bite was present (**Fig. 2a**). As the edges of the maxillary and mandibular incisors were situated somewhat apical to the alveolar crest, the anterior open bite was deemed to be due to incomplete eruption of the incisors rather than a habit. A mesial-step terminal place relationship existed between the maxillary and mandibular second deciduous molars.

The maxillary first permanent molars were also partly erupted, whereas the mandibular first molars had already been lost to caries. A supernumerary tooth was present in the lower left canine area (**Fig. 2b**).

Initially, buttons were bonded to the erupted maxillary and mandibular incisors and vertical intermaxillary elastic traction was applied to assist their further eruption and promote closure of the anterior open bite. The occlusal contacts between teeth 54 and 85, 63 and 74 and 64 and 75 served to maintain the vertical dimension of the occlusion during this time. Once the mandibular incisors were adequately erupted, segmental orthodontic appliances were placed to aid in preliminary alignment of the maxillary central incisors and the mandibular central and lateral incisors.

## Case 2 continued

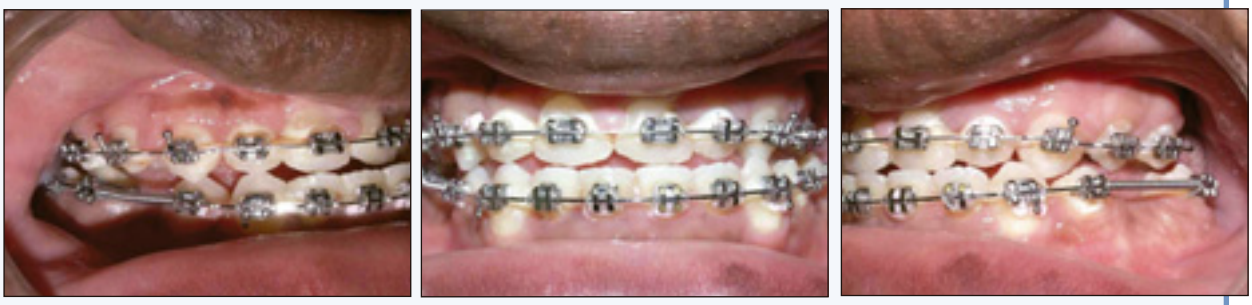

**Figure 2e:** Presurgical occlusal relationship.

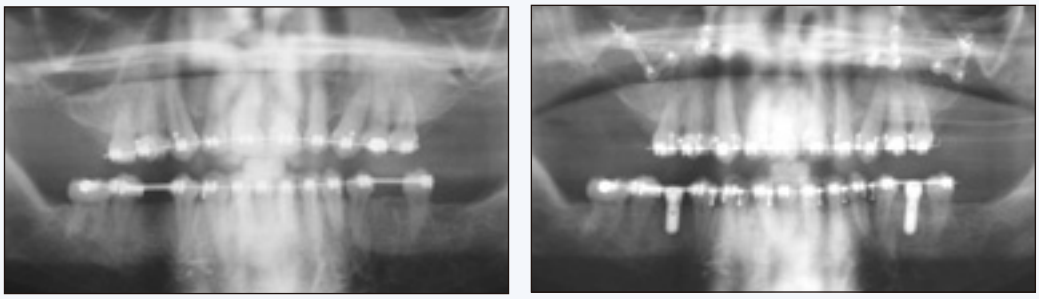

**Figure 2f:** Presurgical panoramic radiograph.

**Figure 2g:** Postsurgical panoramic radiograph.

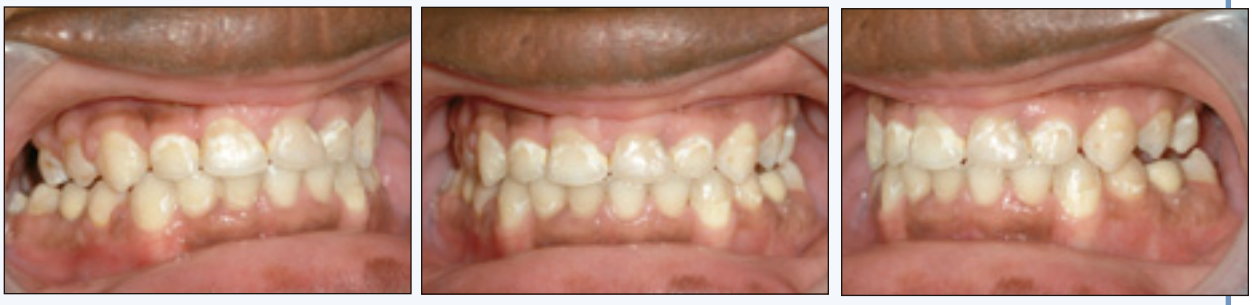

**Figure 2h:** Intraoral views after removal of orthodontic appliances and completion of the mandibular implant-supported crowns.

