



# JCDA

Journal of the Canadian Dental Association

Vol. 71, No. 4

April 2005



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in Montreal,  
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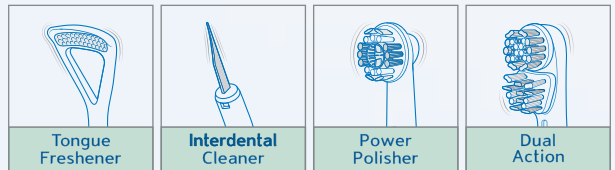


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# Editorial

## ORAL HEALTH – GOOD FOR LIFE



*Dr. John P. O'Keefe*

April is National Oral Health Month and there are many activities going on around the country in conjunction with this event. CDA has been involved with this public awareness campaign since 1973. Raising public awareness about the importance of oral health issues is an important part of CDA's mission. Our members tell us that they want CDA to be active in this area. You can find out about the range of activities that our organization is undertaking for this campaign at [www.cda-adc.ca/nohm](http://www.cda-adc.ca/nohm).

The theme for this year's campaign is "Oral health – good for life." I believe this phrase can be interpreted 2 ways: you can maintain good oral health throughout your lifetime and good oral health has a positive impact on general health. The latter interpretation ties in with research efforts in recent years to show that periodontal diseases are correlated with cardiovascular problems, diabetes, low birth weight and pre-term birth.

You can scarcely have missed the plethora of media reports in recent months that speak of the links between periodontal disease and heart disease. Some of the more irresponsible of these reports scream headlines as dramatic as "Floss or Die!" Partially in response to such hyperbole, the Royal College of Dental Surgeons of Ontario (RCDSO) organized a very interesting workshop that I attended in early February.

The purpose of the workshop was to provide an update on the science behind the linkage of periodontal diseases and systemic health. It also explored how the dental profession could best disseminate responsible information about this linkage to a range of stakeholders.

The take-away messages from the workshop were finely nuanced, not lending themselves to newspaper headlines. There does seem to be a strong 2-way correlation between periodontal diseases and diabetes. A diabetic, especially one with poor glycemic control, appears to be particularly at risk of developing periodontal diseases. Similarly, periodontal diseases appear to exacerbate diabetes.

No cause and effect relationship has been established between periodontal diseases and cardiac conditions, even though there appears to be a strong theoretical basis for a link between the 2 disease processes. It may well be that the association between the disease processes is underpinned by the nature of reaction of the different body systems to infectious microorganisms. The evidence about the link between periodontal diseases and low birth weight or pre-term birth appears to be equivocal.

An epidemiologist attending the workshop told me that he believes there are definite associations between periodontal diseases and diabetes as well as heart disease. However, to

verify a cause and effect relationship, he advised of the need to conduct clinical trials, to prove that people would be at less risk of developing these systemic conditions if they were treated for their periodontal diseases.

Who knows whether a true cause and effect relationship will ever be proven. In the meantime, we have a duty to promote research into the links between oral and general conditions and to give well-founded information to our patients and medical colleagues about the links between oral diseases and systemic conditions.

It is most important that the messages coming from individual practitioners, and from associations and regulatory bodies alike, are responsible and similar in content and tone. I congratulate the RCDSO for organizing this workshop and for its desire to cooperate with other organizations. When the various arms of the dental profession work together for the public good, everybody benefits.

Such cooperation between dental organizations in the context of oral health improvement brings to mind the American Dental Association's "Give Kids a Smile" program ([www.ada.org](http://www.ada.org)). This dental care access day for underserved children is a resounding success, operating across many states with strong support from corporate and legislative circles.

Similar dental care access days exist in a number of Canadian provinces. Perhaps if we coordinated these efforts on a national scale, we could magnify our efforts to the benefit of vulnerable groups in Canada. It would make a nice centrepiece for future National Oral Health Month campaigns in this country.

*John O'Keefe*  
1-800-267-6354, ext. 2297  
[jokeefe@cda-adc.ca](mailto:jokeefe@cda-adc.ca)

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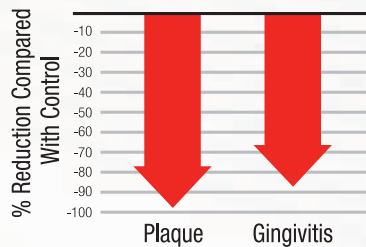
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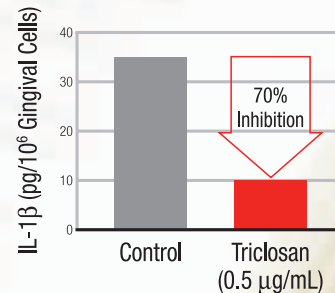
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† gingivitis.

§ reduction in severity index vs ordinary toothpaste.

†† in vitro.

1. Data on file. Piscataway, NJ; Colgate-Palmolive Technology Centre. 2. Volpe AR, et al. *J Clin Dent*. 1996;7(suppl):S1-S14. 3. Mustafa M, et al. *Eur J Oral Sci*. 1998; 106:637-643. 4. Gaffar A, et al. *J Clin Periodontol*. 1995;22:480-484. 5. Modéer T, et al. *J Clin Periodontol*. 1996;23:927-933. TM Trademark of the Canadian Dental Association \*TM Reg'd Colgate-Palmolive Canada Inc. 2005 \*\*Colgate-Palmolive independent research study on file.





# President's Column

## MEMORIES ARE MADE OF THIS



Dr. Alfred Dean

When I began my tenure as CDA president, I remember how daunting it seemed to write a monthly column for *JCDA*. Now that my final installment is complete, I am grateful for the opportunity to thank the people whose efforts sometimes go unnoticed.

The past year has been an active one for the Association. CDA is in the final stages of implementing its new governance model. We have restructured our committees and approved the accountability framework — all part of a commitment to our members to improve the decision-making process and the flow of information. In January, we began work on a revised Strategic Plan in partnership with dentistry's stakeholders. Add these initiatives to CDA's new membership model and they collectively represent a solid foundation for the future of our organization.

But we haven't only been looking inward. CDA organized, partnered or participated in several conferences on topics ranging from access to care, seniors' oral health, licensure of foreign-trained specialists and a shared concerns conference between members of the insurance industry and organized dentistry.

In government relations, our messages were conveyed to parliamentarians and cabinet ministers during the Days on the Hill event. I was also fortunate to present before both the Finance and Citizenship and Immigration parliamentary committees. We continue to make progress with the Non-Insured Health Benefits Program (NIHB), proposing ways to make it work effectively. Our public advocacy campaigns are also effective, judging from the number of interview requests I receive on the subject of oral health as an integral part of overall health.

Tremendous energy and hard work has seen ITRANS develop as planned. This Web-based service is now ready for transmitting claims and I encourage dentists to support this project. On the international front, our relationship with the American Dental Association has flourished. We share information on issues common to our 2 nations and work closely at the FDI World Dental Federation to help improve oral health worldwide.

Such accomplishments would not be possible without the collective efforts of dedicated individuals. As you are currently reading the latest issue of *JCDA*, I hope you can agree that Dr. O'Keefe and his team continue to do a marvelous job with their publications. They are always looking for innovative ways to keep members informed while also reaching out to potential members.

It has been a privilege and honour to work with my fellow directors and

the staff of CDA. This group continually proves its dedication to the profession and the future of the Association. I also want to express my sincere gratitude to all of you who have volunteered for organized dentistry at the local, provincial or national level.

Our profession is strong in Canada, as are its organizations. I can say with complete confidence that the individuals who lead these organizations truly care about the profession and give freely of their time. This spirit of volunteerism should not be undervalued. While it is easy to question our profession's leadership and committee members, passing judgment without knowing the whole story is unjust. Our job is to ask questions and to ensure that the decisions are being made with all the available knowledge.

Travelling across Canada gave me the chance to interact with many dentists and their families along the way. I kissed a cod in Newfoundland, I ate lobster in Prince Edward Island. I experienced Prairie hospitality and I had my wallet emptied at a charity auction in British Columbia. I met dentists both young and old and I was always made to feel welcome at each destination. I tried to serve you the best that I could.

Through it all, I was touched by the expressions of goodwill. While in Vancouver, a young dentist from Calgary approached me, simply to say he thought CDA was doing good work and thanking me for my efforts. An unnecessary gesture but obviously sincere. My time as president may be ending, but I move on with the knowledge that there are many dentists like Dr. Darrell Morden who will ensure that Canadian dentistry thrives in the future.

Memories are made of this.

*Alfred Dean, DDS*  
*president@cda-adc.ca*



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# Letters

## 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. 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.

## Paying Your Dues

How many times have we heard it said during a recognition ceremony that someone has "paid their dues"? The expression is used to show that the person has done all the right things to be deserving of the honour being awarded. This saying also has a literal meaning that is often lost on many.

My dad graduated from dental school the year I was born; when I graduated he had already been practising for 25 years. Over the next 18 years, we shared an office. Because he and many of his peers were actively involved in organized dentistry, he insisted that I be involved as well. As the child of a dentist growing up in the '50s and '60s, I often heard friends say: "Your dad isn't a doctor, he's a dentist." It took people like my father, who were true professionals in the strictest sense of the word, to change that attitude.

We are now a respected profession and this high esteem has been confirmed in recent public opinion polls. Professionals are defined by more than their education level. To be referred to as a doctor and to earn the respect of the general population, we must be willing to accept certain responsibilities. Professionals are usually not seen on the news being arrested for disorderly conduct, they are fairly well spoken and articulate. They are often actively involved in

voluntary and charitable activities with organizations outside of dentistry. Many of these activities better the communities we live in. That is one way to pay our dues.

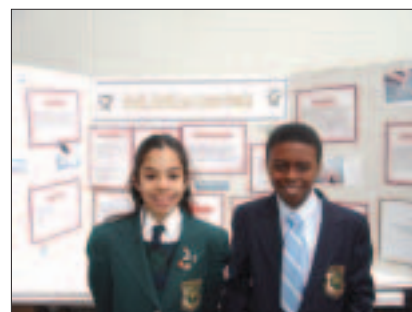
As professionals, we must also literally pay our dues to our professional organizations, locally, provincially and nationally. When I started practising in 1977, supporting organizations both monetarily and through participation was something that *had* to be done. If I wished to be respected in my community and amongst my peers, I had to belong and pull my weight to further the cause. If we didn't agree with what was being done in the association, we attempted to fix it or at least ensure that the majority view was represented. To even contemplate not belonging was considered heresy and an abrogation of professional obligation. To not give back to a community that had given us a standard of living and public respect was unheard of.

Why should the so-called dentists, doctors and other professionals who are not joining their associations and fulfilling their obligation to pay their dues expect the rest of their peers to work and pay for the betterment of their profession? I guess it's a sign of the times — everyone wants to know what's in it for them. I'll tell you what paying your dues means: it gives you the right to be called a true professional and a "real" doctor!

*Dr. Brian Barrett  
Charlottetown, Prince Edward Island*

## School Project on Tooth Whitening

In our grade 6 class, we did a project on whitening teeth. We had to test which whitening product, Crest Whitening Strips, Colgate Simply White, Nite White Excel 2 and Rembrandt Toothpaste, would remove the most stains off teeth in a



*Ashiana Jivraj and Oluwamuyiwa Abolarin*

3-day period. After we did our test, we found that Nite White Excel 2 removed the most stains in this period (72 hours). In our science class, we decided we would write to you concerning this matter.

We wanted you to know this information because you can spread it to dentists throughout our global village. We feel this would be important information for dentists to know because consumers wish for their teeth to be as white as possible in the shortest amount of time. In our observations, we noticed that Nite White had a shade of 1 on the dentist chart. This number was consistent all 3 times we did the test, whereas when we used Colgate Simply White and Crest Whitening Strips, the numbers varied between shade 1 and 2.

In conclusion, we think this information will help dentists all over the world make a huge profit on this product and make patients content and satisfied.

*Oluwamuyiwa Abolarin  
Ashiana Jivraj  
Strathcona-Tweedsmuir School  
Calgary, Alberta*

## Acknowledging CDA's Professionalism

I am writing this letter to express my great satisfaction following a meeting I had with Ms. Fatna Moussali, the coordinator for the Dental Aptitude Test (DAT).

On January 21, 2005, my daughter Ariane and I went to Ottawa to obtain information about the DAT she had written in fall 2004. We were very cordially welcomed by Ms. Moussali, who graciously answered all our questions.

Ms. Moussali exhibited a high level of professionalism and her enthusiasm turned this meeting into an exceptional encounter. While listening to her talk about her work and the team spirit that characterizes CDA, I understood that you were all very involved and passionate about your work and commitment to the profession. When I got back to my practice, I immediately signed up to become a member of CDA.

Once again, my daughter and I would like to take this opportunity to thank Ms. Moussali for her professionalism and CDA for its excellent work.

*Dr. Alain Babin  
Rouyn-Noranda, Quebec*

### Insurance Coverage for Stainless Steel Crowns

Last December I was asked to write a letter on behalf of my patient to a dental insurance company about treatment requiring 2 formocresol pulp-tomies with stainless steel crowns. I also sent a copy of the letter to CDA.

The parents asked me to appeal the insurance company's decision to consider stainless steel crowns as "major" restorative work and therefore eligible for only 50% coverage instead of the 90% that would be allowed for basic coverage.

It is a fallacy to allow insurance companies to consider stainless steel crown preparations for primary and hypoplastic permanent molars as "major" dental restorative procedures for children. It is a practice by certain companies within the insurance industry that appears to be motivated by profits rather than the health and welfare of the children.

The primary cause of failure of restorations in the primary posterior dentition is the use of resin or amalgam restorative material when full coverage using a stainless steel crown preparation is indicated. For the sake of the children, the stainless steel crown procedure should be considered nothing less than a basic service. Unfortunately the word "crown" elicits an inappropriate "major restorative procedure" classification and reduced financial coverage. The use and failure rates of large 2- and 3-surface restorations have been well documented in the dental literature, especially on teeth having been treated with pulp therapy. Studies of the longevity of preformed metal crowns indicate they are more economical than multisurface amalgams. Literature reviews of preformed metal crowns for primary and permanent molar teeth conclude that "preformed metal crowns are superior to amalgam restorations for multisurface cavities in primary molar teeth."<sup>1</sup>

With the present focus on evidence-based dentistry, CDA should be encouraged to ensure insurance companies compensate for the appropriate therapy. To do otherwise encourages failure, further pain and suffering for the children so afflicted.

I would hope that insurance companies would be focused on the health and well-being of Canadian children and not unduly constrained by semantics and the use of the word "crown."

*Dr. Robert Barsky  
Certified specialist in pediatric dentistry  
Calgary, Alberta*

### Reference

1. Randall RC. Preformed metal crowns for primary and permanent molar teeth: review of the literature. *Pediatr Dent* 2002; 24(5):489-500.

**Editor's Note:** In consultation with the insurance company, CDA staff confirmed that this plan design is not standard and is unique to the plan sponsor. In an effort to improve the

plan, the insurer has committed to discussing the issue with the plan sponsor.

### National Medicare Program

In his President's Column<sup>1</sup> in the October *JCDA*, Dr. Dean discussed accessibility issues and the push to include dental services in a national medicare program. He requested opinions from the membership. I anticipated the responses with great interest. Interestingly, only 2 letters have been published in response.<sup>2,3</sup> Both writers were against government involvement in the delivery of dental care. Does this indicate the degree of interest shown by Canadian dentists? Also, is it representative of the views of the profession and CDA?

On behalf of the Kingston Coalition for Dental Care, I wish to present another side of the issue. Our coalition is one of several in Ontario committed to ensuring that everyone has access to dental care regardless of age, circumstance or income. We understand the profession's hesitancy to dismiss the "time-tested" relationships that dentists have with those patients who have employer-paid dental plans. We are also aware, however, that the current system does not ensure access to oral health care for all Canadians. We would like to propose an option between denticare and private care.

Instead of including dentistry in a universal medicare program, we suggest that the federal government implement a program similar to the National Child Benefit Fund, which would be administered by the provinces. The premise of the program would be to provide low-income families, seniors and single adults with an adequate dental benefits package that would be geared to their taxation bracket. Assessment could be done by inclusion in the tax form of a question on dental insurance. If the individual answered "no" to this question and his or her personal or family income was below

the poverty line, then a dental benefits card would be issued. Claims would be submitted to the province, which could either administer the benefits under its medical programs or contract out the administration to private companies, public health organizations or arm's-length dental associations. Of course, it would be important that use of this card not stigmatize the user. (This is not an uncommon complaint among current social service recipients of dental benefits.)

This is only one of many suggestions our coalition has discussed. The issue of "dental care for all" is of growing concern across the country. The recent national symposium "Access and Care: Towards a National Oral Health Strategy" identified 4 priorities for oral health care. One of them was accessibility of care for marginalized populations. We hope that the dental community will work with local coalitions to solve this issue before, as Dr. Matt Irvine said, "the government feels a need to get involved and try to (solve) it for us."<sup>2</sup>

Helen Mabblerly  
Kingston Coalition for Dental Care

### References

1. Dean A. The ability and the will. *J Can Dent Assoc* 2004; 70(9):589.
2. Irvine M. Access to care. [Letter] *J Can Dent Assoc* 2004; 70(11):739.
3. Chernesky R. Access to care. [Letter] *J Can Dent Assoc* 2004; 70(11):739-40.

### Access to Care

I fully agree with Dr. Matt Irvine<sup>1</sup> when he states that our profession should stay away from the national medicare program. I would like to expand on this idea with the following suggestion. If dental professionals provided services to people who can't afford to go to a private practitioner's office, the government would have no interest in getting involved with our profession. I would be more than willing to donate a half day a week at the local hospital. There would need to be a dental clinic staffed and paid for by

the province. The clinic could be organized so that there would be different services available on different days. Dentists could volunteer for particular clinics (general dentistry, pediatric dentistry, surgery, etc.) depending on their interests. The dentists would benefit from the interaction with their colleagues at these clinics and it would be a learning experience. This is one way we can retain our autonomy in our offices.

Dr. Mark Lazare  
Montreal, Quebec

### Reference

1. Irvine M. Access to care. [Letter] *J Can Dent Assoc* 2004; 70(11):739.

### Treatment for Trigeminal Neuralgia

Diagnostic criteria for head and orofacial pain including trigeminal neuralgia have recently been published in *Cephalalgia*<sup>1</sup> and are also available on the Internet.<sup>2</sup> Trigeminal neuralgia is typically provoked by light touch. When describing treatment for trigeminal neuralgia,<sup>3</sup> evidence from systematic reviews<sup>4</sup> and randomized controlled trials<sup>5</sup> should be quoted. These resources are available from the Cochrane Library and in *Clinical Evidence*. Phenytoin is a drug that has never been evaluated in a randomized controlled trial and has been superseded by the newer anticonvulsant drugs.<sup>4</sup> Early referral to neurosurgeons is now advocated as surgical treatments, especially microvascular decompression, result in high satisfaction.<sup>6</sup>

Prof. Joanna Zakrzewska  
London, England

### References

1. The International Classification of Headache Disorders: 2nd edition. *Cephalalgia* 2004; 24(suppl 1):9-160.
2. Available from: URL: [http://216.25.100.131/members/Sections/members/login/Temp\\_Frame/frameset\\_26\\_06\\_02.htm](http://216.25.100.131/members/Sections/members/login/Temp_Frame/frameset_26_06_02.htm).
3. Matwychuk MJ. Diagnostic challenges of neuropathic tooth pain. *J Can Dent Assoc* 2004; 70(8):542-6.

4. Wiffen P, Collins S, McQuay H, Carroll D, Jadad A, Moore A. Anticonvulsant drugs for acute and chronic pain. *The Cochrane Database of Systematic Reviews* 2000; Issue 3. Art. no.: CD001133.

5. Zakrzewska JM, Lopez BC. Trigeminal neuralgia. *Clin Evid* 2003; 10:1599-609.

6. Zakrzewska JM. Trigeminal neuralgia. In: Zakrzewska JM, Harrison SD, editors. Assessment and management of orofacial pain. Amsterdam: Elsevier Sciences; 2002. p. 267-370.

### Insurance Disbursements

The recent disbursement of excess insurance funds to the participants of the Canadian Dentists' Insurance Program (CDIP) merely serves to illustrate one of the several advantages of our profession acting as a united collegial body.

I used the funds to subsidize a cruise, which (it seems to me) put the money to better use than to help build yet another high-rise monument to corporate profit.

Well done CDIP!

Dr. Andrew Thompson  
Halifax, Nova Scotia

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# News

## **Highlights of CDA Board Meeting**

CDA's Board of Directors met February 18–19 in Ottawa. The following is a brief review of some of the key issues discussed at the meeting.

### ***Seniors' Oral Health***

"Taking Action on Seniors' Oral Health in Canada" was a one-day conference attended by representatives of CDA and the provincial dental associations and licensing bodies. Participants agreed that seniors' oral health and access to care would be considered as the focus of the 2006 National Oral Health Month in April or Seniors' Month in June. CDA will work with provincial communication directors to maximize opportunities for joint messaging.