Following this, the maxillary lateral incisors and first premolars were exposed and traction hooks were placed on them (**Fig. 2c**). At the same time, forced eruption of the deeply impacted mandibular second molars was attempted by bonding parylene-coated neodymium–iron–boron magnets to them.

A mandibular Hawley appliance was fabricated with 2 larger magnets in direct juxtaposition with the magnets on the teeth to attempt their disimpaction by making use of the attractive magnetic forces through the tissue. This approach proved unsuccessful and, despite a number of modifications to achieve the best position for the larger magnets on the appliance, it was eventually aborted.

The maxillary arch was bonded from first molar to first molar and the traction hooks were tied to a stiff stainless steel archwire with elastic thread (**Fig. 2d**).

Sequential extractions and exposures followed by forced orthodontic eruption continued over several years as the patient's compliance with appointments dwindled under the taxing burden of care. The limited mouth opening (16 mm) made access to the posterior teeth very difficult. The maxillary first molars were lost to caries and, later, the maxillary second molars and the mandibular left second molar were deemed to be ankylosed. They were subsequently removed along with the third molars.

Eventually, good arch alignment of the remaining teeth was achieved, although a Class III interarch relation and an anterior crossbite remained due to the maxillary hypoplasia. The plan was to address this through orthognathic surgery. To avoid over-retraction of the mandibular incisors, which would compromise the skeletal correction,

a decision was made to open 7–8-mm-wide spaces for additional prosthetic teeth between the mandibular premolars in each quadrant (**Figs. 2e** and **2f**).

A Le-Fort I maxillary osteotomy was undertaken to advance the maxilla by 4–5 mm asymmetrically and achieve coincident midlines while correcting the anterior crossbite. During the same procedure, 2 dental implants (Standard Plus, 4.1-mm diameter, SLA; Straumann) were placed in the mandibular spaces (**Fig. 2g**). The occlusal and skeletal outcomes were highly satisfactory. However, due to the significantly prolonged duration of the orthodontic treatment (a little over 10 years) and the patient's deficient oral hygiene, generalized marked decalcification was evident at removal of the orthodontic appliances (**Fig. 2h**).

## Discussion

Planning treatment for a patient with CCD is complicated by a host of factors. The plan is largely dependent on both the chronological and dental ages of the patient, which, due to the frequency of delayed eruption in this condition, are frequently not coincident. The timing of diagnosis is not only important in choosing an appropriate treatment plan but also in attaining a successful result.[3,14] Because typically no pain, swelling or difficulty in functioning is present in the young patient with CCD and the distinctive facial features are not usually sufficiently disfiguring,[10] the patient's perception of the need for treatment may deviate from that of the treating practitioner. Coupled with the fact that the parent (often also afflicted with CCD) may have some personal experience of the burden of care involved, this makes it difficult for the patient to consent to a treatment involving multiple surgical exposures and forced eruption of teeth. In our experience, treatment initiated early has a better prognosis, but patients and parents should be informed at the outset of its extended duration and the unpredictability of achieving eruption of all teeth, especially in more severe cases.

In the first reported case, placement of 2 dental implants in the anterior mandible and replacement of the existing prostheses was the treatment of choice. This treatment has become widely regarded as the standard of care for the edentulous mandible.[14] In this case, the impacted mandibular molars were retained because they did not obstruct optimal placement of the implants and their removal would have potentially weakened the mandible to the point of risking a pathologic fracture.

The second case reported involved multiple surgical exposures of unerupted teeth and orthodontic treatment to establish an intact and aligned dental arch. Following this, at skeletal maturity, the underlying skeletal deformity was corrected and an improved occlusal relationship was attained through a maxillary advancement osteotomy. This combined orthodontic–surgical approach yielded satisfactory results, as the natural dentition could be spared and good occlusal function and esthetics achieved. The obvious disadvantage of this approach is the extensive duration of treatment, requiring multiple surgical procedures, which taxes the patient and challenges the treating practitioners.

## Conclusion

Two very different cases of CCD are presented, each with radically diverse goals. Both treatments successfully met the objectives set out for each case. When establishing an appropriate treatment plan for a patient with CCD, the expected duration of treatment, the age of the patient and the patient's attitude toward treatment are important considerations. For patients with questionable motivation, a prosthetic alternative may be a more realistic option.