### ***CDA Position Statements***

The Board approved a number of revised position statements that had previously been sent to Corporate Members for consultation (see News for more details).

### ***USC&LS Redevelopment and Maintenance***

Dr. Dennis Fuchs of Yorkton, Saskatchewan, has been named chair of the Uniform System of Codes and List of Services (USC&LS) Review Oversight Committee. This committee will ensure that the consultant adheres to the parameters set out in the Request for Proposal circulated in 2003 and will share information about the progress of the project with stakeholders in an accurate and ongoing fashion.

The USC&LS Maintenance Project team considered requests for new code series that required Board approval. In response to a request from the British Columbia Dental Association, code series 00020 (for

header Elements of the Diagnostic & Preventive Package) and 00021 (Annual Diagnostic & Preventive Package) were approved and will be introduced as an addendum to the 2005 edition of USC&LS. As well, a request from the Association of Prosthodontists of Canada to create 2 new codes series for Provisional Denture was approved for introduction in 2006.

### ***Canada Health Infoway***

An arm's-length agency of the federal government, Canada Health Infoway's mandate is to accelerate the adoption of the Electronic Health Record (EHR) in Canada. CDA has been invited to participate in 2 working groups, the Provider Registry Standards Working Group and the Privacy & Security Conceptual Architecture Project.

### ***Bill C-45***

The Board considered the impact of Bill C-45 (an Act to amend the Criminal Code, concerning criminal liability of organizations for workplace health and safety negligence) on the dental profession. Information on the Bill will be sent to Corporate Members, urging them to examine their provincial legislation to determine the implications for dentists in their province.

### ***2005 CDA Elections***

The CDA Nominating Committee met to consider the 2005 election protocol and candidates for election. The elections for CDA vice-president and members of the Board of Directors will take place at CDA's Annual General Meeting in April.

### ***Relationship with CDRAF***

A working group has been established to consider issues of

common interest between CDA and the new Canadian Dental Regulatory Authorities Federation (CDRAF).

### ***CDAnet Contract Negotiations***

At a meeting with industry representatives in January, CDA reached an agreement in principle for the renewal of CDAnet contracts with claims processors. The industry negotiating group will present this agreement to their stakeholders, preparing the way for signing by individual companies in the coming months.

### ***Hygiene Issues***

The Board received a status report on work being done to assist provinces in dealing with issues related to dental hygiene services. CDA developed a Principles document that will soon be circulated to Corporate Members for feedback.

### ***Controlled Drugs and Substances Act***

The federal government is considering expanding the authority to prescribe controlled drugs and substances to regulated health professionals other than practitioners of medicine, dentistry or veterinary medicine. CDA is now an active participant in the consultation process with the federal government and other stakeholders. The Board received an update from the task force created to address this issue. ♦

## Smile and Say Cheese



Being asked to show off your smile for a photograph by saying “Cheese!” will take on new relevance in 2005. The link between dairy products and good oral health will be reinforced through a joint public education initiative, launched by the Canadian Dental Association (CDA) and the Dairy Farmers of Canada (DFC).

The collaboration between the 2 organizations will centre around a public education campaign designed to raise children’s awareness of the importance of good oral health. To help reach kids with this message, dietitians from DFC created an educational tool based on the traditional X’s and O’s game. *Tic Tac Tooth* includes fun messages about the importance of good oral hygiene, while emphasizing tooth-friendly foods.

Another aspect of this partnership is a poster campaign, creatively emphasizing the link between milk products and good oral health. The campaign will enjoy high visibility, as these posters have been displayed both in major print publications and in public transit stations in previous years. DFC dietitians will be distributing the poster and *Tic Tac Tooth* games at dental shows across the country. ♦

## CDA Updates its Position Statements

CDA has traditionally produced guidelines and position statements

primarily for use by the dental profession. These statements cover a wide range of clinical and political issues such as CDA’s position on dental amalgam or its position on privacy (personal data protection).

CDA has increasingly received requests for its position statements from members of the public and the media. To continue in its role as the national voice of dentistry, and as part of CDA’s new governance model, the Association undertook a thorough review process of all existing guidelines and position statements. The ultimate long-term goal of the project is to make these statements available to the profession and the public via CDA’s public Web site.

Following a thorough review and consultations of existing positions, a number of statements were recently “re-approved” by the Board of Directors and will remain active. Other statements were deemed to require more thorough appraisal before they would be considered for re-activation. CDA’s Committee on Clinical and Scientific Affairs will take a lead role in the review process, and also in identifying subject areas for new position statements. Members may notice changes to the list of CDA’s positions on the members’ Web site during this transition.

All statements will include a disclaimer, directing readers to ask their dentist for more information if they require clarification. Before moving the statements to the public domain, supporting resource materials such as literature reviews, reference lists and FAQs will be made available on the members’ side of the CDA Web site. ♦

## Oral Health Forum in Rwanda

On February 17, the World Health Organization (WHO/AFRO) and the FDI World Dental Federation jointly organized the first ever workshop on oral health in Kigali, Rwanda. The high-level forum brought together members of the dental profession, government officials, and oral health and policy experts.

The 2-day workshop was organized to generate recommendations to address the significant oral health challenges that exist in Rwanda. These challenges include a dentist to population ratio of approximately 1 to 800,000, people travelling an average distance of 300 kilometres to receive dental care and two-thirds of the population having no access to oral health care at all.

The Rwanda meeting is a follow-up to the international conference on oral health in the African Region held

## COVER ARTIST

This month’s cover art comes from **Dr. Lucy Schappy** of Cumberland, British Columbia. After graduating from the University of Alberta in 1990, Dr. Schappy settled in the Comox Valley on Vancouver Island. This culturally vibrant community offered many opportunities to pursue her lifelong interest in art. An oil painting course provided the impetus to numerous solo shows and an ever-increasing appetite to develop an artistic language. Dr. Schappy is presently on hiatus from dentistry to devote more time to her artistic pursuits and family. She acknowledges her husband and children as sources of inspiration and support. The oil painting on the cover is a commissioned work entitled *Aitana*. ♦





last April in Nairobi, Kenya. That conference saw the adoption of the landmark *Nairobi Declaration on Oral Health*, which emphasized oral health programs in Africa and a commitment to general and oral health as basic human rights. ♦

### Can Saliva Test Predict Caries?

Researchers at the University of Southern California (USC) School of Dentistry claim to have developed a simple saliva test that can predict whether children will get caries, how many caries they will get and which teeth are most vulnerable.

The Caries Assessment and Risk Evaluation (CARE) test quantifies the genetic component of dental caries and measures the relative proportions of the oligosaccharides (sugar chains) in the saliva. The USC researchers claim the CARE test can predict a child's future caries history to plus or minus one carious lesion with greater than 98% confidence. However, they advise that the test will likely not be used to diagnose caries but rather to evaluate the susceptibility and risk of caries, to help implement preventive measures. Details on the study can be found at [www.usc.edu/uscnews/stories/11005.html](http://www.usc.edu/uscnews/stories/11005.html). ♦

### Launch of Research Evidence Registry

A new searchable online registry of synthesized research related to the effectiveness of public health and health promotion interventions was launched in March. Found at [www.health-evidence.ca](http://www.health-evidence.ca), the registry provides relevant, concise, quality-rated research evidence to help promote evidence-based public health decision making. Of particular interest, there is a section on the Web site summarizing research related to dental health.

The research team responsible for the registry is led by Dr. Maureen Dobbins at the McMaster University faculty of health sciences. One goal of the project is to provide summary

statements for each systematic review, synthesizing the research evidence along with practical implications for policy and practice in a Canadian context. ♦

### Canada Health Day 2005

On May 12, community health organizations, public health units, seniors' residences, schools, health facilities and agencies will join together to celebrate Canada Health Day.

This event recognizes new developments in the public health field. It is also a time to reflect on past public health accomplishments, to appreciate the people who deliver public health services and a time to consider future public health needs and public health system capacity. Visit the Canada Health Day Web site at [www.cpha.ca/chd](http://www.cpha.ca/chd). ♦

### Students Receive John Sherman Prize

The charitable foundation of the Alpha Omega Fraternity of Canada has awarded 8 Alpha Omega students with the John Sherman prize. This prize goes to second- and third-year dental students in Canada who best exhibit scholastic ability along with leadership in their schools and community.

This year's winners are Brian Laski, Kyle Stevens and Gina Markin (University of Toronto), Bram Salis and Andrea Heckler (McGill University), Belinda Weltman (University of Manitoba), Brad Lands (University of Montreal) and Darren Kaplan (University of Western Ontario).

The inventor of the original water cooling device for dental handpieces, Dr. John Sherman was also part of the group of dentists responsible for founding Alpha Omega in Canada. ♦

### Fluoridation Symposium in Chicago

The American Dental Association (ADA) and the Centers for Disease Control and Prevention (CDC) are hosting a National Fluoridation

Symposium at the ADA headquarters in Chicago from July 13–16. The goal of the symposium is to further recognize the impact of water fluoridation on improving oral health and overall health.

This year marks the 60th anniversary of the introduction of community water fluoridation in the United States. The CDC named community water fluoridation as one of the 10 great public health achievements of the 20th century. Details on the symposium can be found at [www.ada.org/prof/events/featured/fluoridation.asp](http://www.ada.org/prof/events/featured/fluoridation.asp).

### CAED Annual Meeting

The Canadian Academy for Esthetic Dentistry (CAED) is planning its 2005 annual meeting in Montreal from August 26–28, in conjunction with the FDI World Dental Federation, CDA and les Journées dentaires internationales du Québec meetings. CAED's mission is to work with Canadian dentists and dental team professionals for the advancement of esthetic dentistry in Canada and to develop affiliations with other dental societies and academies. The group held its inaugural annual meeting in Toronto in September 2004. More information on CAED can be found at [www.caed.ca](http://www.caed.ca). ♦




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To access further News stories and the Web sites mentioned in this section, go to April's *JCDA* bookmarks at [www.cda-adc.ca/jcda/vol-71/issue-4/index.html](http://www.cda-adc.ca/jcda/vol-71/issue-4/index.html).

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# THE DENTAL ADVISOR™

"Improved Patient Care Through Research"



*This month's feature of THE DENTAL ADVISOR is taken from the March 2004 issue, Vol. 21, No. 2.*

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## Composite Core Materials

Bonded resin composites have become the core material of choice for rebuilding broken down teeth before placing an extra-coronal restoration. Composites used as core materials bond to tooth structure and may be light-cured, dual-cured or self-cured. The short cure time allows crown preparations to begin immediately after core placement. These materials require a clean, dry field during placement. Compatibility of the adhesive and composite is essential to achieving a predictable bond to the tooth.

### Mode of Delivery

Some composite core products utilize automix cartridges with small tips for direct syringing into tooth preparations. Others can be loaded into small syringes (Centrix) for delivery after hand-mixing. They may also be supplied in tubs, compules and/or unit-dose packaging.

	Product	Company	Packaging	Automix Mixing	Viscosity
Dual-cured	ABSOLUTE DENTIN	PARKELL	Automix cartridge	Yes	Low
	BIS-CORE	BISCO	Syringes	No	High
	BUILD-IT! FR	PENTRON CLINICAL TECHNOLOGIES	Automix cartridge	Yes	Low
	COMPCORE AF DUAL-CURE	PREMIER	Automix cartridge	Yes	Low
	CORE PASTE SYRINGEABLE	DEN-MAT	Automix cartridge	Yes	Low
	ENCORE D/C	CENTRIX	Automix cartridge	Yes	Med
	FLUOROCORE	DENTSPLY/CAULK	Syringes	No	High, med
	LUXACORE AUTOMIX DUAL	ZENITH/DMG	Automix, Smartmix	Yes	Low
	PARACORE	COLTENE/WHALEDENT	Automix cartridge	Yes	Med
REBILDA DC	VOCO GMBH	Automix, QuickMix	Yes	Low	
Light-cured	BISFIL CORE	BISCO	Syringe, unit dose	na	High
	CLEARFIL PHOTO CORE	KURARAY AMERICA	Syringe	na	High
	ENCORE SUPERCURE	CENTRIX	Unit syringe	na	High
	LIGHT-CORE	BISCO	Syringe, unit dose	na	High
Self-cured	CLEARFIL CORE NEW BOND	KURARAY AMERICA	Tubs	No	Med
	CORE-FLO	BISCO	Syringes, tubs	No	Low
	CORE PASTE SYRINGEABLE	DEN-MAT	Automix cartridge	Yes	Low
	ENCORE	CENTRIX	Tubs	No	Med
	ENCORE AF	CENTRIX	Tubs	No	Med

Overall rating = 75% clinical rating + 25% property rating.

\*Costs are listed for comparison only and are not used to calculate the ratings; all costs shown in U.S. dollars.

## Viscosity

Most composite core materials have a medium or low viscosity, allowing flow into undercuts and around pins and posts. The few products that have a high viscosity can be placed with hand instruments. The light-cured core materials tend to have the highest viscosity and are more packable.

## Method of Placement

Preferences for obtaining proper form and contour of composite core materials vary among dentists. Core forms, matrix bands or hand molding are often used and may depend on the size of the build-up needed.

## Compatibility with Bonding Agents

Light-cured composite core materials generally bond best to tooth structure with light-cured bonding agents. Dual- or self-cured composite core materials require dual- or self-cured bonding agents. For best results, use the bonding agent that is recommended by the manufacturer. Many composite core materials available today have the option of being light- or self-cured. If placement in a non-vital root canal is necessary, the self-curing mode is preferable to ensure adequate curing.

## Color

Core materials are available in a blue, gold or gray color, opaque white or an esthetic dentin color. The contrasting color is an advantage in the posterior and subgingival areas. The tooth-colored shades are ideal for use in the anterior when placing translucent all-ceramic restorations.

## Fluoride Release

The amount of fluoride released from composite cores adequately sealed by a crown is very small and of questionable value.

## Retention

Retention for a future crown should not depend on the bond of the core to tooth structure, but rather on the taper of the preparation. Posts or pins should be considered when little or no structural or mechanical retention is present or when little coronal portion is remaining. Margins should always end on tooth structure, preferably with a ferrule of tooth structure at least 1.5 mm in height. ■

**Editors' Note:** Most self-etching bonding systems (6<sup>th</sup>- and 7<sup>th</sup>-generations) are not recommended for use with core materials.

### THE DENTAL ADVISOR Recommends:

#### Dual-cured

*ParaCore (96%), LuxaCore Automix Dual (95%), BUILD-IT! FR (94%), Rebilda DC (94%), CompCore AF Dual-Cure (91%), Core Paste Syringeable (90%), Fluorocore*

#### Light-cured

*Clearfil Photo Core (94%), ENCORE SuperCure (93%)*

#### Self-cured

*Core Paste Syringeable (91%), ENCORE (91%)*

Bonding Agent	Shades	Contains Fluoride	Light Curing Time	Flexural Strength	Flexural Modulus	Compressive Strength	Cost/ml	Property Rating	Clinical Rating	Overall Rating
Not Included	3	No	40 sec	Med	Med	High	\$1.80 c	89%	na	na
Not Included	2	No	20 sec	Med-High	High	High	\$8.15 s	94%	na	na
Not Included	4	Yes	40 sec	Med-High	Med	High	\$4.28 c	92%	95%	94%
Included	2	Yes	40 sec	Med	Med	Med-High	\$7.48 c	87%	92%	91%
BondLink	2	Yes	40 sec	Low-Med	Med	Med	\$5.31 c	80%	93%	90%
Not Included	2	Yes	20 sec	Med	Low-Med	Med-High	\$3.60 c	83%	na	na
Included	2	Yes	40 sec	High	Med	High	\$16.41 s	na	98%	na
Not Included	3	Yes	20 sec	Med	Med	Med-High	\$10.52 c	87%	97%	95%
Included	2	Yes	40 sec	High	Med	High	\$9.73 c	94%	96%	96%
Included	3	Yes	20 sec	Med-High	Low-Med	High	\$4.56 c	89%	96%	94%
Not Included	1	No	40 sec	Med-High	High	High	\$8.88 s	94%	na	na
Not Included	1	No	20 sec	High	High	High	\$11.93 s	100%	92%	94%
Not Included	2	No	40 sec	Med	Med-High	Med-High	\$17.17 u	90%	94%	93%
Not Included	1	No	20 sec	Med	Med-High	High	\$10.70 s	92%	na	na
Not Included	1	No	na	Med	Med-High	High	\$5.03 t	92%	na	na
Not Included	2	No	na	Med	Med	Med-High	\$6.51 s	87%	87%	87%
BondLink	2	Yes	na	Low-Med	Med-High	Med	\$5.13 c	83%	93%	91%
Not Included	2	Yes	na	Low-Med	Med-High	Med	\$5.65 t	83%	94%	91%
Not Included	1	Yes	na	Med	Med	Med-High	\$5.70 t	87%	na	na

u = unit dose, c = cartridge, s = syringe, t = tub, na = not available

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# (Mis)Interpretations of Leukoplakia

• Ajit Auluck, BDS •  
• Keerthilatha M. Pai, MDS •

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Leukoplakia is a common lesion observed in clinical practice and the term is familiar to most clinicians. Upon reviewing the literature, one comes across a number of different definitions and classifications of leukoplakia. This term is used indiscriminately in textbooks and journal articles to describe white keratotic lesions. The misuse of the term leukoplakia can lead to misinterpretations of patient records and create confusion among dentists. The purpose of reporting on this ambiguity is to make academicians and clinicians aware of the widespread misuse of this term in the literature and to develop clarity for future scientific communications.

In 1978, a World Health Organization (WHO) group defined leukoplakia as “a white patch or plaque that cannot be characterized, clinically or pathologically, as any other disease.”<sup>1</sup> The accompanying text emphasized that the term leukoplakia should carry no histologic connotation and should only be used in a descriptive clinical sense.

This definition is vague. If a patient has a white patch or plaque in the mouth, it is clearly abnormal. Any abnormality will have some clinical or pathologic basis. Yet the WHO definition states that leukoplakia is a patch having no clinical or pathologic basis. This raises the question, “What is this white patch?”

Another popular definition of leukoplakia states that “leukoplakia is a whitish patch or plaque that cannot be characterized, clinically or pathologically, as any other disease and it is not associated with any physical or clinical causative agent except the use of tobacco.”<sup>2</sup> This definition reserves the term leukoplakia for white lesions associated with tobacco consumption only. The authors suggest that the terms idiopathic leukoplakia and tobacco-associated leukoplakia be used.<sup>2</sup> However, this terminology is not routinely employed as there is no rationale for distinguishing tobacco-associated leukoplakias from non-tobacco-associated or idiopathic leukoplakias.<sup>3</sup>

In 1996, a new definition of leukoplakia was proposed which stated that “oral leukoplakia is a predominantly white lesion of the oral mucosa that cannot be characterized

as any other definable lesion; some oral leukoplakias will transform into cancer.”<sup>4</sup> In the accompanying guidelines for use of the term leukoplakia, it was suggested that when there is a white lesion for which a local cause can be identified, the lesion should be classified according to the established cause and not included among leukoplakias. The guidelines further state that when a white patch is associated with a disease or pathology, it should not be designated as leukoplakia but should be termed as a leukoplakic-like lesion associated with the known cause.

Although the 1996 definition is most widely accepted,<sup>4</sup> different definitions continue to appear in textbooks and journals. This misuse of the term leukoplakia creates confusion among readers.

For example, it has been suggested that “mechanical trauma of a chronic and mild nature produces whitish leukoplakial patches.”<sup>5</sup> Leukoplakia has also been described as a protective reaction against a chronic irritant (e.g., occlusal trauma, sharp edges of prostheses or teeth) that produces a dense layer of keratin, which insulates the deeper epithelial components from the deleterious effects of the irritant.<sup>6</sup> Such statements are confusing, as this patch has a known clinical cause and should be termed frictional keratosis, not leukoplakia.

Terminology such as sanguinaria-induced leukoplakia and Viadent-induced leukoplakia is also frequently encountered in textbooks.<sup>7</sup> Sanguinaria is a benzophenanthridine alkaloid derived from bloodroot plant (*Sanguinaria canadensis*) and has been used in oral rinses and toothpaste products since 1982.<sup>7</sup> Routine use of sanguinaria-based products causes leukoplakia in the maxillary vestibule.<sup>7,8</sup> When the cause of the oral lesion is known (in this example, a chemical constituent of some dentifrices), how can the term leukoplakia be used to describe it? Terminology like sanguinaria-induced lichenoid reaction or sanguinaria-induced keratosis is more appropriate to describe such lesions. Use of terms like oral hairy leukoplakia, candidal leukoplakia and syphilitic leukoplakia also appear as

misnomers for etiological cause, as each of these conditions is well-known and established.

White patch associated with dyskeratosis congenita, or Cole-Engman syndrome, is another example of the erroneous use of the term leukoplakia. This condition is rare but when reported in the literature, it is referred to as Zinsser-Cole-Engman syndrome associated with leukoplakia of the tongue.<sup>9</sup> Dyskeratosis congenita is characterized by the triad of oral leukoplakia, nail dystrophy and skin pigmentation.<sup>10</sup> White patch associated with dyskeratosis congenita is an X-linked disorder and part of a syndrome that therefore has a known cause. To define it as leukoplakia is inappropriate. It is better to describe these white patches as leukoplakia-like lesions associated with dyskeratosis congenita.

Terminology used to describe a lesion provides information as to its biological behaviour and prognosis. Leukoplakia is a premalignant lesion in which the chances of malignancies occurring are greater than normal tissues. The majority of lesions like oral hairy leukoplakia, candidal leukoplakia or frictional keratosis are benign. It is therefore inappropriate to use the term leukoplakia to describe these lesions. This term can make patients fearful of cancer and create unnecessary panic. It is impossible to correct the entire existing literature but clinicians, students and teachers should be made aware of the misuse of this term. In future publications, as well as in clinical practice, we should use the appropriate term to avoid misinterpretation and confusion. The current ambiguity emphasizes the need for an international collaboration to reach a consensus on the use of the term leukoplakia. ♦



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*The views expressed are those of the author and do not necessarily reflect the opinions or official policies of the Canadian Dental Association.*

## References

1. Kramer IR, Lucas RB, Pindborg JJ, Sobin LH. Definition of leukoplakia and related lesions: an aid to studies on oral precancer. *Oral Surg Oral Med Oral Pathol* 1978; 46(4):518–39.
2. Axell T, Holmstrup P, Kramer IRH, Pindborg JJ, Shear M. International seminar on oral leukoplakia and associated lesions related to tobacco habits. *Community Dent Oral Epidemiol* 1984; 12(3):145–54.
3. Van der Waal I, Axell T. Oral leukoplakia: a proposal for uniform reporting. *Oral Oncol* 2002; 38(6):521–6.
4. Axell T, Pindborg JJ, Smith CJ, van der Waal I. Oral white lesions with special reference to precancerous and tobacco-related lesions: conclusions of an international symposium held in Uppasala, Sweden, May 18-21, 1994. International collaborative group on oral white lesions. *J Oral Pathol Med* 1996; 25(2):49–54.
5. Wood NK, Dick HM. Red and white lesions. In: Wood NK, Goaz PW, editors. *Differential diagnosis of oral and maxillofacial lesions*. India: Mosby Year Book Inc; 1998. p. 128.
6. Wood NK, Goaz PW. White lesions of the oral mucosa. In: Wood NK, Goaz PW, editors. *Differential diagnosis of oral and maxillofacial lesions*. India: Mosby Year Book Inc; 1998. p. 99.
7. Bhattacharya I, Cohen DM, Silverman S Jr. Red and white lesions of the oral mucosa. In: Greenberg MS, Glick M. *Burkett's oral medicine diagnosis and treatment*. Elsevier India BC Decker Inc; 2003. p. 92–3.
8. Damm DD, Curran A, White DK, Drummond JF. Leukoplakia of the maxillary vestibule — an association with Viadent? *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1999; 87(1):61–6.
9. Tanaka A, Kumagai S, Nakagawa K, Yamamoto E. Cole-Engman syndrome associated with leukoplakia of the tongue: a case report. *J Oral Maxillofac Surg* 1999; 57(9):1138–41.
10. Ogden GR, Connor E, Chisholm DM. Dyskeratosis congenita: report of a case and review of the literature. *Oral Surg Oral Med Oral Pathol* 1988; 65(5):586–91.

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# Development and Testing of an Audio-visual Aid for Improving Infant Oral Health through Primary Caregiver Education

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## A b r i d g e d V e r s i o n

The complete article can be viewed on the eJCDA Web site at: <http://www.cda-adc.ca/jcda/vol-71/issue-4/241.html>

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**A**nticipatory guidance is defined as practical, developmentally appropriate oral health information in anticipation of physical, emotional and psychological milestones. Anticipatory guidance for infant oral health (IOH) should include early education and counselling for the parents and caregivers, ideally during the prenatal period to help them adopt good oral habits as the primary dentition starts developing early in pregnancy. Introducing dental health messages as part of “well-baby care” and counselling throughout infancy and toddler stages ensures a reasonable chance of success in helping parents adopt healthy habits before negative ones develop. Audio-visual (AV) media, such as television, are currently the primary mode of obtaining information for a majority of the population. Providing evidence-based anticipatory guidance for IOH through this well-accepted medium has additional advantages. It provides a standardized level of teaching and information delivery through practical messages in an entertaining medium; active participation by the audience (which is a significant deterrent for many) is not needed; it presents role models by providing visible behaviours and examples that can be emulated by the audience regardless of their literacy or skill levels; it is suitable for individual or group education; and it can be used for IOH promotion by health professionals or educators with no dental education background.

The purpose of this project was to create and test an AV aid for providing comprehensive anticipatory guidance in IOH to caregivers. The ultimate aim in using the AV aid is

to prevent common dental diseases and increase public awareness of the importance of early dental preventive intervention.

**Methods:** A DVD-video containing evidence-based information about IOH care and prevention has been developed ([www.utoronto.ca/dentistry/newsresources/kids/](http://www.utoronto.ca/dentistry/newsresources/kids/)). Comprehensive anticipatory guidance in the areas of pregnancy, oral development, teething, diet and nutrition, oral hygiene, fluoride use, acquisition of oral bacteria, feeding and oral habits, causes and sequelae of early childhood caries, trauma prevention, early dental visits and regular dental visits is presented in the AV aid. A questionnaire was developed to test the audience’s knowledge before and after viewing the AV aid; it was administered to groups of expectant and young mothers ( $n = 11$ ) and early childhood educators ( $n = 16$ ).

**Results:** Significant lack of knowledge about IOH was indicated by the proportion of “I don’t know” (22%) and incorrect (19%) responses to the questionnaire before the viewing. The proportion of correct responses (91%) following a single viewing of the AV aid indicated significant improvement in knowledge.

**Conclusions:** The AV aid promises to be an effective tool in providing anticipatory guidance regarding IOH in high-risk populations. Widespread application of this prevention protocol is expected to result in greater awareness, increased use of dental services and reduced incidence of preventable oral disease in the target populations. ♦

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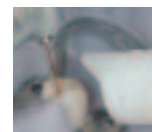
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# Financing and Delivering Oral Health Care: What Can We Learn from Other Countries?

• Stephen Birch, DPhil •  
• Rob Anderson, PhD

## A b r i d g e d V e r s i o n

The complete article can be viewed on the eJCDA Web site at <http://www.cda-adc.ca/jcda/vol-71/issue-4/243.html>

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Oral health care has low priority in public policy in Canada. Provinces determine the level and form of public funding for dental care and the criteria for patients who qualify for public funding. Publicly funded programs are generally restricted to specific groups, and the majority of the population is left to meet dental care costs out of pocket or through private insurance. Accordingly, use of services increases with income rather than need for care. Moreover, fee-for-service payments reward providers for delivering services to clients as opposed to meeting needs of populations. With no consideration of dental care in recent health care reports to Parliament, dental care is unlikely to be a priority in future health care reform.

We focus attention on dental care in 4 English-speaking countries: Australia, New Zealand, the United Kingdom and the United States, to see what messages can be applied to oral health policy in Canada. This international perspective on the funding and delivery of dental care generates several points. First, per capita dental care expenditures in Canada are high by international standards. Any perceived problems with the provision of dental care are not the result of low expenditures. However public funding per capita is low by international standards and, in contrast to other countries, represents a diminishing proportion of total expenditures over time. The impact of this trend is concentrated heavily on less prosperous groups. Without population-based data on outcomes, it is difficult to determine the full consequences of this trend.

Second, the absence of universal, publicly funded programs for children's dental care appears to be restricted to North America. Methods of providing children's

programs range from school-based dental therapists to public funding of office-based private dentists; however, the latter approach is associated with lower uptake and poorer outcomes.

Third, there is increasing aversion among private providers to taking on publicly funded patients. This may be a result of increasing opportunity costs to dentists of participating in publicly funded dental care, as government-regulated remuneration rates fail to keep up with either the real cost of providing quality care or the levels of private fees. Hence, improving accessibility, in particular among poorer groups, may require publicly *provided* services. Public funding does not guarantee access to services, particularly where providers choose practice locations and provide mixed public-private care. Public subsidization of private insurance is unlikely to be an efficient approach to improving access in the population and publicly funded fee-for-service systems must be commercially viable to maintain coverage.

Finally, remuneration based predominantly on fee-for-service may be incompatible with social goals. Such approaches fail to respond to changes in the type and distribution of oral health needs in a population and hinder more efficient and team-based care provision. This is not about controlling dentists' incomes, but about choosing from alternative payment mechanisms the approach that best supports social goals while meeting dentists' expectations for incomes and sustainable models of practice organization. The findings provide a first step in informing policy-makers concerned with making the best use of dental care resources. ♦



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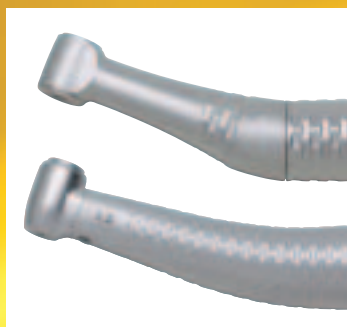
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# Medicolegal Aspects of Replanting Permanent Teeth

• David J. Kenny, BSc, DDS, PhD, FRCD(C) •  
 • Michael J. Casas, DDS, MSc, FRCD(C) •

## A b s t r a c t

*Replantation of a permanent tooth is an intervention that carries the same responsibilities in terms of informed consent as a surgical procedure. Unlike many procedures that can be planned in advance, an avulsion requires decision-making shortly after the injury, often by a distraught patient or parent. Under these circumstances, patients or parents prefer, or may even pressure, clinicians to make the replantation decision for them. Later, the parents may seek advice of other professionals or be confronted by lay opinions or Internet information that may lead them to doubt the decision or even feel betrayed by the dentist who provided the acute care. This article uses an actual parent complaint to illustrate the medicolegal aspects of the replantation decision and describe measures to be taken by the clinician faced with this situation.*

**MeSH Key Words:** dentist-patient relations; informed consent; risk management; tooth replantation

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Replantation of an avulsed tooth is an invasive procedure that requires informed consent of the patient or parent and the cooperation of the patient. Informed consent requires the dentist to know and explain the range of outcomes that include survival prospects, possible effects of replantation on future interventions and costs associated with the decision to replant a tooth. Because replantation is such a rare occurrence, dentists often consult published guidelines or information posted on dental association Web sites. Unfortunately, even recent guidelines do not address the question of whether it is in the patient's best interests to replant a tooth.<sup>1</sup> Other guidelines do not include information from recent basic science, clinical and socioeconomic investigations or they include untested "treatments."<sup>1-3</sup> As a consequence, dentists make recommendations and provide treatment for this rare injury based on information that is neither current nor comprehensive. Injuries such as avulsions often lead to insurance and legal claims and dentists who treat such injuries are routinely required to submit their clinical records. Lawyers and regulatory bodies regularly recruit dental specialists to submit letters of expertise about injury cases based on the dentists' treatment records and consultants' subsequent clinical examinations.

### Outcomes of Replantation

The injured, upset patients who present to dentists'

offices expect them to replant teeth successfully because other dentists and magazine articles have implied that replantation is the treatment of choice. Dentists have been successful in informing the public that, if an avulsed tooth is placed in milk and it and the child are brought to a dentist quickly, then positive outcomes can be expected. However, evidence shows that the most important determinant of survival is immediate replantation at the accident site.<sup>4-6</sup> Delayed replantation (longer than 5 minutes) will invariably lead to root resorption and eventual loss of the tooth regardless of the storage medium.<sup>4</sup> Likewise, if the pulp is not removed and endodontic treatment completed, survival will be compromised by the likelihood of inflammatory resorption with rapid tooth loss.<sup>7,8</sup> Because immature incisors have less root mass, root resorption is more significant and immature apices complicate conventional root canal treatment.<sup>9</sup> Finally, if replantation is undertaken in a pre-adolescent or youth who has not completed growth, replacement resorption and ankylosis will lead to apparent submergence and distortion of the gingival architecture during vertical jaw growth.<sup>10,11</sup> The outcome is frequently determined even before the patient presents to a dentist. The evidence is clear that delayed replantation of teeth with incomplete root development in growing jaws produces predictably poor outcomes.<sup>9,12</sup> Young adults whose skeletal growth is complete have longer

post-replantation survival rates, but the long-term outcome is the same: eventual tooth loss as a direct result of the avulsion.<sup>4,7,9</sup>

### Clinician-based Factors in Decision-making

Despite evidence that delayed replantation leads to tooth loss and sequelae that may compromise future restorative care, dentists are still likely to replant avulsed incisors. Factors that promote this practice include delays in translation of research information into clinical practice and the immediate appreciation that the patient or parent offers the dentist. This is one of the few heroic moments in dental practice and once clinicians experience this appreciation, subsequent clinical choices are apt to be influenced by favourable memories.

Additional factors may play a role in a dentist's decision to recommend delayed replantation of an avulsed incisor. The clinician who replants the tooth is often not the person who has to deal with late-presenting complications, such as surgical extraction of the ankylosed incisor, bone grafting before prosthetic restoration and implant failure. Many dentists continue to practise the techniques they learned as undergraduates despite changes in the evidence base. The time lag between publication of new evidence and acceptance of that evidence into clinical practice coupled with the human tendency to resist change mean that dentists will likely continue to recommend delayed replantation for some time, even for pre-adolescents. Finally, clinicians and patients or parents are often willing to take a chance.

### Risks Associated with the Decision Not to Replant

Although outcomes are predictably poor in cases of delayed replantation, dentists may be at greater risk of complaint or legal challenge for *not* replanting a tooth, regardless of a dismal extra-alveolar history. That is because failure of a replanted incisor may not occur for a number of months or years after replantation, but conflicting opinions can come rapidly. In fact, replanted teeth may last many years in patients who have mature roots and have achieved their full jaw growth.<sup>13</sup> This is the area where anecdotal information, probability and clinical experience lead to conflicting advice to parents resulting in loss of confidence in a clinician who recommends *against* replantation. Another dentist may correctly tell the patient or parent that he or she replanted a tooth that lasted many years concluding that, if the patient had come to him or her, the tooth could have been "saved."<sup>7,13</sup> Parents who search the Internet for information find avulsion guidelines that explain *how* to replant a tooth, but lack information about *whether* to replant. Obviously, this can lead to loss of confidence in the decision not to replant, even feelings of betrayal by a dentist who did not replant a tooth, and this may, in turn, generate a complaint. The quotation below is from a parental

complaint for which one of the authors was asked to provide an expert opinion almost 10 years ago. It illustrates a number of points that affect every clinician.

In order to assist the Complaints Committee with its deliberations, we would appreciate your providing us with a letter of expertise concerning the subject of the avulsion of a maxillary permanent central incisor in a seven year old.

If a seven year old child presents at the dental office with an avulsed (but whole) permanent central incisor which has been wrapped in a cloth soaked with milk and which was avulsed approximately one and one half hours previously, what acute care treatment would be recommended under the circumstances.

In this situation, the supporting alveolar bone (tooth socket) is more or less intact, although there may be some soft tissue lacerations present. As the tooth was retrieved from the school playing field, there may be a small amount of dirt adhering to it.

In this case, the treating dentist recommended against replantation. The parents concurred, then were disturbed to hear contrary advice from others they consulted in the weeks following the avulsion and ultimately lost confidence in the process that led them to choose not to have the tooth replanted.

Specific risk factors for this 7-year-old child included:

- The extra-alveolar duration was longer than 5 minutes (delayed replantation); therefore, periodontal ligament regeneration could not occur and eventual tooth loss would be inevitable.<sup>4-9</sup>
- The central incisor root apex was immature, so pulpectomy and apexification with calcium hydroxide would be required.<sup>2</sup> Recently, mineral trioxide aggregate (MTA) has been used to seal the immature apex.<sup>14</sup> Root immaturity (short thin roots, wide apices) poses a greater risk for survival than the inability to complete root canal treatment.<sup>7,9</sup>
- If root canal obturation was not possible, incisor survival would be further compromised.<sup>9</sup>
- The small amount of dirt is not a known risk and could have been removed before replantation.
- This pre-adolescent would have an ankylosed incisor that would appear to submerge as his maxilla grows downward and forward. This would not be apparent until his adolescent growth spurt 5 or more years following his injury and replantation.<sup>10,11</sup>
- Replantation would involve multiple appointments, multiple radiographs, endodontic treatment and restoration of the access cavity. Estimated first-year chair time would be over 7 hours including the emergency replantation and splinting appointment.<sup>15</sup>

- The effects of delayed replantation on subsequent single-tooth implant sites are still not fully understood, but sites for implant placement are likely compromised after replantation due to ankylosis and replacement resorption of the replanted tooth.<sup>16</sup>

The outcomes in this case were based solely on time out of the mouth, i.e., pulp necrosis, periodontal ligament necrosis, root resorption with ankylosis and eventual loss of the tooth. The storage medium is irrelevant in this case. If the necrotic pulp were managed by pulpectomy, then completion of obturation and incomplete root formation would be further complicating factors due to the child's age. Replantation would require root canal treatment, splinting, follow-up and associated radiographs, reassessment and endodontic visits. First-year costs would approximate \$1,500.<sup>15</sup> The incisor could be submerged up to 3–5 mm if it survived until adolescent growth was completed.<sup>9,10</sup>

### Parental or Patient Desires and Informed Consent

If parents understand the consequences and elect for replantation and the child allows the procedure, the tooth can be replanted. The following technique predictably produces ankylosis, but reduces the probability of inflammatory root resorption that leads to loss of the tooth in the short term.<sup>17</sup> The necrotic periodontal ligament is removed by prophylaxis with flour of pumice and water, the root canal treatment is completed with gutta-percha and sealer, the immature apex is sealed with a retrograde apical filling of intermediate restorative material (IRM) before replantation and the replanted tooth is splinted for 2 months to facilitate ankylosis.

If the parent and patient are content, they will not complain regardless of the pathological outcome. The dentist should explain outcomes and costs based on the extraoral history and risk factors (Box 1). The parent must then make the decision without coercion from the dentist. Parents of children with cancer or epilepsy make life-changing decisions for their children when the consequences are more serious than those of replantation. Dentists should provide the prognosis and have the parent or patient choose treatment based on the evidence described. Dentists must guard against their inherent optimism about treatment outcomes, coercion by parents to make the decision for them and the influence of initial praise received for replanting a tooth. The parent or patient will decide based on their risk comfort level, and the dentist's records will describe the informed consent process to protect against future changes of mind, failure to comply with follow-up instructions or early negative outcomes. If the informed parent opts for replantation, then the dentist should apply his or her best technical expertise according to the best available evidence.

### Box 1 To replant or not: extraoral history and risk factors

- If the tooth was out of the mouth less than 5 minutes, replant and follow guidelines for management.
- If the tooth was out of the mouth and into cold milk or other physiological medium within 5 minutes and available for replantation within 30 minutes, replant and follow guidelines for management.
- If the tooth was out of the mouth more than 5 minutes and not stored in physiological media, there is only one outcome: root resorption and eventual tooth loss.
- If the patient has completed adolescent growth, the tooth may last longer than if he or she were pre-adolescent as root resorption slows with age.
- If the patient is a pre-adolescent, the tooth will become infraoccluded as he or she grows and the amount of infraocclusion will increase with adolescent growth.
- If the root of the avulsed tooth is not completely formed, the prognosis for survival following replantation is hopeless.
- If the root of the avulsed tooth is completely formed, pulp necrosis is the expected outcome.
- If the root is incompletely formed and replantation is rapid, vitality may be maintained but is not predictable.
- Approximately half of the incisors replanted in pre-adolescents are lost within 4–5 years.
- There is insufficient evidence to understand the late effects of replantation and root resorption on single-tooth osseointegrated implants that replace replanted teeth.
- First-year costs involve approximately 5–7 hours treatment time, \$1,500, 4–6 visits and 7 radiographs.