## THE AUTHORS


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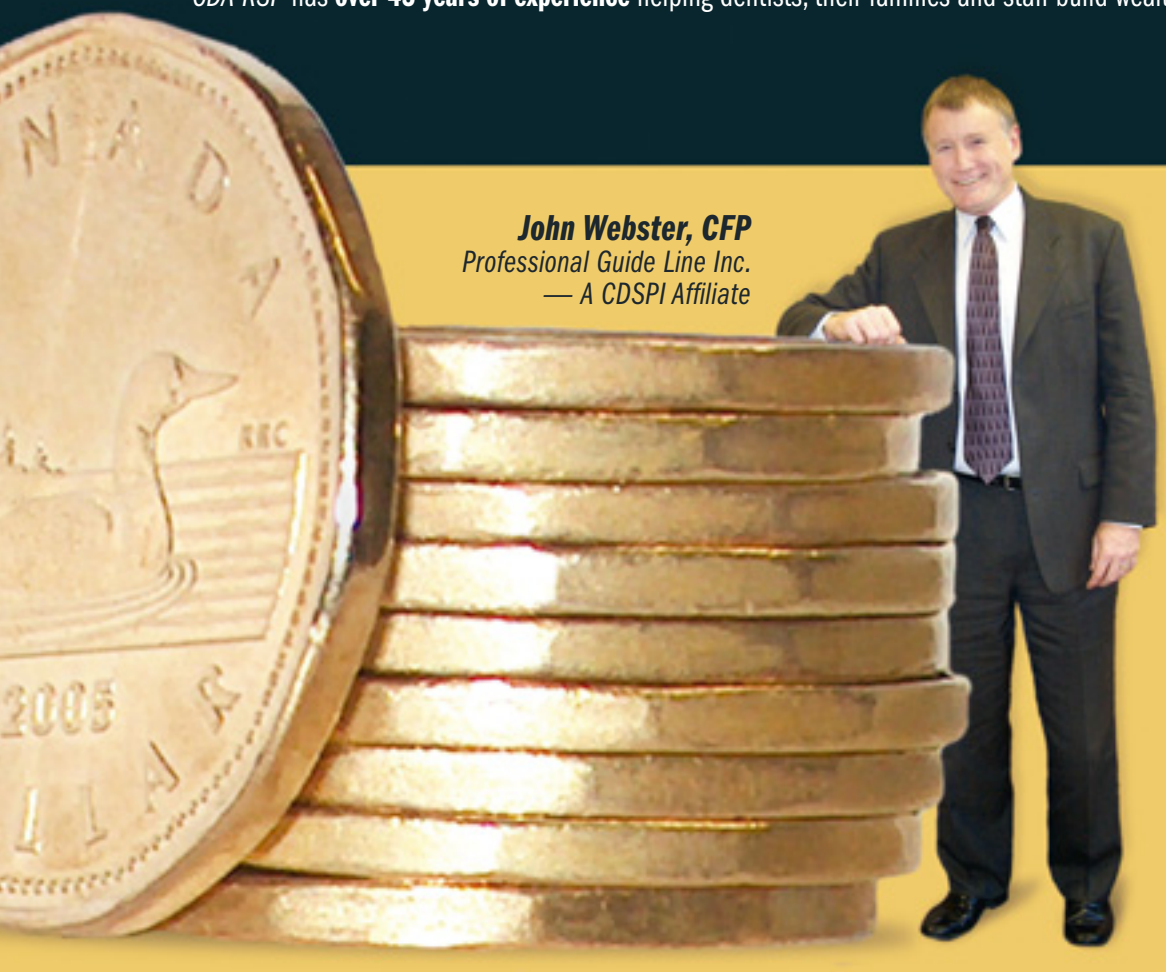

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# Responding to the Financial Needs of Women Dentists

**By Susan Roberts,** *FLMI, ACS, and* **John Webster,** *CFP*

Today, over 20% of Canada's dentists are women. As record numbers of women enter the profession (about 50% of current dental school graduates are female compared to just 13% 30 years ago), dental associations and financial services organizations have been responsive to the growing, and sometimes unique, needs of female dentists.

For instance, many Canadian women on maternity leave are eligible to collect employment insurance (EI) benefits. However, because self-employed dentists aren't allowed to contribute to EI, many female dentists aren't entitled to EI maternity benefits. Since private insurance plans do not offer similar coverage, the dental profession's own Canadian Dentists' Insurance Program stepped in to address this need.

The Program's Office Overhead Expense Insurance plan designed a Maternity Leave Benefit to offset some of the office expenses of female dentists who are away from their dental practice due to a full-time maternity leave. To be eligible for maternity benefits, female dentists must have the coverage in force for 12 months before the birth of their child. Benefits are payable for up to 15 consecutive weeks.

Additionally, CDA continues to lobby for legislative changes, including amendments to EI provisions and RRSP withdrawal rules, to facilitate more equitable maternity and parental leaves for self-employed Canadian dentists.

Dr. Nancy Jeffery joined the dental profession in 1982 and operates as a sole practitioner in Fredericton, New Brunswick. She has noticed many changes over the years. For example, when she had her second child 16 years ago, "there was no locum network in place," she says. "I took two weeks off. Then I was back to work."

For Dr. Jeffery, having a financial services provider who is responsive to the needs of all dentists makes a difference. "I have life and disability coverage through the Canadian Dentists' Insurance Program," she says. "Over the years, I've compared it to coverage offered elsewhere. For me the Program's coverage always comes out ahead."

Proper financial planning is important for both male and female dentists. This includes having adequate income replacement insurance to protect their family's standard of living, since many dentists contribute a significant portion of the household income. When it comes to retirement planning, the needs of female dentists may be somewhat different.

Generally, women live longer than men, so women dentists may require more retirement savings. One study has also shown that female dentists are more likely than male dentists to work part-time during their child-rearing years, and it clocked the average career length of female dentists at 20 years, compared to 35 years for males.[1]

One of the ways female dentists can acquire a larger pool of retirement funds is to start saving in a tax-deferred plan such as an RRSP as early as possible. Investments will have the opportunity to grow tax-free longer, resulting in thousands of dollars more in retirement income over the life of the registered plan.

Dentists with professional corporations can also set up an individual pension plan (IPP) to accelerate their retirement savings. IPPs, such as the CDA IPP, typically offer higher contribution limits than RRSPs. The amount contributed can be claimed as an expense by the corporation for greater tax savings, since larger sums are being contributed.

While this article discusses financial considerations for dentists in general, every dentist's situation is unique. For advice tailored to your individual circumstances, it's prudent to obtain personalized financial planning assistance. Dentists may contact Professional Guide Line Inc. at **1-877-293-9455** or **(416) 296-9455** to reach a personal insurance planning advisor (**extension 5002**) or personal investment planning advisor (**extension 5023**).

## THE AUTHORS

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***Mr. Webster*** *is a certified financial planner and vice-president of financial planning, Professional Guide Line Inc. — A CDSPI Affiliate.*

## Reference

1. Brown TA. Un-audited study of average ages of selling dentists, 1995–1999. *Age of Vendors* 2000; p 1–3.

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[1]Versus brushing teeth alone with Oral-B® Indicator®. Williams M et al. Compend Contin Educ Dent 2004; 25(10 Suppl 2): 17–21. [2]Versus Oral-B® CrossAction® Nathoo S et al. Compend Contin Educ Dent 2004; 25(10 Suppl 2): 37–45. [3]Versus Oral-B® Indicator®. Mankodi S et al. Compend Contin Educ Dent 2004; 25(10 Suppl 2): 28–36. [4]Versus brushing teeth alone with Oral-B® Indicator® and Crest® SpinBrush™ PRO. Williams M et al. Compend Contin Educ Dent 2004; 25(10 Suppl 2): 22–27. Oral-B, CrossAction and Indicator are registered trademarks of Oral-B Laboratories. Crest and SpinBrush are trademarks of the Procter & Gamble Company, Inc.

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**SASKATCHEWAN – Gravelbourg:** Family practice for sale in a very pleasant community, located in a medical-dental clinic shared with three medical physicians. Excellent potential for the right individual to practise all phases of dentistry, with room for expansion. Over 1,400 patients serving a very large area. Nearest dentists are 35 miles away. Some new equipment. Phone Robert at: (306) 648-3649. D2044

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**ALBERTA – Edmonton:** Busy family practice seeking full-time associate to join caring team with focus on clinical excellence. Candidate should be an effective communicator, highly motivated and a good leader. Please fax CV to: (780) 424-3210 or email to: hdg99@telus.net. D2111

**ALBERTA - Drayton Valley:** Associate required immediately. Established family practice with fun, friendly staff looking for a motivated, full-time associate to be part of our successful team. Excellent patient volume. New graduates welcome. Town has enormous growth potential, located only 1.5 hours southwest of Edmonton. Close to mountains. Excellent location. tel: (780) 542-5395. fax: (780) 542-3165. D2002

**ALBERTA - Calgary:** Associate, full-time, in high-traffic mall location. Excellent location for family practice. Fax: (403) 269-3800. Discretion assured. D1791

**ALBERTA - Edmonton:** Full/part-time associate required for growing sedation office in the west end. Confidentiality guaranteed. Fax: (780) 444-9411. D1791



**ALBERTA – Edmonton:** Busy mall practice looking for full-time associate. Newer office with 9 operatories, computerization, digital x-rays, etc. Must be able to work some evenings and weekends. Right individual will have potential to gross/bill ~$20,000 - $50,000 per month. Check our website www.bonniedoondental.com. Please submit resume to: vanessacchan@interbaun.com. D2391