Parents and children faced with the situation of delayed replantation must be given accurate and up-to-date information on the likely outcomes of injury management. Then, without coercion or clinician bias, they must be left to make a decision based on the evidence and their child's specific risk factors. This means that dentists must remain critical and active consumers of the dental literature, and patients or parents may elect more often to have avulsed teeth left out of the mouth when faced with the costs and prognosis of replantation now that the reliability of single-tooth implants has been demonstrated. ♦



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*The authors have no declared financial interests.*

## References

1. Flores MT, Andreasen JO, Bakland LK, Feiglin B, Gutmann JL, Oikarinen K, and others. Guidelines for the evaluation and management of traumatic dental injuries. *Dent Traumatol* 2001; 17(5):193-8.
2. Treatment of the avulsed permanent tooth: recommended guidelines of the American Association of Endodontists. *Dent Clin North Am* 1995; 39(1):221-5.
3. Treatment of avulsed permanent teeth in children. London: Royal College of Surgeons of England; 1997.
4. Andreasen JO, Borum MK, Jacobsen HL, Andreasen FM. Replantation of 400 avulsed permanent incisors. 4. Factors related to periodontal ligament healing. *Endod Dent Traumatol* 1995; 11(2):76-89.
5. Lekic P, Kenny D, Moe HK, Barrett E, McCulloch CA. Relationship of clonogenic capacity to plating efficiency and vital dye staining of human periodontal ligament cells: implications for tooth replantation. *J Periodontal Res* 1996; 31(4):294-300.
6. Lekic PC, Kenny DJ, Barrett EJ. The influence of storage conditions on the clonogenic capacity of periodontal ligament cells: implications for tooth replantation. *Int Endod J* 1998; 31(2):137-40.
7. Andersson L, Bodin I, Sorensen S. Progression of root resorption following replantation of human teeth after extended extraoral storage. *Endod Dent Traumatol* 1989; 5(1):38-47.
8. Kinirons MJ, Boyd DH, Gregg TA. Inflammatory and replacement resorption in replanted permanent incisor teeth: a study of the characteristics of 84 teeth. *Endod Dent Traumatol* 1999; 15(6):269-72.
9. Barrett EJ, Kenny DJ. Survival of avulsed permanent maxillary incisors in children following delayed replantation. *Endod Dent Traumatol* 1997; 13(6):269-75.
10. Malmgren B, Malmgren O. Rate of infraposition of replanted ankylosed incisors related to age and growth in children and adolescents. *Dent Traumatol* 2002; 18(1):28-36.
11. Ebeleseder KA, Friehs S, Ruda C, Pertl C, Glockner K, Hulla H. A study of replanted permanent teeth in different age groups. *Endod Dent Traumatol* 1998; 14(6):274-8.
12. Donaldson M, Kinirons MJ. Factors affecting the time of onset of resorption in avulsed and replanted incisor teeth in children. *Dent Traumatol* 2001; 17(5):205-9.
13. Martins WD, Westphalen VP, Westphalen FH. Tooth replantation after traumatic avulsion: a 27-year follow-up. *Dent Traumatol* 2004; 20(2):101-5.
14. Giuliani V, Baccetti T, Pace R, Pagavino G. The use of MTA in teeth with necrotic pulps and open apices. *Dent Traumatol* 2002; 18(4):217-21.
15. Nguyen PM, Kenny DJ, Barrett EJ. Socio-economic burden of permanent incisor replantation on children and parents. *Dent Traumatol* 2004; 20(3):123-33.
16. Andersson L, Emami-Kristiansen Z, Hogstrom J. Single-tooth implant treatment in the anterior region of the maxilla for treatment of tooth loss after trauma: a retrospective clinical and interview study. *Dent Traumatol* 2003; 19(3):126-31.
17. Andreasen JO. The effect of pulp extirpation or root canal treatment on periodontal healing after replantation of permanent incisors in monkeys. *J Endod* 1981; 7(6):245-52.

A patient information sheet on knocked-out permanent teeth is available on the eJCDA Web site at <http://www.cda-adc.ca/jcda/vol-71/issue-4/245.html>.

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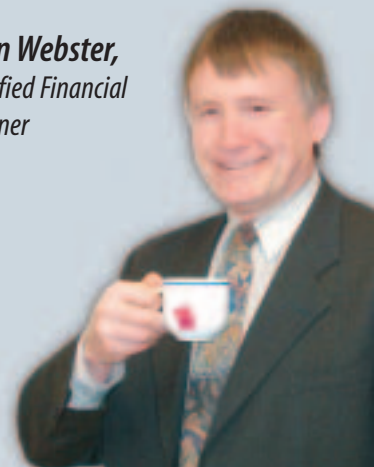
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# Adenomatoid Odontogenic Tumour: Review and Case Report

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## A b s t r a c t

*Adenomatoid odontogenic tumour is a benign (hamartomatous), noninvasive lesion with slow but progressive growth. The 3 variants — follicular, extrafollicular and peripheral — present with identical histological findings. This report describes a patient with a large adenomatoid odontogenic tumour in the mandible, with the involved mandibular canine being pushed to the contralateral side. The paper also provides a refresher for general dental practitioners about various diagnostic aspects of this tumour and highlights the controversies regarding its origin and management in light of recent findings.*

**MeSH Key Words:** case report; mandibular neoplasms/pathology; odontogenic tumors/pathology

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Adenomatoid odontogenic tumour was first described by Dreibradt, in 1907, as a pseudo-adenameloblastoma.<sup>1</sup> In 1948 Stafne<sup>2</sup> considered it a distinct entity, but it was classified by others as a variant of ameloblastoma. As a result, the lesion is known by many names, including adenoameloblastoma, adenoameloblastic odontoma, epithelial tumour associated with developmental cysts, ameloblastic adenomatoid tumour and adenomatoid or pseudoadenomatous ameloblastoma.<sup>2–4</sup> Philipsen and Birn<sup>4</sup> proposed the name adenomatoid odontogenic tumour in 1969 and suggested that it not be regarded as a variant of ameloblastoma because of its different behaviour. This term was adopted by the World Health Organization (WHO) classification<sup>5</sup> in 1971.

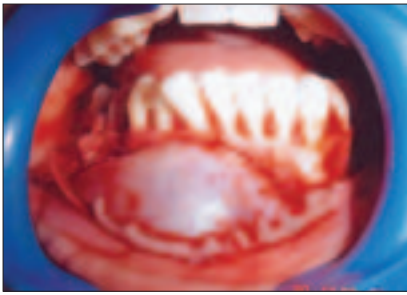
There are 3 variants of adenomatoid odontogenic tumour,<sup>6–8</sup> the follicular type (accounting for 73% of cases), which has a central lesion associated with an embedded tooth; the extrafollicular type (24% of case), which has a central lesion and no connection with the tooth; and the peripheral variety (3% of cases). Both types of central intraosseous tumours produce a corticate radiolucency, sometimes with radiopaque specks. The follicular type is usually initially diagnosed as a dentigerous or follicular cyst. The extrafollicular type usually presents as a unilocular, well-defined radiolucency found between, above

or superimposed on the roots of erupted teeth and often resembling a residual, radicular, globulomaxillary or lateral periodontal cyst. The peripheral type usually presents as a gingival swelling, located palatally or lingually relative to the involved tooth. In two-thirds of cases of the types with a central lesion the radiolucency shows discrete foci and a flocculent pattern of scattered radiopacities. If the tumour has minimum quantities of calcified deposits, intraoral periapical radiography is superior to panoramic radiography in detecting the characteristic radiopacities (although these are not pathognomic).<sup>9</sup>

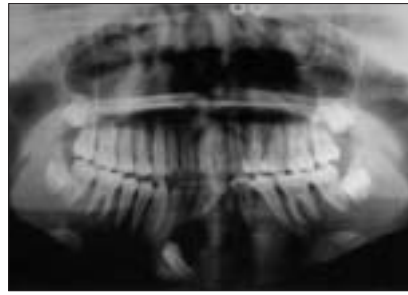
This report describes an unusually large follicular adenomatoid odontogenic tumour in the mandible, illustrates the clinical, microscopic and biological features of the tumour and emphasizes the importance of the relation between the dental follicle and the tumour tissue. The article provides a refresher for general dental practitioners about diagnostic aspects of this tumour and discusses current controversies in pathogenesis and management.

### Case Report

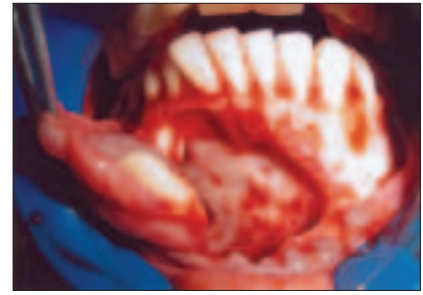
A 17-year-old girl presented to the department of dental surgery, All India Institute of Medical Sciences, with swelling and discharge of pus in the lower right canine region. Intraoral examination showed that the labial



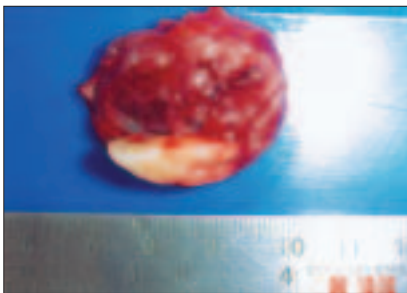
**Figure 1:** Intraoral photograph shows a swelling and obliteration of the buccal vestibule.



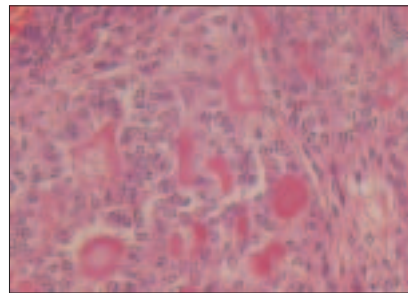
**Figure 2:** Panoramic radiograph reveals a transigrated canine of the right side and the retained deciduous canine.



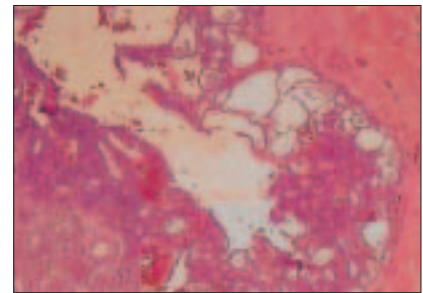
**Figure 3:** Intraoral photograph shows the canine that was extracted and the enucleated lesion.



**Figure 4:** The tooth and the cyst lining after enucleation of the cyst.



**Figure 5:** Histopathological slide shows features typical of adenomatoid odontogenic tumour, including sheets of polygonal cells throughout the fibrous connective tissue stroma.



**Figure 6:** Histopathological slide shows the ductal lumina were surrounded by columnar epithelial cells and filled in some areas with eosinophilic material.

vestibule was obliterated by expansion of the buccal cortical plate from the lower right canine to the left first premolar region (Fig. 1). The mandibular incisors were displaced labially; the right mandibular deciduous canine was retained but the permanent canine was missing.

A panoramic radiograph revealed a large, well-circumscribed radiolucency extending throughout the anterior mandible from the right canine to the left first premolar region (Fig. 2). The lesion produced an expansion of tissue and extended into the alveolar processes, disrupting the usual orientation of the anterior teeth. The right mandibular canine, which was present within the lesion, had been displaced considerably toward the contralateral side.

On the basis of the clinical and radiographic findings, the differential diagnosis was adenomatoid odontogenic tumour, ameloblastic fibrous odontoma, calcifying odontogenic cyst, calcifying epithelial odontogenic tumour and infected dentigerous cyst.

The patient underwent surgery with local anesthesia. A mucoperiosteal flap from the right to the left premolar region was reflected to expose the labial aspect of the tumour. The labial cortex was very thin and had several areas of complete resorption. The tumour was enucleated along with the impacted lower permanent canine (Figs. 3 and 4). The areas between the roots of the involved teeth were curetted well. The cavity was packed with Gelfoam

(Pharmacia & Upjohn Co, Kalamazoo, Mich.) and the flap was sutured in place. Healing was uneventful, and there was no evidence of recurrence 1 year after the surgery.

Histopathological examination revealed sheets of polygonal cells throughout the fibrous connective tissue stroma (Fig. 5). The ductal lumina were surrounded by columnar epithelial cells and filled in some areas with eosinophilic material (Fig. 6). In other places amorphous calcified material was present. The histopathological report confirmed the diagnosis of adenomatoid odontogenic tumour.

## Discussion

Adenomatoid odontogenic tumour is a slowly growing lesion, with a predilection for the anterior maxilla (ratio of cases 2:1 relative to mandible) of young females. Sixty-nine percent of adenomatoid odontogenic tumours are diagnosed in the second decade of life, and more than half occur during the teenage years. The female to male ratio for all age groups and all variants is close to 2:1.<sup>10</sup> Generally the tumours do not exceed 1–3 cm in greatest diameter, but they can be larger, as in the case reported here.<sup>6</sup> The lesions are typically asymptomatic, but growth of the types with central lesion results in cortical expansion, as in the case reported here. The involved teeth are commonly impacted, and adjacent teeth may be slightly displaced.<sup>11</sup> The distribution of unerupted teeth associated with the follicular type has a typical pattern. The 4 canines combined account for

59% of cases and the maxillary canines alone for 40%.<sup>12</sup> Unerupted first and second molars are rarely involved, nor are deciduous teeth. Root resorption is a less common finding. If the lesion is large, it can cause a painless hard swelling, as in the case reported here.

Adenomatoid odontogenic tumours, accounting for approximately 3% of all odontogenic tumours, are less frequent than odontoma, cementoma, myxoma and ameloblastoma. It has been suggested that this tumour may be a hamartoma rather than a true neoplasm,<sup>7</sup> but there is currently no evidence to resolve this dispute. A diagnosis of adenomatoid odontogenic tumour should be considered in the differential diagnosis of corticate radiolucencies with small radiopaque foci, especially in teenagers and young adults. For cases in which the lesion appears to surround an unerupted tooth and has no radiopaque component, dentigerous cyst may also be considered in the differential diagnosis. However, an adenomatoid odontogenic tumour often appears to envelop the crown as well as the root, whereas dentigerous cysts do not envelop the roots.<sup>13-16</sup>

The origin of adenomatoid odontogenic tumours is controversial.<sup>17-22</sup> Some believe they originate from the odontogenic epithelium of a dentigerous cyst. In addition to the anterior maxilla, the tumour has been reported in other areas of the jaw, such as the angle of the mandible. Therefore, dental lamina remnants likely represent the progenitor cells for this benign odontogenic tumour. According to this hypothesis, the lesion grows (sometimes while forming a cystic space) next to or into a nearby dental follicle, leading to the "envelopmental theory."<sup>17</sup> In the case reported here, the lesion surrounded a fully formed canine tooth, which suggests "envelopmental" pathogenesis. Recent reports indicate that the cells of an adenomatoid odontogenic tumour usually differentiate toward an apparent ameloblastic phenotype but fail to achieve further functional maturation.<sup>22</sup>

WHO<sup>23</sup> has described the histologic features of the tumour as follows: "A tumor of odontogenic epithelium with duct like structures and with varying degree of inductive changes in the connective tissue. The tumor may be partly cystic and in some cases the solid lesion may be present only as masses in the wall of a large cyst. It is generally believed that the lesion is not a neoplasm." The histologic appearance of all variants is identical and exhibits remarkable consistency.<sup>21,24</sup> At low magnification the most striking pattern is that of various sizes of solid nodules of columnar or cuboidal epithelial cells forming nests or rosette-like structures with minimal stromal connective tissue. Between the epithelial cells of the nodules and in the centre of the rosette-like configuration is found eosinophilic amorphous material, often described as tumour deposits. Conspicuous within the cellular areas are structures of tubular or duct-like appearance. A third characteristic

cellular pattern consists of nodules of polyhedral, eosinophilic epithelial cells with squamous appearance and exhibiting well-defined cell boundaries and prominent intracellular bridges. These islands may contain pools of amorphous amyloid-like material and globular masses of calcified material (thus the suggestion of a combination of calcifying epithelial odontogenic tumour and adenomatoid odontogenic tumour).<sup>25</sup> Another epithelial pattern has a trabecular or cribriform configuration. Occasional foci of mitotic activity can be traced. Induction of hyaline, dysplastic dentinoid material or calcified osteodentin has been described. Ultrastructurally, 3 tumour epithelial cell types have been recognized, corresponding to the types that are evident on light microscopy. The connective tissue stroma is very loosely structured and contains thin-walled congested vessels characteristically showing marked degenerative (fibrinoid) changes of the endothelial lining, vessel wall and perivascular connective tissue. It has been suggested recently that the tumour droplets represent some form of enamel matrix.<sup>25</sup>

Immunohistochemical studies of the lesion suggest expression of keratin and vimentin in the tumour cells at the periphery of the ductal, tubular or whorled structures.<sup>27</sup> Amelogenin and enamel in small mineralized foci are found in the tumour cells and in hyaline droplets.<sup>28</sup>

Since all variants show identical benign biological behaviour and almost all are encapsulated, conservative surgical enucleation or curettage is the treatment of choice. Recurrence has been reported in very few cases.<sup>20</sup> If the follicle is found during surgery to be uninvolved, it can be easily separated from the tumour; it may then be possible to remove the lesion while leaving the teeth in place, as described by Toida and others.<sup>29</sup> This would be especially desirable in the maxillary canine region of a young person. However, in the case reported here, the tooth had been pushed to the contralateral side across the midline, and the large size of the lesion justified the decision to remove a tooth along with the lesion. ♦



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## References

1. Lucas RB. Pathology of tumors of the oral tissues. 4th ed. Edinburgh, Scotland: Churchill Livingstone; 1984. p. 66.
2. Stafne EC. Epithelial tumors associated with developmental cysts of the maxilla: report of 3 cases. *Oral Surg Oral Med Oral Pathol* 1948; 1:887.
3. Mallon HL, Sabes WR, Monaco F. Ameloblastic adenomatoid tumor. *Oral Surg Oral Med Oral Pathol* 1968; 25:143.
4. Philipsen HP, Birn H. The adenomatoid odontogenic tumor, ameloblastic adenomatoid tumor or adeno-ameloblastoma. *Acta Pathol Microbiol Scand* 1969; 75(3):375-98.
5. Kramer IRH, Pindborg JJ. WHO International histological classification of tumors. No 5. Histological typing of odontogenic tumors, jaw cysts, and allied lesions. Berlin: Springer Verlag; 1971.
6. Philipsen HP, Reichart PA, Zhang KH, Nikai H, Yu QX. Adenomatoid odontogenic tumor: biologic profile based on 499 cases. *J Oral Pathol Med* 1991; 20(4):149-58.
7. Regezi JA, Kerr DA, Courtney RM. Odontogenic tumors: analysis of 706 cases. *J Oral Surg* 1978; 36(10):771-8.
8. Courtney RM, Kerr DA. The odontogenic adenomatoid tumor. A comprehensive study of twenty new cases. *Oral Surg Oral Med Oral Pathol* 1975; 39(3):424-35.
9. Dare A, Yamaguchi A, Yoshiki S, Okano T. Limitations of panoramic radiography in diagnosing adenomatoid odontogenic tumor. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1994; 77(6):662-8.
10. Philipsen HP, Srisuwan T, Reichart PA. Adenomatoid odontogenic tumor mimicking a periapical (radicular) cyst: a case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2002; 94(2):246-8.
11. Geist SY, Mallon HL. Adenomatoid odontogenic tumor: report of an unusually large lesion in the mandible. *J Oral Maxillofac Surg* 1995; 53(6):714-7.
12. Abrams AM, Melrose RJ, Howell FV. Adenoameloblastoma: a clinical pathological study of ten new cases. *Cancer* 1968; 22(1):175-85.
13. Tsaknis PJ, Carpenter WM, Shade NL. Odontogenic adenomatoid tumor: report of a case and review of the literature. *J Oral Surg* 1977; 35(2):146-9.
14. Bedrick AE, Solomon MP. The adenomatoid odontogenic tumor: an unusual presentation. *Oral Surg Oral Med Oral Pathol* 1979; 48(2):143-5.
15. Curran AE, Miller EJ, Murrah VA. Adenomatoid odontogenic tumor presenting as periapical disease. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1997; 84(5):557-60.
16. Lee JK, Lee KB, Hwang BN. Adenomatoid odontogenic tumor: a case report. *J Oral Maxillofac Surg* 2000; 58(10):1161-4.
17. Philipsen HP, Samman N, Ormiston IW, Wu PC, Reichart PA. Variants of the adenomatoid odontogenic tumor with a note on tumor origin. *J Oral Pathol Med* 1992; 21(8):348-52.
18. Giansanti JS, Someren A, Waldron CA. Odontogenic adenomatoid tumor (adenoameloblastoma). Survey of 3 cases. *Oral Surg Oral Med Oral Pathol* 1970; 30(1):69.
19. Tajima Y, Sakamoto E, Yamamoto Y. Odontogenic cyst giving rise to an adenomatoid odontogenic tumor: report of a case with peculiar features. *J Oral Maxillofacial Surg* 1992; 50(2):190-3.
20. Philipsen HP, Reichart PA. The adenomatoid odontogenic tumor: ultrastructure of tumor cells and non-calcified amorphous masses. *J Oral Pathol Med* 1996; 25(9):491-6.
21. Philipsen HP, Reichart PA, Nikai H. The adenomatoid odontogenic tumor (AOT): an update. *J Oral Pathol Med* 1997; 2:55-60.
22. Philipsen HP, Reichart PA. Adenomatoid odontogenic tumour: facts and figures. *Oral Oncol* 1998; 35(2):125-31.
23. Kramer IRH, Pindborg JJ, Shear M. WHO International histological classification of tumours. Histological typing of odontogenic tumors. 2nd ed. Berlin: Springer Verlag; 1992.
24. Mosqueda-Taylor A, Ledesma-Montes C, Caballero-Sandoval S, Portilla-Robertson J, Ruiz-Godoy Rivera LM, Meneses-Garcia A. Odontogenic tumors in Mexico. A collaborative retrospective study of 349 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1997; 84(6):672-5.
25. Takeda Y, Kudo K. Adenomatoid odontogenic tumor associated with calcifying epithelial odontogenic tumor. *Int J Oral Maxillofac Surg* 1986; 15(4):469-73.
26. Ide F, Kusama K. Adenomatoid odontoma. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2002; 94(2):149-50.
27. Tatemoto Y, Tanaka T, Okada Y, Mori M. Adenomatoid odontogenic tumor: co-expression of keratin and vimentin. *Virchows Arch A Pathol Anat Histopathol* 1988; 413(4):341-7.
28. Saku T, Okabe H, Shimokawa H. Immunohistochemical demonstration of enamel proteins in odontogenic tumors. *J Oral Pathol Med* 1992; 21(3):113-9.
29. Toida M, Hyodo I, Okuda T, Tatetatsu N. Adenomatoid odontogenic tumor: report of two cases and survey of 126 cases in Japan. *J Oral Maxillofac Surg* 1990; 48(4):404-8.