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equipment e.g. digital radiography, CEREC 3D, laser, digital cameras, CAESY, etc. Great support team. High remuneration. Email resume to: smile_doc@shaw.ca or fax to: (780) 486-7328. D2028

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**ALBERTA – Edmonton:** Full-time associates required for West End and Clare View Clinics. We are looking for caring, motivated and dedicated applicants. New graduates welcome, position would start ASAP. Working days included, some evenings and weekends. Please fax resume to: (780) 444-1444 or (780) 487-8854 attention: Mr. Ephraim Baragona. D2091

**ALBERTA - Edmonton:** Associate needed for very busy West Edmonton, Alberta, practice. Full-time or part-time. Excellent working environment! Terrific staff! Great patients! Please forward current CV to: smiledesign@telus.net. D2107

**ALBERTA - Edson:** Full-time associate needed for busy, well-established family practice. Edson is centrally located between Jasper and Edmonton, and is rapidly growing. New graduates are welcome. Interested applicants please contact: Dr. Shari Jean Robinson, tel: (780) 723-3084. res: (780) 723-5221, bus. fax: (780) 723-2402, email: srobin11@telus.net. D1843

**ALBERTA - Fort McMurray:** Excellent full-time associate opportunity available immediately for a motivated, energetic individual. Owner of a busy, rapidly expanding family practice in Fort McMurray, Alberta, that has an excellent team already established wants to cut back. Please call: (780) 743-3570 or fax to: (780) 790-0809. D1817

**ALBERTA - Grande Prairie:** Associate, full-time needed immediately. Well-established office with six operatories. Very busy, patients waiting to see you. Contact: Susan, tel: (780) 538-2992, fax: (780) 538-0966. D2004

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**ALBERTA - Red Deer:** Associate required for busy general dentistry practice. Present associate moving out of province. Office newly renovated - great location in a fast-growing community. New grads welcome. Option to buy-in. Long-term staff. Contact Wendy: (403) 342-5800 Email: imagedentalstudio@shaw.ca. D2439

**ALBERTA - St. Albert:** Excellent opportunity for associate to take on existing patient base with excellent new patient flow. Daytime starting at 3 days/week. A highly motivated, great "people" person with quality dental skills and ability to work independently will do very well. Email resume to Dr. Randall Croutze at: rabc@telusplanet.net. D2421

**ALBERTA – St. Albert:** Fantastic associate opportunity. Step right into an established patient base with excellent staff. We are a patient-centred practice with exceptional new patient flow. Please email resume to: sadick@shaw.ca. D2032

**ALBERTA - Wetaskiwin:** Full-time associate required for a progressive family practice 30 minutes south of Edmonton. Opportunity for transition available. Contact Dr. Ron Tratch, 5007 51 Ave., Wetaskawin, Alberta. Call: (780) 352-5016 or fax: (780) 352-4568. D2381

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**BRITISH COLUMBIA – Castlegar:** Full-time associate required for a busy general practice. Well-established patient base, long-term staff, six operatories. Castlegar is a wonderful caring community. We enjoy all the seasons have to offer. We have a community college, sports and pool complex and the regional airport. If this is the place for you, owner would like to arrange for a future buy-in or purchase of the practice. Email: donellis @shaw.ca. D2059

**BRITISH COLUMBIA - Duncan:** Southern Vancouver Island, 50 km north of Victoria, part-time/full-time

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**BRITISH COLUMBIA – Chemainus:** Southern Vancouver Island. Full-time associate required June 2006 – general dental practice. Current associate returning to grad school. Practice established 30 years ago, facility completely renovated and upgraded in 2003. Communication skills priority requirement. Buy-in option. Reply to Dr. Megas, fax: (250) 246-4323, email: bmegas@island.net (use subject: associate). D2027

**BRITISH COLUMBIA – Kamloops:** Associate required for a busy general practice. Wide range of dentistry and a wonderful staff. Buy-in option for the right candidate. Interested applicants please call: (250) 374-4544 or email: abtucker@telus.net. D2037

**BRITISH COLUMBIA – Port Coquitlam:** Full-time associate required. Excellent opportunity with great staff in well-established larger office. Periodontal focused with 3 full-time and 1 part-time hygienist. Principal dentist areas of interest are periodontal, implant placement, and occlusion. Position available February 2006. Please send resume, attention office manager to: myrnapearce@stargate.ca or fax to: (604) 552-9145. D1855

**BRITISH COLUMBIA - Sunshine Coast:** Full-time associate required for our busy Pender Harbour Dental Clinic on beautiful Sunshine Coast. (The fastest growing community in B.C.) Only a 45-minute ferry trip from Vancouver. Excellent opportunity for a dentist looking for a long-term position and great earnings. New patients daily. Call or fax resume: 604-886-7830/Jari. D2370

**BRITISH COLUMBIA - Vancouver:** Prosthodontist or endodontist needed to associate, partner, or share office in an established periodontal practice in a growing area of Vancouver. Part/full time. Proven record of previous endodontics services. 3,333 sq. ft. of space with 6 operatories and available space for expansion. Call: (604) 939-8467 or email: info@periodentalimplants.com. D1735

**BRITISH COLUMBIA - Vancouver:** We are committed to creating beautiful smiles! Are U? We are seeking a full-time Certified Dental Assistant and dental receptionist to join our busy, modern Oakridge dental office. Please fax resume to: Dr. Marcy Schwartzman (604) 266-0784. D2441

**BRITISH COLUMBIA - West Kootenay:** Associate required for a very busy family practice. Lots of new patients, active periodontal program, all aspects of general dentistry practised. If you enjoy the outdoors, you'll love the area. Great downhill skiing at Red Mountain, numerous cross-country ski trails, golfing, hiking plus great cycling in the mountain bike capital of Canada. Please contact: Dr. Jillian Sibbald, tel: (250) 367-6494 or res: (250) 362-2130, email: sibbald@telus.net. D1844

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**NORTHWEST TERRITORIES - Yellowknife:** And surrounding communities. Associate position. Excellent opportunity in North America's diamond capital. Good recreation and outdoor activities. Work in a modern friendly dental clinic with excellent remuneration and benefits. For more information reply to fax: (867) 873-4410. D1754

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**ONTARIO - Eastern:** Oral maxillofacial surgery. Busy full-scope practice looking for associate leading to partnership. OR time available and GA suite in office. One hour east of Toronto. If interested reply to: CDA Classified Box # 1858. D1858

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**ONTARIO – Toronto:** Associate for downtown Toronto practice. Walking minutes from Bay Street, theatre district and City Hall. Build your own practice with no capital investment. Opportunity to purchase the principal's practice after suitable period. Email resume to: dental.recruiter@sympatico.ca. D2034

**ONTARIO - Toronto:** We are in need of a full-time pediatric dentist to provide quality care in our modern, progressive, pediatric dental office located minutes from Toronto. Practice provides all aspects of pediatric dentistry including sedation and general anesthesia (on site and in hospital). This is your chance to become involved in an extremely busy practice with two practitioners, a great staff and a great future. Fax resume to: (905) 513-7833. D2167

**ONTARIO - 19 locations:** Experienced associate required for our well-established, busy practice. Enjoy a small-town or a large city atmosphere. For more information visit our website at www.altima.ca or contact: Dr. George Christodoulou, Altima Dental Canada, tel. (416) 785-1828, ext. 201, or email: drgeorge@altima.ca. D1783

**ONTARIO/QUEBEC:** Looking for bilingual associate for 5 mature and busy practices, south-west Quebec and/or Cornwall, Hawkesbury, Ontario area. Full schedule (crown/bridge, endodontics, etc.). Stability, flexibility and respect assured. Possible sale. Seeing is worth believing. Contact: Luc, tel: (450) 370-7765. D1674

**ONTARIO - London:** We are seeking a dedicated and people-oriented associate to join our busy family dental practice. Part-time position leading to full-time. Experience preferred. Please fax resume to: (519) 672-2545. D2115

**ONTARIO - Windsor:** Oral & maxillofacial surgeon. Full-scope, professionally satisfying, private practice opportunity. Associateship position leading to partnership. Please reply in confidence to: Dr. Joe Multari, tel: (519) 252-0985, fax: (519) 734-8853 or email: multari@mnsi.net. D1812

## General Dentist

The Labrador-Grenfell Regional Integrated Health Authority invites applications for the position of permanent General Dentist on a full-time basis for northern Newfoundland and southern Labrador, effective as soon as possible. This is a challenging and interesting area where dental services are provided from regional bases in Newfoundland and traveling clinics on the south Labrador coast. Dependent on the base location, the traveling requirement is up to one third of the total working time.

Salary for this position is on an 11 point Government scale of $75,433 - $94,916. Initial placement on this scale will be dependent on years of experience. An isolation bonus payment ranging from $5,000 - $10,000 will be payable upon the completion of each full year of service. Currently, a retention incentive of $10,000 annually, payable bi-weekly, is also in effect.

Fringe benefits include 6 weeks paid leave in a twelve month term. Assistance with relocation and continuing education costs are available. Accommodations are available at a reasonable rate.

Applicants must be eligible for registration with the Newfoundland and Labrador Dental Board. Experience in oral surgery is desirable. Experience in general dentistry is essential.