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# Forced Orthodontic Eruption of Fractured Teeth before Implant Placement: Case Report

• Leandro Chambrone, DDS •  
• Luiz A. Chambrone, PhD, MSD, DDS •

## A b s t r a c t

*The treatment of esthetic areas with single-tooth implants represents a new challenge for the clinician. Placement of a single-unit implant is indicated for fractured or periodontally compromised teeth. In 1993, a modification of the forced eruption technique, called "orthodontic extrusive remodelling," was proposed as a way to augment both soft- and hard-tissue profiles at potential implant sites. This case report describes augmentation of the coronal soft and hard tissues around a fractured tooth, which was achieved by forced orthodontic extrusion before implant placement. This technique may be used to improve primary anchorage of a dental implant, fill the alveolar socket with bone, preserve interdental bone height and increase the amount of attached gingiva.*

**MeSH Key Words:** alveolar bone loss; dental implantation, endosseous/methods; tooth movement/methods

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This article has been peer reviewed.

The treatment of esthetic areas with single-tooth implants represents a new challenge for the clinician. The primary goals of such restorations include successful osseointegration of the dental implant, harmony between the final restoration and the adjacent teeth, and the health of the surrounding soft and hard tissues.<sup>1</sup>

To evaluate an implant site in an esthetic area, 4 factors should be considered: smile line, soft-tissue morphology, tooth morphology and osseous architecture.<sup>2</sup> A single-tooth site can present as great an esthetic challenge as an extensive alveolar ridge defect, especially in anterior areas.<sup>3</sup>

Placement of a single-unit implant is indicated for fractured or periodontally compromised teeth. However, these sites can be deficient in gingiva and alveolar bone in the horizontal or vertical planes (or both).

Various surgical procedures have been developed to preserve or reconstruct the alveolar ridge, such as distraction osteogenesis,<sup>4</sup> guided tissue regeneration<sup>5</sup> and graft procedures.<sup>6</sup> These techniques are available to treat the ridge defect either at the time of extraction or at a later date.

Another approach to soft- and hard-tissue augmentation is forced orthodontic eruption (FOE). As first described by Heithersay<sup>7</sup> and Ingber,<sup>8</sup> this technique is based on osteo-physiologic and orthodontic principles.<sup>9</sup> It has been used

frequently because of its demonstrated advantages, including correction of isolated infrabony defects, repositioning of the gingival margin and clinical lengthening of the crown.<sup>7-12</sup>

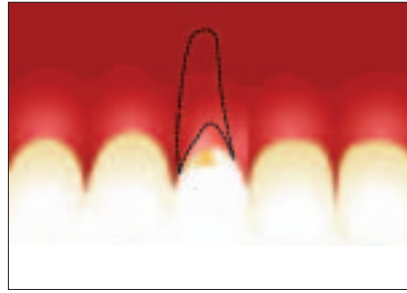
Moreover, this technique can be used to change the root position, providing space and anchorage for an implant. In 1993, Salama and Salama<sup>13</sup> proposed a modification of the forced eruption technique. This new approach, termed "orthodontic extrusive remodelling," was used to augment both soft- and hard-tissue profiles of potential implant sites, by forced orthodontic extrusion of "hopeless" teeth and their periodontal apparatus.<sup>13</sup>

Periodontally compromised teeth without endodontic periapical lesions can be orthodontically extruded to develop the gingiva and bone in a coronal direction before implant placement.<sup>13-17</sup> Such vertical augmentation, especially for the buccal bone plate and crest, allows better implant placement in relation to the cemento-enamel junction of the adjacent dentition (within 1 to 3 mm apically, depending on implant type).<sup>16</sup> This additional bone and gingiva enhances the site for a more esthetically pleasing final restoration.<sup>17</sup>

This case report describes coronal soft- and hard-tissue augmentation around a fractured tooth, which was achieved by FOE before implant placement.



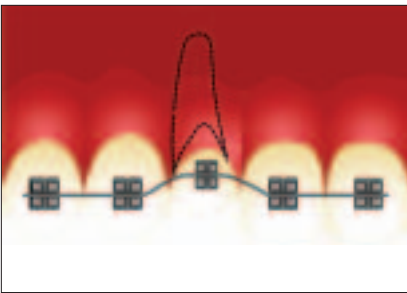
**Figure 1:** Pretreatment frontal view of the vertical fracture on the root of the maxillary right lateral incisor.



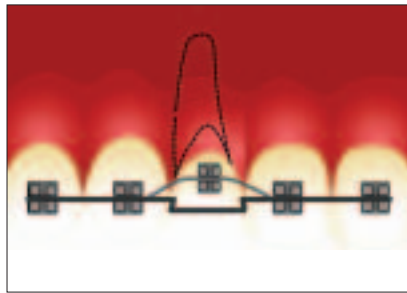
**Figure 2:** Diagrammatic representation of pretreatment frontal view.



**Figure 3:** Radiograph of maxillary right lateral incisor before treatment.



**Figure 4:** Diagrammatic representation of 0.016-inch nickel-titanium arch wire (first arch).



**Figure 5:** Diagrammatic representation of 0.019 x 0.025 inch stainless steel auxiliary arch (second arch).



**Figure 6:** Frontal view during stabilization phase.

## Case Report

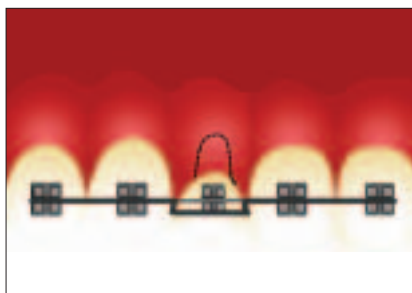
A healthy 48-year-old man (a nonsmoker) was referred to the authors' private dental office with symptoms of tooth fracture on the maxillary right lateral incisor. His dental history included a cast-gold core and post with a metal-ceramic crown on this tooth. Clinical examination revealed a vertical fracture on the buccal root portion (Figs. 1 and 2). Vertical probing depth in the area was 4 mm. Radiographic examination revealed the extension of the root fracture and the level of the alveolar crest (Fig. 3). Crown-lengthening procedures were contraindicated because of the impossibility of obtaining an adequate crown-to-root ratio, and it was decided that the remaining root should be replaced by a dental implant.

To prevent ridge resorption and to increase the amount of soft tissue and bone before implant placement, the tooth was orthodontically extruded by FOE as described by Salama and Salama.<sup>13</sup> Orthodontic treatment was initiated in the upper arch with passive bonding (in the same horizontal plane) of 0.022-inch edgewise brackets from the first right bicuspid to the left central incisor, and a 0.016-inch nickel-titanium arch wire was placed (Fig. 4). A metallic post was placed inside the fractured root, and the tooth was provisionally

restored. The brackets on the right lateral incisor were positioned more apically, at the location of the cemento-enamel junction, to provide an extrusive component (approximately 50 g of force). To avoid intrusion of the anchorage teeth, a 0.019 inch x 0.025 inch stainless steel auxiliary arch was used to stabilize the segmented wire (Fig. 5).

The patient was seen every 2 weeks, for reduction of the incisal surface of the extruded tooth and repositioning of the lateral incisor bracket more apically along the root surface. After 10 weeks, the segmented arch had stabilized. This eruptive phase was followed by 10 weeks of stabilization (Figs. 6 and 7).

Before extraction of the maxillary right lateral incisor, it was observed that the remaining root was no longer located inside the alveolus. Radiographic assessment revealed improvement in the vertical bone of this area (Fig. 8). The implant was placed at the time of tooth extraction (3.75 mm x 11 mm implant, Osseotite, 3i, Palm Beach Gardens, Fla.) and remained unloaded for 6 months (Fig. 9). The final restorations for the implant and the maxillary central incisor, which received a new metallo-ceramic crown, were placed (Figs. 10 to 12). The FOE therapy yielded an increase in the zone of attached gingiva



**Figure 7:** Diagrammatic representation of stabilization phase.



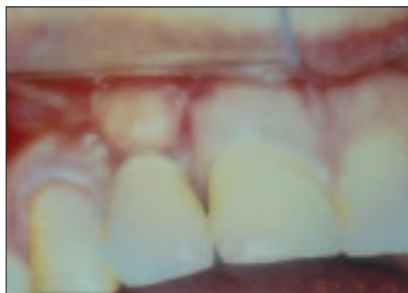
**Figure 8:** Improvement in the vertical bone before implant placement.



**Figure 9:** Radiographic assessment 6 months after implant placement.



**Figure 10:** Clinical aspect of gingival tissues.



**Figure 11:** Finished restorations with a satisfactory esthetic result.



**Figure 12:** Radiograph after placement of final restorations.

and a satisfactory emergence profile for the dental implant. The patient experienced esthetic benefit from this approach.

### Discussion

Usually, the placement of dental implants in esthetic areas is linked to the smile line, hard- and soft-tissue anatomy, and tooth morphology.<sup>2</sup> In this case, a multidisciplinary approach was used to treat a fractured tooth. FOE was performed first, to preserve the esthetic appearance of the area, to avoid ridge collapse after extraction and to improve the 3-dimensional topography of the recipient site (soft-tissue morphology and osseous architecture), followed by tooth extraction and implant placement. After the initial FOE therapy, the osseous alveolar crest and the gingival margin were located in normal relation to the tissues of the contiguous teeth.

This technique was first described for periodontally compromised teeth as a means of enhancing the soft- and hard-tissue dimensions of potential implant sites.<sup>13</sup> Mantzikos and Shamus<sup>15</sup> termed this procedure “orthodontic extraction,” whereas Salama and Salama<sup>13</sup> called it “ortho-

odontic extrusive remodelling.” The authors of the present report prefer the term “forced orthodontic extrusion.”

Tooth extractions in the anterior maxillary areas generally cause simultaneous deficiencies of the alveolar ridge.<sup>18,19</sup> In isolated sites before implant placement, this procedure can create a greater volume of alveolar bone and soft tissue in the vertical and horizontal planes, without surgical intervention.<sup>2,13–16,20</sup> By stretching the gingival and periodontal ligament fibres during FOE, tension is imparted to the entire alveolar socket, stimulating osseous apposition at the alveolar crest.<sup>2</sup> The orthodontic extraction increases the width of the attached gingiva, and the mucogingival junction remains stable when the gingival margin migrates coronally.<sup>2,13–16,20</sup>

With FOE the diameter of the remaining alveolus is smaller, and an endosseous dental implant can usually be placed to fill the remaining alveolus at the time of root extraction.<sup>17</sup> The most important benefit is the creation of a greater volume of bone to engage the implant at the time of extraction.<sup>13</sup> In addition, the creation of more intimate contact between the implant surface and the adjacent alveolar bone can result in greater initial implant stability and possibly earlier osseointegration over a large

surface area.<sup>13</sup> Furthermore, this technique allows placement of the implant head 3 mm apical to the level of the cemento-enamel junction of the adjacent natural tooth and hence allows an adequate emergence profile.<sup>3</sup>

For teeth that have been fractured below the level of the crestal bone, FOE often yields results that could not be obtained by surgical crown-lengthening procedures, guided tissue regeneration or bone graft procedures, especially when there is not enough soft tissue to allow the use of membranes or osseous grafts. Mantzikos and Shamus<sup>14</sup> demonstrated that when a periodontally compromised tooth is erupted, some changes can be observed in the surrounding gingiva. First, teeth that are extruded in the presence of periodontal pockets seem to move coronally before the gingival margin follows. Consequently, pocket depth is reduced, and an immature tissue (the "red patch") appears coronal to the original gingival margin. This sulcular epithelium appears to be induced to peel away from the tooth, through inversion of the pocket lining. After 28 days, keratinization of the everted epithelium occurs.<sup>14</sup>

FOE before implant placement is a further procedure to cope with isolated nonrestorable teeth in esthetic sites. It contributes to the emergence profile of the dental implant and the final restoration by increasing tissue depth (as measured from the alveolar bone crest to the seating surface of the implant), improving implant angulation and torque placement in relation to adjacent natural teeth, and improving the interarch distance.<sup>21</sup>

However, the relationships between tooth, gingival unit, attachment apparatus, applied force and consequent stress must be considered when forced eruption is used.<sup>9</sup> During the FOE procedure, the root may be moved laterally, which could affect the position of teeth in the arch.<sup>22</sup> This movement may compromise prosthodontic treatment, or it may be used to esthetically enhance such treatment.<sup>22</sup> In the case reported here, a secondary arch was placed to avoid intrusion of the contiguous teeth. (The secondary arch can also be used to avoid intrusion of the contiguous teeth in cases of deep overbites.) This technique also enabled proper implant placement in a situation where the bone was compromised.<sup>13-16,20</sup>

This type of orthodontic treatment is a form of adjunctive tooth movement.<sup>23</sup> Adjunctive tooth movement can be used to achieve better distribution of teeth before restorative procedures, to allow for proper tooth preparation and parallel abutments, to create pontic spaces, to correct mucogingival and osseous defects, to improve the crown-to-root ratio, to close open contacts, to upright severely tipped teeth and to re-establish adequate occlusion.<sup>23</sup> Manipulation of the attachment apparatus through tooth movement offers the potential to improve the implant site and, consequently, to optimize the treatment and the final result.<sup>13</sup>

Combined with guided tissue regeneration and bone graft procedures, this technique may result in more predictable implant placement in sites with buccal osseous dehiscence.<sup>13-16,20</sup>

Teeth with root fractures or advanced caries cannot offer sound root structure on which to place a restoration. In such situations, this technique may be used to improve the primary anchorage of a dental implant, fill the alveolar socket with bone, preserve the interdental bone heights and increase the amount of attached gingiva.

In the case reported here, the fractured root was extruded over the course of 10 weeks, and 10 weeks of stabilization followed. Other authors have proposed different protocols.<sup>13-16,20</sup> In conclusion, the combination of FOE and single-implant placement in the treatment of fractured teeth seems advantageous, especially in maxillary esthetic areas. ♦



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## References

1. Phillips K, Kois JC. Aesthetic peri-implant site development. The restorative connection. *Dent Clin North Am* 1998; 42(1):57-70.
2. Schincaglia GP, Nowzari H. Surgical treatment planning for the single-unit implant in aesthetic areas. *Periodontol 2000* 2001; 27:162-82.
3. Palmer RM, Palmer PJ, Newton JT. Dealing with esthetic demands in the anterior maxilla. *Periodontol 2000* 2003; 33:105-18.
4. Chin M, Toth B. Distraction osteogenesis in maxillofacial surgery using internal devices: report of five cases. *J Oral maxillofac Surg* 1996; 54(1):45-53.
5. Hämmerle CH, Jung RE. Bone augmentation by means of barrier membranes. *Periodontol 2000* 2003; 33:36-53.
6. van Seenberghe D, Naert I, Bossuyt M, De Mars G, Calberson L, Ghyselen J, and other. The rehabilitation of the severely resorbed maxilla by simultaneous placement of autogenous bone grafts and implants: a 10-year evaluation. *Clin Oral Invest* 1997; 1(3):102-8.
7. Heithersay GS. Combined endodontic-orthodontic treatment of transverse root fractures in the region of the alveolar crest. *Oral Surg Oral Med Oral Pathol* 1973; 36(3):404-15.
8. Ingber JS. Forced eruption. I. A method of treating isolated one and two wall infrabony osseous defects — rationale and case report. *J Periodontol* 1974; 45(4):199-206.
9. Potashnick SR, Rosenberg ES. Forced eruption: principles in periodontics and restorative dentistry. *J Prosthet Dent* 1982; 48(2):141-8.
10. Ingber JS. Forced eruption: part II. A method of treating nonrestorable teeth — periodontal and restorative considerations. *J Periodontol* 1976; 47(4):203-16.

11. Ingber JS. Forced eruption: alteration of soft tissue cosmetic deformities. *Int J Periodontics Restorative Dent* 1989; 9(6):416-25.
12. Johnson GK, Sivers JE. Forced eruption in crown-lengthening procedures. *J Prosthet Dent* 1986; 56(4):424-7.
13. Salama H, Salama M. The role of orthodontic extrusive remodeling in the enhancement of soft and hard tissue profiles prior to implant placement: a systematic approach to the management of extraction site defects. *Int J Periodontics Restorative Dent* 1993; 13(4):312-33.
14. Mantzikos T, Shamus I. Forced eruption and implant site development: soft tissue response. *Am J Orthod Dentofac Orthop* 1997; 112(6):596-606.
15. Mantzikos T, Shamus I. Case report: forced eruption and implant site development. *Angle Orthod* 1998; 68(2):179-86.
16. Mantzikos T, Shamus I. Forced eruption and implant site development: an osteophysiologic response. *Am J Orthod Dentofacial Orthop* 1999; 115(5):583-91.
17. O'Neal RB, Butler BL. Restoration or implant placement: a growing treatment planning quandary. *Periodontol 2000* 2002; 30:111-22.
18. Abrams H, Kopczyk RA, Kaplan AL. Incidence of anterior ridge deformities in partially edentulous patients. *J Prosthet Dent* 1987; 57(2):191-4.
19. Hawkins CH, Sterrett JD, Murphy HJ, Thomas JC. Ridge contour related to esthetics and function. *J Prosthet Dent* 1991; 66(2):165-8.
20. Nozawa T, Sugiyama T, Yamaguchi S, Ramos T, Komatsu S, Enomoto H, and other. Buccal and coronal bone augmentation using forced eruption and buccal root torque: a case report. *Int J Periodontics Restorative Dent* 2003; 23(6):585-91.
21. Garber DA. The esthetic dental implant: letting restoration be the guide. *J Am Dent Assoc* 1995; 126(3):319-25.
22. Vanarsdall RL. Orthodontics and periodontal therapy. *Periodontol 2000* 1995; 9:132-49.
23. Ziskind D, Sharon E, Hirschfeld Z, Becker A. Analysis of lateral tooth movement during forced orthodontic eruption. *J Prosthet Dent* 2000; 84(4):462-6.

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# Clinical Showcase

*Clinical Showcase is a series of pictorial essays that focus on the technical art of clinical dentistry. The section features step-by-step case demonstrations of clinical problems encountered in dental practice. This month's article is by Drs. Edward J. Barrett and David J. Kenny, speakers at the International Society for Dentistry, Sport and Trauma (ISDST) Fourth World Symposium on Sport Dentistry and Dental Trauma, which will be held August 26 and 27 in Montreal, in conjunction with the FDI World Dental Congress.*



## Emergency Vital Pulpotomy and Restoration

Edward J. Barrett, BSc, DDS, MSc, FRCD(C)

David J. Kenny, BSc, DDS, PhD, FRCD(C)

Pulp exposure following a crown fracture is among the most common dental injuries. If the dental pulp has been exposed for less than 3 days, vital pulpotomy is the treatment of choice to facilitate recovery of the pulp. When successful, this procedure produces a tooth with normal root length and an apex sufficiently constricted to allow conventional endodontic treatment should the pulp eventually become necrotic.

A typical case illustrates the principles of vital pulpotomy. A 12-year-old girl was hit in the mouth with the butt end of a stick while playing street hockey with friends. She presented 6 hours after the injury with pulp exposure of approximately 3 mm × 2 mm (Figs. 1 and 2); she brought with her the fractured crown segment (Fig. 3). Radiography revealed that the root, while close to complete, still had an immature apex. There were no medical contraindications to treatment, and the child was prepared to cooperate.

In this case vital pulpotomy was chosen over direct pulp capping to ensure that the interface between the calcium hydroxide and pulp tissue was free of blood clot and excessive bacteria. Pulpotomy allows better pulp visualization, removal of blood clot and debris, and reduction of bacteria than direct pulp capping.