Labrador-Grenfell Regional Integrated Health Authority is also currently prepared to consider applicants who are available for short-term locum appointments. Interested individuals are encouraged to contact the organization for further details and discussions.

The successful applicant will be required to submit a Certificate of Conduct.

Interested individuals are requested to submit resumes, along with names and addresses of references, stating competition number, 06.03, to:

**Human Resources Department**
**Labrador-Grenfell Regional Integrated Health Authority**
**St. Anthony, NL A0K 4S0**
**Canada**
**Telephone: (709) 454-0347**
**Fax: (709) 454-3301**
**E-mail: humanresources@grhs.nf.ca**

D2050

## PROFESSIONAL OPPORTUNITY
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Crestwood Dental Clinic of Medicine Hat, Alberta, is seeking a full-time associate dentist. We now have 5 dentists in a large 16-operatory modern clinic, well situated and centrally located in a thriving and growing community that also has a very large drawing area from South-East Alberta and South-West Saskatchewan.

Crestwood Dental Clinic offers all aspects of dentistry to the community, including hospital surgery, orthodontics, periodontics and restorative dentistry.

This is an excellent opportunity for recent grads or for new grads in the spring of 2006. All interested parties please contact:

**Gordon Rice, Clinic Manager**
**Crestwood Dental Clinic**
**200, 1899 Dunmore Road SE,**
**Medicine Hat, AB T1A 1Z8**
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**PRINCE EDWARD ISLAND:** Oral maxillofacial surgeon. Opportunities available for associateship leading to partnership in all aspects of busy oral surgery practice in Atlantic Canada. Hospital privileges available. If interested please reply to: CDA Classified Box #1548. tel: (902) 892-2970 (bus.), (902) 892-8337 (res.), email: habbi@islandtelecom.com. D1548

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# Products Bearing the CDA Seal of Recognition

## Church & Dwight Ltd.

Aim Toothpaste
Arm & Hammer Dental Care Toothpaste
Close Up Red Gel Toothpaste
Close Up Green Gel Toothpaste

## Colgate Palmolive Canada Inc.

Colgate 2 in 1 Toothpaste and Mouthwash Tartar Fighting
Colgate 2 in 1 Toothpaste and Mouthwash Fresh Mint
Colgate 2 in 1 Toothpaste and Mouthwash Kids Bubble Gum
Colgate 2 in 1 Toothpaste and Mouthwash Kids Watermelon
Colgate 2 in 1 Toothpaste and Mouthwash Whitening
Colgate Active Angle Toothbrush
Colgate Cavity Protection Toothpaste
Colgate Fresh Confidence Toothpaste
Colgate Herbal White Toothpaste
Colgate Massager Toothbrush
Colgate Mint Toothpaste & Gel Tartar Fighting Formula
Colgate Navigator Toothbrush
Colgate Plus Toothbrush
Colgate Replace Toothbrush
Colgate Sensation Whitening Toothbrush
Colgate Sensitive Whitening Fresh Stripe Toothpaste
Colgate Sensitive Whitening Cool Mint Toothpaste
Colgate Sparkling White Baking Soda & Peroxide Toothpaste
Colgate Sparkling White Mint Zing Toothpaste
Colgate Sparkling White Stain Protection Toothpaste
Colgate Fluoride Toothpaste for Kids
Colgate Total Advanced Fresh Toothpaste
Colgate Total Fresh Stripe Toothpaste
Colgate Total Plus Whitening Toothpaste
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## Combe Incorporated

Cepacol Antibacterial Mouthwash with Fluoride (Peppermint)

## Gillette Canada

Oral-B Advantage Toothbrush
Oral-B Indicator Toothbrush
Oral-B ProfessionalCare 7500 Power Toothbrush
Oral-B ProfessionalCare 8850DLX Power Toothbrush
Oral-B Sonic Complete Power Toothbrush

## GlaxoSmithKline

Aquafresh Extreme Clean Toothpaste
Aquafresh for Kids Toothpaste
Aquafresh Multi-Action Whitening Toothpaste
Aquafresh Sensitive Toothpaste
Aquafresh Whitening Mint Advanced Freshness Toothpaste
Sensodyne Toothpaste for Sensitive Teeth
Sensodyne-F Baking Soda Clean Toothpaste
Sensodyne-F Brilliant Whitening TP
Sensodyne-F Cool Mint Gel Toothpaste
Sensodyne-F FreshMint Toothpaste
Sensodyne-F Mint Toothpaste
Sensodyne-F Revitalizing Whitening Toothpaste
Sensodyne-F Ultra Fresh