### Procedure

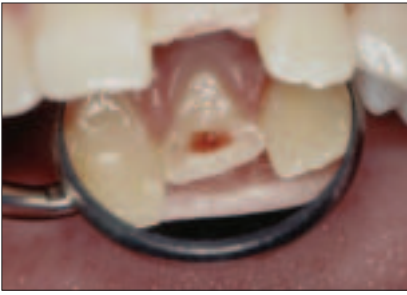
Once local anesthesia has been achieved, the dentist begins the procedure by opening the pulp chamber with a new fissure or diamond bur in a high-speed handpiece with irrigation (Fig. 4). The coronal pulp is removed to a depth of 3–4 mm with a round or football-shaped diamond bur in a high-speed handpiece with water irrigation. Other implements are not suitable for this procedure: a slow-speed round bur might become entangled in the pulp chamber tissue and the canal pulp may be torn free by the bur or stretched by a spoon excavator, especially if the tool is not brand new and sharp. High-speed diamond burs produce the desired debridement without damaging adjacent chamber or canal pulp.

The next phase is the most sensitive to technique and is critical for a successful outcome. In the vital pulpotomy technique described by Cvek,<sup>1</sup> the freshly bleeding pulp stump(s) must be compressed with a moistened pledget of cotton for 5 minutes to achieve hemostasis (Fig. 5). The damp cotton will not adhere to the pulp tissue and, unlike a dry cotton compress, will not stimulate bleeding when it is removed. The cessation of bleeding after a 5-minute application of pressure is an important diagnostic clue. Failure to arrest bleeding by the application of direct pressure indicates that the clinician should remove additional pulp tissue, possibly all of the coronal pulp if necessary to arrest bleeding after 5-minute compression cycles. If hemostasis cannot be attained with coronal pulpotomy, the clinician should proceed to pulpectomy and conventional endodontic treatment.

After the bleeding has been arrested, a dressing of nonsetting calcium hydroxide (e.g., Pulpdent, Pulpdent Corp., Watertown, Mass., or Calasept, Nordiska Dental, Angelholm, Sweden) is applied to the amputated pulp by means of a blunt cannula (Fig. 6) and is condensed with a moistened cotton pledget to ensure contact (Fig. 7). Before the restoration is initiated, a layer of glass ionomer lining (e.g., Vitrabond, 3M ESPE, St. Paul, Minn.) is placed over the exposed tissue to “protect” the calcium hydroxide paste (Fig. 8).

A glass ionomer seal should be used only as temporary protection for a few days before the tooth is restored with composite resin. In this case the fragment was to be reattached, so the glass ionomer, dentin and enamel surfaces were acid etched and bonded (Fig. 9). In addition, the fragment was hollowed out slightly (Fig. 10), and the trial fit demonstrated room for a composite resin interface. The resin was applied (Fig. 11), the 2 segments were approximated, and the composite resin interface was polymerized. When, as in this case, the tooth fragment is available, it can be used to effect a quick and esthetic restoration (Fig. 12) after pulp therapy.

# Clinical Showcase



**Figure 1:** Lingual view of complicated crown fracture (i.e., with pulp exposed).



**Figure 2:** Incisal view of complicated crown fracture.



**Figure 3:** Fractured crown segment.



**Figure 4:** The pulp chamber is opened with a #56 flat fissure bur.



**Figure 5:** Hemorrhage is controlled after removal of 3–4 mm of chamber pulp.



**Figure 6:** Calcium hydroxide is extruded from the cannula onto the remaining chamber pulp.



**Figure 7:** Calcium hydroxide is compressed against the chamber pulp with cotton pledget.



**Figure 8:** Light-cured glass ionomer lining is packed against the calcium hydroxide.



**Figure 9:** Bond is applied over the glass ionomer seal.



**Figure 10:** Hollowed crown segment is acid etched and bonded.



**Figure 11:** Crown segment is reinforced with composite resin.



**Figure 12:** Labial view after vital pulpotomy and reattachment of the fractured crown segment.



### Summary Points

- Traumatically exposed pulp has very good regenerative capacity and prognosis.
- Vital pulpotomy has several advantages over direct pulp capping: visibility, ease of debridement and compression, and reduction of bacterial populations.
- Early pulpotomy improves prognosis and necessitates less removal of pulp tissue.
- There must be no blood clot between the remaining pulp and the calcium hydroxide.
- The calcium hydroxide interface must be protected by glass ionomer and composite resin restoration or the reattached fragment.
- Radiographic follow-up at 6 months is required. ♦

### Reference

1. Cvek M. A clinical report on partial pulpotomy and capping with calcium hydroxide in permanent incisors with complicated fracture. *J Endod* 1978; 4(8):232–7.



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*The authors have no declared financial interests in any company manufacturing the types of products mentioned in this article.*

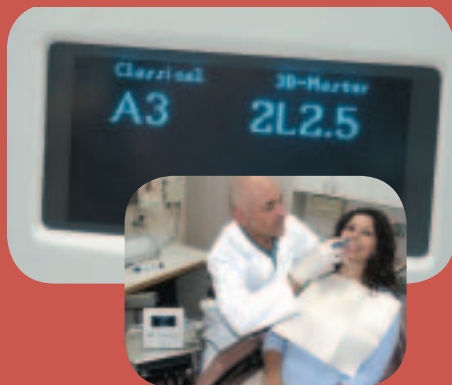
*At the ISDST symposium, Dr. Barrett will be speaking on “The Emdogain case series: lessons from cell biology that affect replantation.” Dr. Kenny’s topic will be “Finite element modelling of blunt trauma to the maxilla.”*

*For more information on the ISDST symposium, visit [www.sportsdentistry.org](http://www.sportsdentistry.org) or e-mail [ISDSMontreal2005@aol.com](mailto:ISDSMontreal2005@aol.com).*



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# Point of Care

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 International Society for Dentistry, Sport and Trauma (ISDST) Fourth World Symposium on Sport Dentistry and Dental Trauma ([www.sportsdentistry.org](http://www.sportsdentistry.org)), which will be held August 26 and 27 in Montreal, in conjunction with the FDI World Dental Congress.



## Question 1 As a team dentist, what issues in doping control and banned substances do I need to be concerned about?

### Background

The use of performance-enhancing substances has become widespread among both elite athletes and young adult members of our society. Testing of Olympic athletes for banned substances began in 1968, and is now common in many sports, both during and outside of competition. Various studies have documented the use of anabolic steroids among high school students,<sup>1</sup> people using public gymnasia<sup>2</sup> and schoolchildren.<sup>3</sup>

For a team dentist, there are 2 particular concerns:

- What drugs might my patient be taking that could cause an adverse effect during dental treatment?
- What drugs might I inadvertently give to my patient that would result in a positive result on a doping test?

The most commonly abused drugs<sup>3</sup> are listed in **Box 1**. In addition, counterfeit drugs produced on the black market may contain anabolic steroids of indeterminate dosage prepared in a nonsterile manner or may contain drugs different than what appears on the product label. Contamination of the nutritional supplements often used by athletes is a recent concern.

### Dental Management of Athletes

The adverse effects of performance-enhancing drugs are poorly reported. Therefore, epidemiologic data on specific risks are often unavailable and controversial. Although it may be difficult to assess significant side effects from these drugs or techniques, some potential complications might manifest themselves in the dental office. Cardiovascular risks include hypertension, myocardial infarction, cerebrovascular accidents (stroke) and cardiomyopathy, and caution is necessary when administering epinephrine-containing local anesthetics. Hepatic risks include cholestatic jaundice, liver tumours and increases in liver enzymes, as well as a possible increase in the risk of bleeding during dental extractions and other surgical procedures. Hematologic effects include altered coagulation and polycythemia (from use of androgens or blood “boosters”

### Box 1 Most commonly abused drugs

- Androgenic and anabolic steroids
- Glucocorticosteroids (e.g., prednisone)
- “Protective” drugs, including tamoxifen to reduce gynecostasia, and clomiphene and human chorionic gonadotropin to combat testicular shrinkage and stimulate recovery
- Polypeptide hormones (e.g., insulin and human growth hormone)
- Agents with antiestrogenic activity
- Stimulants (e.g., amphetamines, cocaine, ephedrine, pseudoephedrine, caffeine)
- Diuretics (e.g., furosemide and ethacrynic acid), used to help patient meet a specific weight, promote muscle definition or dilute urine (i.e., as a masking agent)
- Dehydrating agents (e.g., glycerol), used to enhance muscle definition
- Opioid analgesics
- Cannabinoids and/or ethanol
- Blood “boosters” (e.g., erythropoietin or recombinant hemoglobin, as well as blood doping techniques), used to increase oxygen-carrying capacity, especially for long-distance events)
- Growth hormone stimulators (e.g., L-dopa, gamma-aminobutyric acid and gamma hydroxybutyrate)
- Masking agents (e.g., probenecid or epitestosterone)
- b-blockers (e.g., propranolol), used to help reduce tremors in sports such as shooting and biathlon
- b<sub>2</sub>-agonists (e.g., salbutamol and terbutaline), which can be used legally in certain cases but may require an application for therapeutic exemption

or with blood doping techniques), which carry an increased risk of hypertension, myocardial infarction and stroke. Anabolic steroids may alter humoral immunity by lowering levels of IgG, IgM and IgA, leading to a possible increase in the risk of infection.<sup>3</sup> Injecting drug users who share needles are at risk of HIV and hepatitis B and C infection.

The team dentist can take several precautions to avoid causing an inadvertent positive test in an athlete during the provision of dental treatment. Local anesthetics such as

lidocaine and mepivacaine may be used, but caution should be exercised when using solutions containing a vasoconstrictor just before or during competition. During postoperative dental management, the team dentist should avoid the use of opioid analgesics and should instead rely mainly on nonsteroidal anti-inflammatory drugs such as ibuprofen. Corticosteroids in various dental medicaments for oral ulceration and sedative dressings should be avoided and alternative techniques used. Treatment of generalized tooth pain attributable to acute maxillary sinus congestion or infection, which might include the use of a decongestant or nasal spray, should be delayed until the proposed drugs have been approved.<sup>4</sup>

A team dentist must be aware of possible treatment complications as a result of the illicit use of banned substances or techniques and should also be cognizant of the administration and prescription of drugs and medicaments for dental treatment and postoperative management. Excellent information is available from the World Anti-Doping Agency ([www.wada-ama.org](http://www.wada-ama.org)); the United States Anti-Doping Agency ([www.usantidoping.org](http://www.usantidoping.org)) and the Canadian Centre for Ethics in Sport ([www.cces.ca](http://www.cces.ca)). ♦



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*Dr. Gizzarelli's session at the ISDST symposium, titled "Doping issues for the sport dentist," will be presented on Friday, August 26.*

## References

1. Buckley WE, Yesalis CE 3rd, Friedl KE, Anderson WA, Streit AL, Wright JE. Estimated prevalence of anabolic steroid use among male high school seniors. *JAMA* 1988; 260(23):3441-5.
2. Korkia P, Stimson GV. Indications of prevalence, practice and effects of anabolic steroid use in Great Britain. *Int J Sports Med* 1997; 18(7):557-62.
3. Dawson RT. Drugs in sport – the role of the physician. *J Endocrinol* 2001; 170(1):55-61.
4. Woods RG. Dental implications — drugs and sporting performance. *Australian Prescriber* 1989; 12(3):62.

## Question 2

What is the role of the team dentist in elite and amateur sports?

The team dentist is an important member of the medical staff for a sports team, especially in contact sports such as ice hockey. The privilege of being a team dentist can be demanding and comes with significant responsibilities, as outlined below.

### Preseason Screenings

The responsibilities of the team dentist begin during training camp, when medical examinations are performed. Every player should undergo a dental assessment, including a brief dental history and clinical examination; bitewing films or a pantographic radiograph should be obtained, if possible.

The dental history should determine prior dental trauma, the presence of any prostheses or orthodontic devices, and the occurrence of any concussions. Athletes should be cautioned to avoid wearing removable appliances or partial dentures during practice or competition to avoid the risk of aspiration. The player should be asked about use of a mouthguard and spit tobacco.

During the clinical examination, the dentist should pay particular attention to oral hygiene, presence of caries or visible infection, status of the wisdom teeth and location of any fixed prostheses that might require additional protection. Fractures, discoloured teeth and lost restorations should be noted in case questions arise later regarding payment or team responsibility for such problems. A

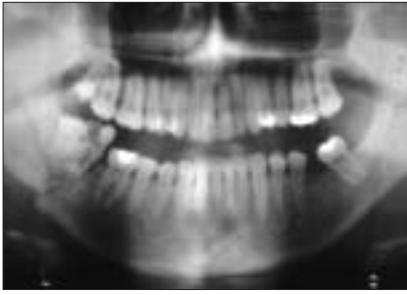
summary of all examinations and recommendations should be given to the head trainer or the team physician to ensure appropriate follow-up.

### Event Coverage

In elite contact sports a venue dentist is often needed during competitions. For example, in the Canadian Hockey League the home team provides both a physician and a dentist to deal with any injuries that might occur. Many leagues have rules that require bleeding to be controlled before an athlete can return to play, so the team dentist must be able to use sutures, dressings or other agents such as cyanoacrylate tissue adhesives to deal with soft-tissue injuries.

Current protocols proposed by The Hospital for Sick Children in Toronto suggest that avulsed teeth must be reimplanted within 5 minutes for the best chance of success. Fractured tooth segments can be successfully reattached using bonding techniques, so these segments must be retained and properly stored. The team dentist must not only be prepared to treat these injuries, but must also train the team therapist in the emergency management of avulsions, luxations and fractures that might occur on the road or during practice.

Other injuries that might require immediate assessment or treatment by the team dentist include dislocations of the



**Figure 1:** Athletes who don't wear proper mouthguards are at greater risk of serious injuries such as jaw fractures.

temporomandibular joint, fractures, pulp exposures and assorted soft-tissue trauma, including single-layer or through-and-through lacerations or degloving injuries.

### Mouth Protection

One of the key roles of the team dentist is to arrange proper mouth protection for the athletes. With pressure lamination, mouthguards can now be customized to provide additional protection according to the risks of the particular sport, areas of previous trauma, a history of concussion, and the presence of any fixed bridges, crowns or implants (Fig. 1). Team dentists should check for any league rules regarding mouthguards (which might specify use of colouring agents, custom preparation or coverage of the molar segments). It may be useful to embed the athlete's name and the date of fabrication within the guard. Players should be reminded that, because of the high incidence of dental injuries during practice sessions, guards should be worn during practices as well as games.

### Regular Dental Care

The team dentist should also be involved with regular dental care of the players and their families. Whenever possible, such treatment should be scheduled to avoid interfering with games and practice sessions. Dentists should be familiar with doping control regulations, if any, for their sport, to avoid an inadvertent positive result on testing of an athlete.

Athletes should be encouraged to have impacted wisdom teeth removed during the off-season — when adequate time is available for bony healing — as the likelihood of jaw fracture is 4 times greater when these are retained.

### Other Issues

The team dentist should be aware of the potentially harmful effects of sport beverages on the dentition and should work with team officials to minimize use of these products. Drinking water along with sport beverages can reduce these harmful effects, as can both diluting and chilling the drinks.

Acting as a team dentist can provide a great opportunity for community involvement and practice building. However, the dentist must keep abreast of all current protocols and recommendations regarding trauma management, injury prevention and the other issues listed above. Groups such as the Academy for Sports Dentistry ([www.sportsdentistry-iasd.org/](http://www.sportsdentistry-iasd.org/)) and the International Society for Dentistry, Sport and Trauma (ISDSMontreal2005@aol.com) can provide additional assistance and training. ♦



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*Dr. René Fasel is president of the International Ice Hockey Federation and a member of the International Olympic Committee (IOC). He is head of the Olympic Winter Sports Federation and chair of the Coordination Commission for the 2010 Vancouver Olympic Winter Games. He is also a member of the IOC Medical Commission.*

*Dr. Dion is co-chair of the ISDST symposium and will present a session titled "Sport specific management and prevention of dental injuries" on Saturday, August 27. He will also be a co-presenter for the pre-congress course "Sport dentistry and custom mouthguard fabrication," to be offered Monday, August 22.*

*Dr. Fasel is honorary chair of the ISDST symposium. His session at the symposium, titled "Dentistry and the Olympic Games — 'Citius, Altius, Fortius...and carious'" will be presented on Friday, August 26.*

## Question 3

Most young athletes do not like wearing athletic mouthguards because some devices make talking and breathing difficult. Can you suggest a type of mouthguard they can wear comfortably?

### Background

The prevention and treatment of orofacial trauma is now an important part of general dental practice.<sup>1,2</sup> Children and adults are participating more in athletic activities that carry a risk of trauma,<sup>3</sup> which increases the possibility that patients will present needing treatment for orofacial trauma and requesting dentists' opinion on how to

prevent such problems.<sup>4</sup> The dentist has several roles in the prevention of trauma, including patient education, diagnosis of injuries and advising on the use of mouthguards. A mouthguard is the best way to prevent orofacial injury, but a mouthguard that does not fit properly will not afford good protection. Conversely, the better the fit, the better the protection, comfort, acceptance and compliance.

### Types of Mouthguards

Three basic types of athletic mouthguards are currently available, all significantly different in fit, comfort and acceptance. The first type is the stock mouthguard available at sporting goods stores (Fig. 1). These are the least desirable and least acceptable because there is no attempt to fit the device; the user simply removes the mouthguard from the package and places it in the mouth. The second type is the common boil-and-bite mouthguard (Fig. 2). These are usually purchased ready-made, boiled and then moulded to the teeth. Despite this attempt at fitting, the instability and uneven distribution of material in the mouthguard prevent proper comfort, fit and protection. In one study, “custom-made mouthguards all performed better than the boil-and-bite type, which afforded only slightly more protection than no mouthguard at all.”<sup>5</sup> Other authors have reported many injuries among users wearing over-the-counter types of mouthguards.<sup>6,7</sup> In literature reviews by the present author, no data published after 1980 were found to support stock or boil-and-bite mouthguards. The literature thus makes it very clear that only custom-made mouthguards should be offered to our patients.

The third type of mouthguards is the custom-made mouthguard (Fig. 3). Two types are currently available: those made with vacuum machines and those made with pressure machines. The differences in internal adaptation between conventional vacuum machines and newer vacuum and pressure machines are significant. The better

the internal adaptation, the superior the fit. Therefore, internal adaptation should be the prime focus of attention in a decision to purchase one of these machines.

In the design of custom-made mouthguards, minimal thicknesses and extensions are critical. The suggested minimal thicknesses are 3 mm labially, 2 mm palatally and 3 mm occlusally.<sup>8</sup> Mouthguards should be designed according to the sport played, the age of the athlete and the patient’s history of trauma. The material of choice is ethylene vinyl acetate with a shore hardness of 80.

There are 4 steps in the fabrication of custom-made mouthguards: impression, fabrication by pressure lamination, trimming and polishing, and placement and occlusal equilibration. Each dentist must decide whether he or she will fabricate mouthguards in the office or have a qualified laboratory do the work.

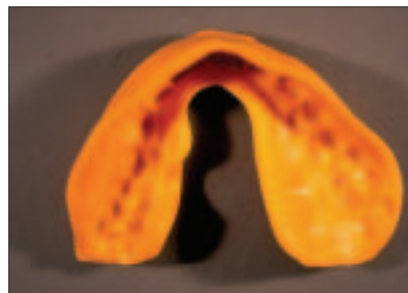
The first step, the impression, is critical to the end result. Similar to any restorative procedure requiring an impression, the better the impression, the better the appliance.

The pressure lamination process involves positive pressure, *not* application of a vacuum. Three pressure machines are currently available for this process, each of which must be connected to a compressor: the Drufomat by Dreve (Unna, Germany) (Fig. 4), the Erkopress by Erkodent (Pfalzgrafenweiler, Germany) (Fig. 5) and the Biostar by Scheu Dental (Iserlohn, Germany) (Fig. 6).

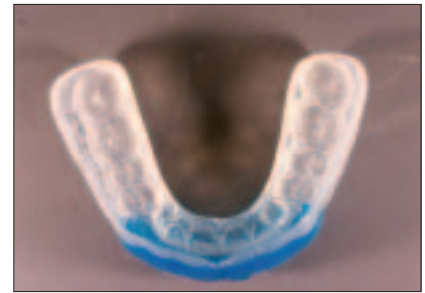
These pressure-laminated mouthguards can be made to any desired specifications, depending on the type of



**Figure 1:** Stock over-the-counter mouthguard.



**Figure 2:** Boil-and-bite mouthguard.



**Figure 3:** Pressure-laminated mouthguard.



**Figure 4:** Drufomat pressure machine, manufactured by Dreve (Unna, Germany).



**Figure 5:** Erkopress pressure machine, manufactured by Erkodent, (Pfalzgrafenweiler, Germany).



**Figure 6:** Biostar pressure machine, manufactured by Scheu Dental (Iserlohn, Germany).

mouthguard that is used and its design. The pressure-laminated mouthguards have a much better internal adaptation than the over-the-counter mouthguards.