## Pfizer Canada Inc.

Listerine Advanced Antiseptic Mouthwash
Listerine Antiseptic Cool Citrus Mouthwash
Listerine Antiseptic Cool Mint Mouthwash
Listerine Antiseptic Freshburst Mouthwash
Listerine Antiseptic Original Mouthwash
Listerine Antiseptic Tartar Control Mouthwash
Listerine Antiseptic with Fluoride Mouthwash

## Procter & Gamble

Crest Baking Soda Toothpaste
Crest Cavity Protection Regular Paste
Crest Clean FreshMint Paste (baking soda & tartar control)
Crest Complete Clean Mint Gel
Crest for Kids Cavity Protection Sparkle Gel
Crest Extra Whitening with Tartar Protection Clean Mint
Crest Multicare Toothpaste
Crest Sensitivity Protection Mint Paste
Crest Tartar Fighting Toothpaste
Fixodent Denture Adhesive

## Sulcabrush Inc.

Sulcabrush
Sulcabrush Travel

## Zila Pharmaceuticals

Peridex Oral Rinse

*For more information on application procedures, contact:*

Coordinator, Dental Programs
Canadian Dental Association
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**CDA Fund Performance (for period ending March 31, 2006)**

| | MER | 1 year | 3 years | 5 years | 10 years |
|---|---|---|---|---|---|
| **CDA Canadian Growth Funds** | | | | | |
| Aggressive Equity fund (Altamira) | up to 1.00% | 21.5% | 26.0% | 14.1% | 10.1% |
| Common Stock fund (Altamira) | up to 0.99% | 23.0% | 22.5% | 7.7% | 8.4% |
| Canadian Equity fund (Trimark)†[1] | up to 1.50% | 12.9% | 17.4% | 7.9% | 9.1% |
| Dividend fund (PH&N)†[2] | up to 1.20% | 16.6% | 21.3% | 12.0% | 18.0% |
| Income Trusts fund (Sceptre) | up to 1.45% | 24.5% | 27.2% | n/a | n/a |
| Special Equity fund (KBSH)†[3] | up to 1.45% | 24.3% | 26.0% | 5.9% | 13.9% |
| TSX Composite Index fund (BGI)†† | up to 0.67% | 27.5% | 25.4% | 11.1% | 10.5% |
| **CDA International Growth Funds** | | | | | |
| Emerging Markets fund (Brandes) | up to 1.77% | 31.9% | 26.9% | 13.1% | 3.4% |
| European fund (Trimark) | up to 1.45% | 19.2% | 12.1% | -6.1% | 3.6% |
| International Equity fund (CC&L) | up to 1.30% | 12.5% | 11.6% | -4.8% | 2.2% |
| Pacific Basin fund (CI) | up to 1.77% | 32.4% | 16.3% | -4.7% | 0.3% |
| US Small Cap fund (Trimark) | up to 1.25% | 9.0% | 4.9% | -6.9% | n/a |
| Global fund (Trimark)†[4] | up to 1.50% | 14.8% | 12.9% | 5.6% | 8.9% |
| Global Stock fund (Templeton)†[5] | up to 1.77% | 11.3% | 17.2% | 1.8% | n/a |
| S&P 500 Index fund (BGI)†† | up to 0.67% | 6.6% | 7.4% | -1.4% | 6.6% |
| **CDA Income Funds** | | | | | |
| Bond and Mortgage fund (Fiera) | up to 0.99% | 0.5% | 4.1% | 4.6% | 5.6% |
| Fixed Income fund (McLean Budden)†[6] | up to 0.97% | 3.3% | 5.6% | 5.7% | 6.9% |
| **CDA Cash and Equivalent Fund** | | | | | |
| Money Market fund (Fiera) | up to 0.67% | 2.2% | 2.1% | 2.3% | 3.2% |
| **CDA Growth and Income Funds** | | | | | |
| Balanced fund (PH&N)†[7] | up to 1.20% | 11.5% | 11.0% | 3.7% | 7.0% |
| Balanced Value fund (McLean Budden)†[8] | up to 0.95% | 10.4% | 13.0% | 6.9% | 9.1% |

**CDA figures indicate annual compound rate of return. All fees have been deducted. As a result, performance results may differ from those published by the fund managers. CDA figures are historical rates based on past performance and are not necessarily indicative of future performance. The annual MERs (Management Expense Ratios) depend on the value of the assets in the given funds. MERs shown are maximum.**

† Returns shown are those for the following funds in which CDA funds invest: [1]Trimark Canadian Fund, [2]PH&N Dividend Income Fund, [3]KBSH Special Equity Fund, [4]Trimark Fund, [5]Templeton Global Stock Trust Fund, [6]McLean Budden Fixed Income Fund, [7]PH&N Balanced Pension Trust Fund, [8]McLean Budden Balanced Value Fund.

†† Returns shown are the total returns for the index tracked by these funds.

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