### Conclusion

The pressure-laminated mouthguard continues to be the mouthguard of choice and acceptance for athletes at all levels. The precise fit leads to better compliance and fewer injuries. Athletes who have previously been unable to wear over-the-counter mouthguards because of their poor fit, bulkiness and lack of retention are more inclined to wear a mouthguard that is comfortable, nonbulky and tight-fitting. ♦

### References

1. Padilla R, Dorney B, Balikov S. Prevention of oral injuries. *J Calif Dent Assoc* 1996; 24(3):30–6.
2. Padilla R. Sports in daily practice. *JADA* 1996; 127:815–7.
3. Guyette RF. Facial injuries in basketball players. *Clin Sports Med* 1993; 12(2):247–64.
4. Morrow RM, Bonci T. A survey of oral injuries in female college and university athletes. *Ath Train* 1989; 24(3):236–7.
5. Greasley A. Materials engineering. Open University, Milton Keynes, Buckinghamshire, England. *Br J Sports Med* 3-19-98.
6. Chapman PJ, Nasser BP. Attitudes to mouthguards and prevalence of orofacial injuries in four teams competing at the Second World Rugby Cup. *Br J Sports Med* 1993; 27(3):1197–9.
7. McNutt T, Shannon SW Jr, Wright JT, Feinstein RA. Oral trauma in adolescent athletes, a study of mouth protectors. *Pediatr Dent* 1989; 11(3):209–13.
8. Hunter K. Modern Mouthguards, Dental Outlook, Volume 15, No. 3, Sept. 1989.



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*The author has no declared financial interests in any company manufacturing the types of products mentioned in this article.*

*Dr. Padilla's session at the ISDST symposium, titled "Trauma prevention through modern athletic mouthguards," will be presented on Friday, August 26. Dr. Padilla will also be a co-presenter for the FDI pre-congress course "Sport dentistry and custom mouthguard fabrication," to be offered Monday, August 22.*

## Question 4 What role do mouthguards play in preventing concussions?

### Background to the Problem

Concussion, also known as minor traumatic brain injury, is an unfortunate reality in contact sports, especially football, rugby and ice hockey. These injuries can cause both significant loss of time from competition as well as premature retirement from the sport. As a result, teams and leagues have begun to look at methods to reduce the number of concussions, including both rule changes and equipment modifications.

Many commercial mouthguard manufacturers claim that their mouthguards drastically reduce the risk of concussions to promote and market their over-the-counter products. However, they offer no scientific validation of these extravagant claims.

Three mechanisms have been proposed for mouthguards in reducing the incidence or severity of concussion.

### Proposed Mechanisms of Protection

#### Opening of the Condylar Space

The condylar head rests in close approximation to the base of the glenoid fossa. Should the jaw receive an upward blow, especially at the chin point, the condylar head might be driven into this fossa, which could result in a potentially traumatic force being delivered to the temporal area of the skull (Fig. 1).

A mouthguard with appropriate occlusal dimensions might serve to open up this "condylar space" by distracting the condyle from the fossa, thus providing additional room for the condylar head to translate upward before making contact with the base of the glenoid fossa and the skull (Fig. 2).

#### Dissipation of Forces

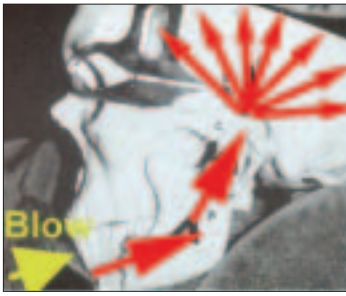
The results of a blow to the jaw can include deformation of the bones of the skull and substantial jarring of the brain. By placing a material with appropriate shock-absorbing qualities between the upper and lower teeth, the upward force might be dissipated across a greater area and be rendered potentially less traumatic to the brain and skull (Fig. 3).

#### Reduction of Rotational Forces

Many clinicians feel that the root cause of cerebral concussions is the rotational torque that the brain suffers when the skull is jarred in any axis. The placement of an appropriately designed mouthguard might allow an athlete to exert greater clenching forces with the head and neck muscles, thus stabilizing the skull and reducing the arc of rotation after a traumatic hit to the head or body (Fig. 4).

#### Evidence for Proposed Benefits

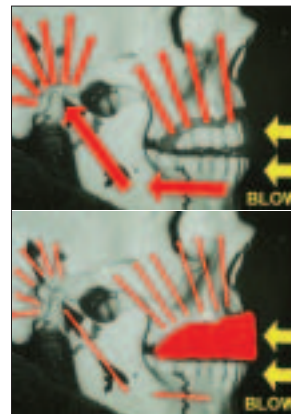
Although a number of authors<sup>1,2</sup> have alluded to the role that mouthguards might play in reducing the number and



**Figure 1:** Blows to the chin may be transmitted to the temporal regions and other areas of the head. (Figures courtesy of Dr. N. Biasca.)



**Figure 2:** Mouthguards can open up the space between the condylar head and the glenoid fossa to provide reduced impact force.



**Figure 3:** Mouthguards may dissipate and reduce forces to the head.



**Figure 4:** Clenching on a mouthguard may increase neck muscle activity and stabilize the head against rotational forces.

severity of concussions, there are no clear scientific data to prove these claims. McCrory<sup>3</sup> recognized the role of mouthguards in reducing dental and orofacial injuries but noted the absence of research linking concussion prevention with these devices. Marshall<sup>4</sup> showed that although mouthguards reduced orofacial injuries in rugby players, they did not lessen the risk of concussion.

### Management of the Problem

Despite the lack of hard clinical evidence, many clinicians still feel that an important component of any return-to-play protocol after a concussion should be a properly fitted mouthguard. Dentists can certainly confirm the beneficial effects of mouthguards in reducing dental trauma but should be extremely cautious in making any unsubstantiated claims regarding prevention of concussion.

It is possible that ongoing research may eventually prove a link between mouthguards and concussions. As McCrory noted, “Absence of proof is not proof of absence.”<sup>3</sup> Until then, by using proper design components and materials in the fabrication of mouthguards, dentists can minimize the risk of orofacial trauma and possibly provide additional neurological protection. The following are considered important aspects of design and materials for mouthguards:

- Delivering only custom-made mouthguards fabricated from a properly extended model of the maxillary teeth using recognized stable materials such as ethylene vinyl acetate (EVA).
- Using techniques such as pressure lamination to improve both fit and comfort, to ensure that the mouthguard stays in place at the time of a blow to the head.
- Extending the guard onto the molar areas — as far back as the athlete can tolerate — to maximize the potential for force dissipation.
- Maintaining an optimal occlusal thickness — currently thought to be at least 3 to 4 mm for adult males — to

increase energy absorption and gain any potential benefit from opening of the condylar space.

- Balancing the occlusion on the guard to reduce specific areas of stress to the teeth or supporting bone. ♦



*Dr. Paul Piccininni is a member of both the International Olympic Committee (IOC) Medical Commission Games Group and the International Ice Hockey Federation Medical Committee. He has worked with the IOC at the past 5 Olympic Games and is part of the Sport Medicine team at York University in Toronto, Ontario. E-mail: peachtor@aol.com.*

*Dr. Piccininni is co-chair of the ISDST symposium. His session, titled “Sport dentistry and the role of the team dentist” will be presented on Friday, August 26. Dr. Piccininni will also be a co-presenter for the pre-congress course “Sport dentistry and custom mouthguard fabrication,” offered on Monday, August 22.*

### References

1. Barth JT, Freeman JR, Winters JE. Management of sports-related concussions. *Dent Clin North Am* 2000; 44(1):67–83.
2. Biasca N, Wirth S, Tegner Y. The avoidability of head and neck injuries in ice hockey: an historical review. *Br J Sports Med* 2002; 36(6):410–27.
3. McCrory P. Do mouthguards prevent concussion? *Br J Sport Med* 2001; 35(2):81–2.
4. Marshall SW, Loomis DP, Waller AE, Chalmers DJ, Bird YN, Quarrie KI, and other. Evaluation of protective equipment for prevention of injuries in rugby union. *Int J Epidemiol* 2004; 31(1):113–8. Epub 2004 Nov 23.

### Further Reading

Aubry M, Cantu R, Dvorak J, Graf-Baumann T, Johnston K, Kelly J, and others. Summary and agreement statement of the first International Conference on Concussion in Sport, Vienna 2001. Recommendations for the improvement of safety and health of athletes who may suffer concussive injuries. *Br J Sports Med* 2002; 36(1):6–10.



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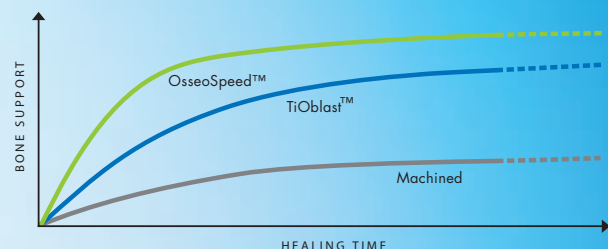
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Ellingsen J. E., Pre-treatment of Titanium Implants with Fluoride Improves Their Retention in Bone. *J of Mater Sci Mater in Med* 1995;6:749-753

Ellingsen J. E. et al., Increasing Biocompatibility by Chemical Modification of Titanium Surfaces. *Bio-Implant Interface: Improving Biomaterials and Tissue Reactions*. CRC Press 2003;323-340

Ellingsen J. E. et al., Improved Retention and Bone-to-implant Contact with Fluoride-modified Titanium Implants. *Int J Oral & Maxillofac Implants* 2004;19:659-666

Berglundh T. et al., Healing of implants with fluoride modified surfaces. (in preparation).

Cooper L. et al., Fluoride modification effects on osteoblast behavior and bone formation at TiO<sub>2</sub>-grit blasted c.p. titanium endosseous implants. (in press)

Gaifredsen K. et al., Histomorphometric and Removal Torque Analysis for TiO<sub>2</sub>-blasted Titanium Implants. *Clin Oral Impl Res* 1992;3:77-84.

Rasmusson L. et al., A 10-Year Follow-up Study of Titanium Dioxide-blasted Implants. *Clin Implant Dent Relat Res* 2005;7:1-6



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# Diagnostic Challenge

The Diagnostic Challenge is submitted by the Canadian Academy of Oral and Maxillofacial Radiology (CAOMR). The challenge consists of the presentation of a radiology case.

Since its inception in 1973, the CAOMR has been the official voice of oral and maxillofacial radiology in Canada. The Academy contributes to organized dentistry on broad issues related to dentistry in general and issues specifically related to radiology. Its members promote excellence in radiology through specialized clinical practice, education and research.



## CAOMR Challenge No. 18

Gurminder Sidhu, BDS  
Axel Ruprecht, DDS, MScD, FRCDC(C)

### Case History

A 45-year-old black woman presented to the clinic for a routine dental checkup. Her medical history was non-contributory. Extraoral and intraoral examinations yielded no significant findings. A pantomograph and 3 bitewing radiographs were made as part of her comprehensive oral examination. The findings on these radiographs prompted further periapical radiographs.

The pantomograph (Fig. 1) showed multiple radiopaque masses surrounded by a radiolucent band. This band was surrounded by a radiopaque line in the molar regions of the mandible bilaterally, in the right molar region of the maxilla and in the left premolar region. No associated displacement of roots or root resorption was seen. The

original pantomograph was no longer available and the copy was not of the same quality.

The 10 periapical radiographs (Fig. 2) showed multiple radiopaque masses surrounded by a radiolucent band. A radiopaque line surrounding this band could be seen at the apices of the right maxillary premolars. Asymmetrical hypercementosis was seen on the left maxillary canine. There was hypercementosis and loss of lamina dura on the left mandibular central incisor. A lobulated radiopaque mass was surrounded by a radiolucent band, which itself was surrounded by a radiopaque line in association with the root apices of the left mandibular permanent central and lateral incisors and the lesions previously seen on the pantomograph. ♦



**What is the diagnosis?**

(See page 276 for answers)

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## Answer to CAOMR Challenge No. 18

### 1. What is the diagnosis?

This patient has cemento-osseous dysplasia.

Cemento-osseous dysplasias are considered to be non-neoplastic, reactive conditions in which there is localized replacement of bone by fibrous tissue. There will usually be deposition of osteocementum within the fibrous tissue. Traditionally these dysplasias have been classified into 3 categories, based on their location and size:

1. Periapical cemento-osseous dysplasia: lesions around the apices of one or more teeth, predominantly in the mandibular anterior region.
2. Focal cemento-osseous dysplasia: solitary lesions predominantly in the posterior mandible.
3. Florid cemento-osseous dysplasia: bilateral lesions, either in the mandible or involving all 4 posterior quadrants.

Periapical cemento-osseous dysplasia, previously known as cementoma, periapical cemental dysplasia, periapical fibrous dysplasia and periapical osteofibrosis, occurs primarily around the mandibular anterior teeth.<sup>1</sup> In approximately one-third of cases, it is associated with just one tooth; in the other two-thirds it involves multiple teeth, often contiguous. The condition is more common in middle-aged black women. Radiographically, periapical cemento-osseous dysplasia can present as a completely radiolucent area, a mixed radiolucent and radiopaque area or a predominantly radiopaque area. The lesion is usually well defined.

Focal cemento-osseous dysplasia often involves a single site, more commonly the mandibular posterior region. It can occur in the anterior region. The lesion tends to be larger than those seen in periapical cemento-osseous dysplasia.<sup>2</sup> Radiographically, the lesion usually presents as a radiopaque mass surrounded by a radiolucent band, which is often surrounded by a radiopaque line. It can present as a completely radiolucent area, in which case, clinical history and pulp vitality testing can help differentiate it from other lesions.

Florid cemento-osseous dysplasia has been reported in the older literature under the terms sclerosing osteitis, gigantiform cementoma and chronic diffuse sclerosing osteomyelitis. In 1976 Melrose and others<sup>3</sup> introduced the term florid osseous dysplasia. As the term “florid” implies, these lesions tend to be larger than the lesions seen in periapical cemento-osseous dysplasia and involve multiple quadrants, either all 4 quadrants or bilaterally in the mandible. The authors reported 34 cases of what is now called florid cemento-osseous dysplasia, of which 32 were in middle-aged black women (mean age: 42 years).<sup>3</sup> The common radiological appearance of florid cemento-osseous dysplasia is that of multiple radiopaque masses surrounded by a radiolucent band, which is often itself surrounded by

a radiopaque line. The lesions are bilateral, often somewhat symmetrical, and may be just in the mandible or involve all 4 quadrants, usually posteriorly.

Most practitioners now consider cemento-osseous dysplasias as one condition with a spectrum of findings. Thus the adjectives periapical, focal and florid are merely used to describe the morphology of the lesions rather than denote different entities.

The lesions are usually found on dental radiographs made for other reasons. Clinically, the patients are usually asymptomatic, although large florid cemento-osseous dysplasia lesions can cause local enlargement of the jaw and may cause dull pain. Because this condition is unrelated to the pulp, the pulps of the teeth in the affected region are usually vital.

If the teeth in the affected region are extracted for reasons other than the presence of cemento-osseous dysplasia, the lesion itself may be left behind. When this occurs, the lesion is referred to as residual cemento-osseous dysplasia.

As with other fibro-osseous lesions, such as fibrous dysplasia, simple bone cysts have been found in association with cemento-osseous dysplasia.

Cemento-osseous dysplasia does not require treatment if the patient is asymptomatic. Biopsy is usually not indicated because the radiographic appearances are most often quite characteristic. Exposure of the sclerotic osseous and cemental masses to the oral environment by biopsy, or secondary to tooth loss or alveolar ridge atrophy under a denture, can lead to secondary infection and osteomyelitis.

The differential diagnosis of cemento-osseous dysplasias includes ossifying fibroma and fibrous dysplasia. ♦



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## References

1. Neville BW, Damm DD, Allen CM, Bouquot JE. Oral & maxillofacial pathology. 2nd ed. W.B. Saunders Co.; 2002. p. 557–61.
2. Su L, Weathers DR, Waldron CA. Distinguishing features of focal cemento-osseous dysplasia and cemento-ossifying fibromas. II. A clinical and radiologic spectrum of 316 cases. *Oral Surg Oral Med Oral Pathol Oral Radio Endod* 1997; 84(5):540–9.
3. Melrose RJ, Abrams AM, Mills BG. Florid osseous dysplasia: A clinical-pathologic study of thirty-four cases. *Oral Surg Oral Med Oral Pathol* 1976; 41(1):62–82.

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# Clinical Abstracts

The Clinical Abstracts section features abstracts and summaries from peer-reviewed dental publications. It attempts to make readers aware of recent literature that may be of interest to oral health care workers. It is not intended to provide a systematic review of the topic. This month's articles were chosen by Dr. James Noble, a dental resident at Mount Sinai Hospital, Toronto, Ontario, Dr. Angelos Metaxas, associate professor in the department of orthodontics, faculty of dentistry, University of Toronto, and Dr. David Locker, professor in the Community Dental Health Services Research Unit, faculty of dentistry, University of Toronto.

## Commentary

### Methods to Prevent White Spot Lesions during Orthodontic Treatment

James Noble, BSc, DDS; Angelos Metaxas, DDS, Dip Ortho, MSc, DDent;  
David Locker, BDS, PhD

Orthodontic brackets provide a surface to which carbohydrates and bacteria, such as *Streptococcus mutans* and species of *Lactobacillus*, can adhere. They also make oral hygiene more difficult. These factors increase orthodontic patients' risk of acquiring dental caries, which manifests itself as white spot lesions. These lesions occur secondary to a decrease in pH, resulting in the diffusion of calcium and phosphate from enamel. The lesions are chalky, and if severe, cavitation may occur. Furthermore, they are unesthetic and potentially resistant to remineralization.

Patient education, diet counselling and regular hygiene appointments are primary strategies to prevent white spot lesions. Daily use of a fluoridated toothpaste (1100 ppm fluoride) and mouth rinse (0.05% sodium fluoride) reduces or prevents white spot lesions in orthodontic patients. However, because compliance is problematic, professionally applied topical fluoride (PATF) is recommended. Traditionally, PATF has been applied as a gel or foam in trays, but the use of fluoride varnish is a desirable alternative. A recent systematic review of caries prevention found that the evidence supporting the efficacy of PATF in individuals at high risk for caries was insufficient except for fluoride varnish.<sup>1</sup> Fluoride varnish has been shown to prevent the development and formation of caries (see **abstract 1**). The varnish stays on enamel longer, does not require a dry field for application and has the highest concentration of fluoride of all PATF methods. Ingestion of fluoride is also reduced with this method of application.

Compliance is also not an issue when brackets are bonded with fluoride-releasing composite resin, glass ionomer and zinc polycarboxylate cement (see **abstract 2**). Because of the risk of bracket debonding, resin-modified glass ionomer (RMGI) cements and compomers have been introduced (see **abstract 3**).

Most clinical studies compare the effect of glass ionomer to composite resin in preventing white spot lesions and yield conflicting results. Several studies indicate no significant difference between the materials<sup>2-4</sup> while others demonstrate significantly more demineralization with composite resin.<sup>5,6</sup> Only 2 studies have quantitatively

assessed the level of demineralization. Gorton and others found that glass ionomer significantly reduced the amount of enamel mineral loss compared to composite resin (see **abstract 4**). Similarly, Pascotto and others found a significantly increased amount of enamel demineralization with brackets bonded with composite resin compared to RMGI (see **abstract 5**). Other advantages of glass ionomer are that etching of enamel is not required and the bond with enamel is stronger than stainless steel. If there is bond failure, it occurs between the band and the cement, thereby preventing microleakage and demineralization under loose bands. The major disadvantage of glass ionomer and RMGI (which possesses a greater adhesive strength than glass ionomer) is the significantly higher risk of debonding.<sup>2,7</sup>

Delivery of fluoride from the elastomeric ligature may be an attractive alternative to fluoride-releasing cements. Patients receive fluoride when the ligatures are replaced at each orthodontic visit. Banks found a significantly reduced amount of decalcification at the end of orthodontic treatment when fluoride-containing elastic ligatures had been used (see **abstract 6**). Mattick found similar results.<sup>8</sup> These findings suggest that fluoride-releasing ligatures are effective in preventing white spot lesions. ♦

## References

1. Bader JD, Shugars DA, Bonito AJ. A systematic review of selected caries prevention and management methods. *Community Dent Oral Epidemiol* 2001; 29(6):399-411.
2. Gaworski M, Weistein M, Borislow AJ, Braitman LE. Decalcification and bond failure: a comparison of a glass ionomer and a composite resin bonding system in vivo. *Am J Orthod Dentofacial Orthop* 1999; 116(5):518-21.
3. Millett DT, Nunn JH, Welbury RR, Gordon PH. Decalcification in relation to brackets bonded with glass ionomer cement or a resin adhesive. *Angle Orthod* 1999; 69(1):65-70.
4. Gilgrass TJ, Benington PC, Millett DT, Newell J, Gilmour WH. Modified composite or conventional glass ionomer for band cementation? A comparative clinical trial. *Am J Orthod Dentofacial Orthop* 2001; 120(1):49-53.
5. Marcusson A, Norevall LI, Persson M. White spot reduction when using glass ionomer cement for bonding in orthodontics: a longitudinal and comparative study. *Eur J Orthod* 1997; 19(3):233-42.
6. Twetman S, McWilliam JS, Hallgren A, Oliveby A. Cariostatic effect of glass ionomer retained orthodontic appliances. An in vivo study. *Swed Dent J* 1997; 21(5):169-75.

7. Hegarty DJ, Macfarlane TV. In vivo bracket retention comparison of a resin-modified glass ionomer cement and a resin-based bracket adhesive system after a year. *Am J Orthod Dentofacial Orthop* 2002; 121(5):496–501.

8. Mattick CR, Mitchell L, Chadwick SM, Wright J. Fluoride-releasing elastomeric modules reduce decalcification: a randomized controlled trial. *J Orthod* 2001; 28(3):217–9.

## 1 Does fluoride varnish prevent demineralization around orthodontic brackets?

Ogaard B, Dushner H, Ruben J, Arends J. Microradiography and confocal laser scanning microscopy applied to enamel lesions formed in vivo with and without fluoride varnish treatment. *Eur J Oral Sci* 1996; 104(4 Pt 1):378–83.

### Background

The effectiveness of fluoride varnish in preventing caries is well documented. It is uncertain, however, if fluoride varnish prevents decalcification of sound enamel during orthodontic treatment. This in vivo study examined the development and progression of caries with and without fluoride varnish on both carious and sound enamel. Analysis of mineral loss was done using quantitative microradiography (TMR) and confocal laser scanning microscopy (CLSM).

### Methods

Seven patients had orthodontic bands placed on 10 pairs of premolars to be extracted for orthodontic reasons. Six pairs of teeth were used to assess caries development. One premolar was treated with fluoride varnish and the contralateral tooth was used as a control. After 4 weeks, all 12 teeth were extracted. The other 4 pairs of teeth were used to assess caries progression. Four weeks after placement of the bands, one untreated tooth of each pair was extracted; the other tooth received fluoride varnish and

was extracted after another 2 weeks. All teeth were then assessed by TMR and CLSM.

### Results

TMR analysis demonstrated that treatment with fluoride varnish on sound enamel decreased lesion depth by 48% compared to the control group ( $p = 0.02$ ). No significant difference in mineral loss was found. In the caries progression part of the study, no significant difference was found between the treated and untreated teeth. CLSM image results were similar to TMR measurements. In lesions treated with fluoride varnish, the CLSM images demonstrated more light scattering, indicating precipitation of enamel.

### Clinical Significance

Findings from this study indicate that the application of a fluoride varnish to sound enamel prevents lesion development and progression. TMR and CLSM techniques are useful for providing information on the ultrastructural details of fluoridated lesions. ♦

## 2 Which orthodontic cement is superior, glass ionomer or zinc polycarboxylate?

Dincer B, Erdinc AM. A comparison between zinc polycarboxylate and glass ionomer cement in the orthodontic band cementation. *J Clin Pediatr Dent* 2002; 26(3):285–8.

### Background

This study examined the frequency of recementation, enamel decalcification, and the degree of cement remaining after debanding on molars banded with zinc polycarboxylate and glass ionomer cements. Both cements contained fluoride.

### Methods

A total of 486 molar bands were cemented with either zinc polycarboxylate or glass ionomer in 148 patients. When the bands were recemented during the course of this study lasting 2 years and 4 months, the enamel surface was checked for hypocalcification and the percentage of cement remaining was recorded.

### Results

Glass ionomer cement had significantly superior retentive properties. Twenty-eight percent of the bands cemented with zinc polycarboxylate required recementation, compared with only 10% for glass ionomer cement. Glass ionomer cement also demonstrated superior abilities in preventing enamel decalcification and more cement remained on the teeth at the time of debanding.

### Clinical Significance

This study suggests that glass ionomer has superior qualities than zinc polycarboxylate with respect to frequency of recementation, enamel decalcification and the quantity of cement remaining after debanding. ♦

3

**Does fluoride released from a compomer or resin-modified glass ionomer protect against demineralization?**

Chung CK, Millett DT, Creanor SL, Gilmour WH, Foye RH. Fluoride release and cariostatic ability of a compomer and a resin-modified glass ionomer cement used for orthodontic bonding. *J Dent* 1998; 26(5-6):533-8.

**Background**

This study compared the local and systemic uptake of fluoride released from a compomer and resin-modified glass ionomer (RMGI) cement and assessed the cariostatic ability of these materials compared to a control (composite resin).

**Methods**

Twenty-six pairs of premolars to be extracted for orthodontic reasons were randomly assigned a test material on one side and a control on the contralateral side. The release of fluoride was measured using saliva, plaque and urine samples and demineralization was measured by assessing the buccal surface of each extracted tooth using a caries index.

**Results**

Salivary and urinary fluoride concentration did not significantly increase 4 weeks after bonding. The concentration of plaque fluoride significantly increased around premolars bonded with the RMGI cement. The fluoride-containing materials were associated with significantly less demineralization than the control material ( $p = 0.016$ ), but no difference in cariostatic ability was demonstrated.

**Clinical Significance**

Fluoride released from a compomer and a RMGI cement is local, not systemic. These materials have the ability to inhibit demineralization around brackets but they are not cariostatic. ♦

4

**Is there a difference in enamel demineralization between glass ionomer cement and composite resin?**

Gorton J, Featherstone JD. In vivo inhibition of demineralization around orthodontic brackets. *Am J Orthod Dentofacial Orthop* 2003; 123(1):10-4.

**Background**

Studies comparing demineralization around orthodontic brackets using fluoride-releasing glass ionomer and composite resin yield conflicting results. Furthermore, no clinical trial has yet to quantitatively measure in vivo demineralization. The present study quantitatively investigated the level of demineralization of teeth to determine if glass ionomer prevents and reduces the amount of demineralization of enamel surrounding orthodontic brackets.

**Methods**

This double-blind, randomized controlled trial examined 21 patients (11 to 18 years old) scheduled to have 2 or more premolars extracted for orthodontic treatment. Eleven subjects received glass ionomer cement and 10 received composite resin. The teeth were extracted 4 weeks later, sectioned and evaluated using microhardness

testing. Fluoride levels were also assessed at days 0, 1, 2, 3, 7, 14, 21 and 28 to determine if fluoride from the glass ionomer had an effect on the overall salivary fluoride levels.

**Results**

Microhardness testing indicated that decalcification was significantly greater in patients receiving composite resin ( $p < 0.01$ ). No significant differences were found between the glass ionomer and composite resin groups for intraoral whole saliva fluoride levels ( $p = 0.06$ ) when the data was analyzed at each time point using a 2-sample  $t$ -test.

**Clinical Significance**

Quantitative testing showed that, in a 4-week period, use of glass ionomer cement resulted in significantly less mineral loss and prevented or reduced white spot lesions around orthodontic brackets. ♦



## 5 Is there a difference in enamel demineralization between resin-modified glass ionomer cement and composite resin?

Pascotto RC, Navarro MF, Filho LC, Cury JA. In vivo effect of a resin-modified glass ionomer cement on enamel demineralization around orthodontic brackets. *Am J Orthod Dentofacial Orthop* 2004; 125(1):36–41.

### Background

Resin-modified glass ionomer (RMGI) cements have the same advantageous properties as conventional glass ionomer cements, with greater adhesive strength. However, their anticariogenic properties have yet to be evaluated clinically. This randomized in vivo study quantitatively compared enamel demineralization in patients with brackets bonded either with a RMGI cement or composite resin.

### Methods

Fourteen patients were randomly assigned to a control (composite resin) or experimental group (RMGI) and 23 brackets were bonded to their premolars. The teeth were extracted after 30 days, sectioned longitudinally and enamel demineralization was determined by cross-sectional microhardness testing.

### Results

ANOVA showed less enamel demineralization around brackets bonded with a RMGI cement than those bonded with composite resin (statistical significance:  $p < 0.05$ ). The effect of demineralization was more evident in the cervical area, not the occlusal region.

### Clinical Significance

The study showed a significant decrease in enamel demineralization with the RMGI cement. This effect was greater in the cervical region. The release of fluoride from a RMGI cement decreases with time; therefore, a limitation of this study was that it evaluated enamel demineralization after only 30 days. ♦

## 6 Do fluoride-releasing elastomeric modules prevent or reduce white spot lesions?

Banks PA, Chadwick SM, Asher-McDade C, Wright JL. Fluoride-releasing elastomerics — a prospective controlled clinical trial. *Eur J Orthod* 2000; 22(4):401–7.

### Background

Incorporating fluoride into elastomeric ligatures and chains provides a unique opportunity to deliver fluoride to banded teeth when the ligatures are replaced at regular orthodontic appointments. Clinicians can use composite resin as a bracket bonding material because of its bond strength, yet still ensure fluoride is delivered at the level of the bracket. This study examined whether fluoride-containing elastomerics significantly prevented enamel demineralization compared to standard elastomerics.

### Methods

Patients were divided into 2 groups: the experimental group of 49 patients (782 teeth) received fluoride-containing elastomerics and the control group of 45 patients (740 teeth) received nonfluoridated elastomerics. All brackets

were bonded with composite resin. Elastomerics were replaced at 4–6 week intervals. At the completion of treatment, all patients were scored using an Enamel Decalcification Index.

### Results

Twenty-six percent of the control group showed decalcification compared to 16% of the experimental group ( $p < 0.001$ ). The experimental group also demonstrated a significantly lower score per tooth (49% difference,  $p < 0.001$ ).

### Clinical Significance

This study indicates that a significant reduction in enamel decalcification can occur when fluoride-containing elastomerics are changed at 4–6 week intervals. ♦

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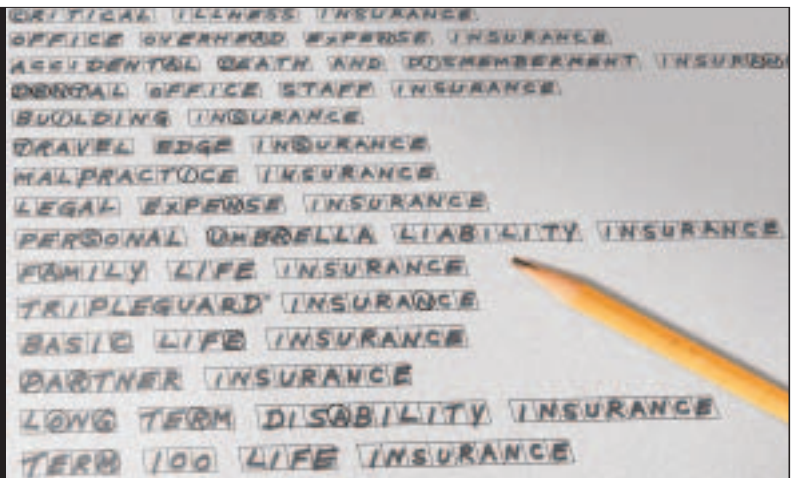
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D1634

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D1688

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D1704

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D1678

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D1652

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D1621

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D1555

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D1548

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D1697

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D1686

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D1663

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D1628



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D1695

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**ONTARIO - Ottawa (Orleans):** Maternity leave replacement needed for 3 months. Full-time hours beginning July 1. We have several bilingual patients. French and English speaking would be an asset. Established clientele with modern facility and energetic staff, possibility of part-time hours afterwards. Please call (613) 834-5959, or fax resume to (613) 830-1752. D1698

**ONTARIO - Mississauga:** Part-time associate position available April 2005 in large, well-established, 9-operator practice. Two of the principal dentists are reducing their hours permanently. Approximately 3 days a week to start. Long-term patients and a wonderful staff to work with. You can visit us on our Web site [www.willowdental.com](http://www.willowdental.com). Please e-mail resume to [willowdental@on.aibn.com](mailto:willowdental@on.aibn.com). D1699



**'NAMGIS DENTAL CLINIC**  
(Alert Bay, British Columbia)  
is seeking a  
**Dentist**

We are seeking a highly motivated dentist to operate our modern three-operator dental clinic. The 'Namgis Dental Clinic serves the residents of Alert Bay and other northern-Vancouver Island communities. The successful candidate will provide a full range of treatment services. An attractive compensation package with a combination of salary and shared billings, plus no overhead, make this an excellent opportunity for someone seeking the rewards and challenges of dentistry without the usual financial stress.

The community of Alert Bay is located in Johnstone Strait, off the northeast tip of Vancouver Island. We offer some of the world's best fishing, whale watching, kayaking, and other outdoor pursuits. The community is also a growing centre for Aboriginal artistic expression in all forms including carving, dance, and other traditions. For more information on the community, please visit our website at [www.namgis.org](http://www.namgis.org)

**For more information on the position, please contact:**

Ian Knipe, Administrator

P.O. Box 290, Alert Bay, B.C. V0N 1A0

ph: (250) 974-5522, fax: (250) 974-2736 e-mail: [IanK@namgis.bc.ca](mailto:IanK@namgis.bc.ca)

D1598



**Tenure Track Faculty Position in  
Oral/Maxillofacial Surgery  
College of Dentistry  
University of Saskatchewan**

The College of Dentistry invites applications from qualified individuals for a faculty position in oral/maxillofacial surgery. The college is implementing an active program of curriculum renewal, faculty renewal, and research intensification. This position is a key part of that process. Start date is July 1, 2005 or when a suitable candidate is found. Responsibilities and duties include didactic and clinical instruction of undergraduate students in oral/maxillofacial surgery, an ongoing research commitment, and college administration. The applicant must have relevant postgraduate and clinical qualifications at the FRCD(C) or equivalent level and research experience. Possession of an advanced degree is desirable. The MD degree would be an asset. The ideal candidate will be from a CDA/ADA-approved oral/maxillofacial surgery residency program with significant experience in dentoalveolar and orthognathic surgery, TMD, anesthesia, implantology, pathology and trauma management. On-site private practice privileges are available. The Royal University Hospital and College of Medicine are adjacent to the College of Dentistry and the successful candidate is expected to become involved with programs and initiatives in these institutions. Rank and salary will be commensurate with experience and qualifications. The university is committed to employment equity. Members of designated groups (women, Aboriginal people, people with disabilities and visible minorities) are encouraged to self-identify on their applications. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. Further information about our college and its programs is available at [www.usask.ca/dentistry](http://www.usask.ca/dentistry).

A letter of application, accompanied by a *curriculum vitae*, professional credentials, a statement of teaching and research interests, and the names of three referees should be sent to:

**Dr. James E. Stakiw**  
College of Dentistry  
University of Saskatchewan  
105 Wiggins Road, Saskatoon, Saskatchewan S7N 5E4  
Tel (306) 966-5122 • Fax (306) 966-5132  
E-mail [james.stakiw@usask.ca](mailto:james.stakiw@usask.ca)

Applications with complete documentation will be accepted until April 30, 2005 or until a suitable candidate is found.

D1672



**Tenure Track Faculty Position in  
Pediatric Dentistry  
College of Dentistry  
University of Saskatchewan**

The College of Dentistry invites applications from qualified individuals for a faculty position in pediatric dentistry. The College of Dentistry is implementing an active program of curriculum renewal, faculty renewal, and research intensification. The successful candidate will be an integral part of this process. Applicants will have postgraduate training in pediatric dentistry at the Masters or PhD level with relevant clinical qualifications (FRCD(C) preferred), and the successful candidate will have research experience. Responsibilities will include didactic and clinical instruction of undergraduate students, research programs and administration. Pediatric general anesthetic services are currently available. On-site private practice privileges are available. The Royal University Hospital and College of Medicine are adjacent to the College of Dentistry and the successful candidate is expected to become involved with programs and initiatives in these institutions. Rank and salary will be commensurate with experience and qualifications. The university is committed to employment equity. Members of designated groups (women, Aboriginal people, people with disabilities and visible minorities) are encouraged to self-identify on their applications. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. Further information about our college and its programs is available at [www.usask.ca/dentistry](http://www.usask.ca/dentistry).

A letter of application, accompanied by a *curriculum vitae*, professional credentials, a statement of teaching and research interests, and the names of three referees should be sent to:

**Dr. James E. Stakiw**  
College of Dentistry  
University of Saskatchewan  
105 Wiggins Road, Saskatoon, Saskatchewan S7N 5E4  
Tel (306) 966-5122 • Fax (306) 966-5132  
E-mail [james.stakiw@usask.ca](mailto:james.stakiw@usask.ca)

Applications with complete documentation will be accepted until April 15, 2005 or until a suitable candidate is found.

D1673

**FULL-TIME ASSOCIATE  
Moose Jaw, Saskatchewan**

Associate needed to join our busy, progressive practice in a mid-sized thriving community. We are looking for a high-energy team player who wants to provide quality dentistry for an existing and growing clientele. Our associate will join two dentists and a large team dedicated to continuing education opportunities such as the Las Vegas Institute, Practice Management, and team building seminars. Our clinic offers leading edge technologies including hard/soft tissue lasers, intra-oral cameras, digital radiography, fully computerized operatories and front desk. Our staff is exceptionally well educated and has learned to produce truly amazing results. We would prefer a candidate with previous experience but are willing to entertain new graduate applications as well. This is an exciting opportunity in one of Canada's top practices and we look forward to meeting you.

Please send resume / enquiries to: **Administration, PO Box 1442, Moose Jaw, SK S6H 4R3, E-mail [kviczko@sasktel.net](mailto:kviczko@sasktel.net), Tel. (306) 692-6438.**

D1668



**Tenure Track Faculty Position in  
Community Dentistry/Public Health  
College of Dentistry  
University of Saskatchewan**

The College of Dentistry invites applications from qualified individuals for a faculty position in community dentistry/public health. The College of Dentistry is implementing an active program of curriculum renewal, faculty renewal, research intensification, and community outreach. The successful candidate will be an integral part of this process. Responsibilities will include teaching and coordination of the undergraduate academic program in community oral health in all its aspects. A significant part of this position will be devoted to the development of outreach programs that will include provision of oral health care but will include the development of a total community awareness initiative that will provide students with an in depth understanding of the community that each practitioner will ultimately serve. This outreach engagement will also include international programs that have been part of the college for over 25 years. There will be ample scope within this appointment to engage in and initiate active research programs within the college and the interdisciplinary health sciences. Participation in the Masters of Public Health graduate program now under development at the university is encouraged. The candidate should have significant and successful experience in community health or oral health programs and initiatives and bring to the college an enthusiasm for furthering and enhancing the role and profile of the college in the community. The candidate should have an advanced degree in dental public health or equivalent at the Masters or PhD level. Rank and salary will be commensurate with experience and qualifications. The university is committed to employment equity. Members of designated groups (women, Aboriginal people, people with disabilities and visible minorities) are encouraged to self-identify on their applications. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. Further information about our college and its programs is available at [www.usask.ca/dentistry](http://www.usask.ca/dentistry).

A letter of application, accompanied by a *curriculum vitae*, professional credentials, a statement of teaching and research interests, and the names of three referees should be sent to:

**Dr. James E. Stakiw**  
College of Dentistry  
University of Saskatchewan  
105 Wiggins Road, Saskatoon, Saskatchewan S7N 5E4  
Tel (306) 966-5122 • Fax (306) 966-5132  
E-mail [james.stakiw@usask.ca](mailto:james.stakiw@usask.ca)

Applications with complete documentation will be accepted until April 30, 2005 or until a suitable candidate is found.

D1671

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at no additional charge.**

**ONTARIO - Mississauga/GTA:** ODA member required for occlusal equilibration research. Please call (905) 278-3725 or fax resume to (905) 278-4341. D1701

**ONTARIO - London:** Full-time general dental associate required. For a complete description of the office please log on to the Web site. Submit resumes and/or enquiries to: Dr. Anwar Dean, Clinic Director, Cosmo Dental Centre, 373 Clarke Rd., London, ON N5W 5G4; tel. (519) 636-8447 (evgs.), e-mail anwar.dean@sympatico.ca, Web site www.cosmodentalcentre.com. D1702

**ONTARIO - Northern:** Large, well-established dental practice is seeking a full-time associate. Must have above-average clinical and communication skills and be able to work well in a busy, team-oriented atmosphere. Situated in Northern Ontario, this great family town offers fishing, hunting, snowmobiling, ATV and many more outdoor activities. This is an excellent opportunity for anyone wishing to enjoy a wonderful lifestyle while practising dentistry at its best. Our

clinic includes three dental hygienists, intraoral camera and privilege to do restorative work under general anesthesia. Bilingualism an asset. Drs. Gilles Lecours and Stephane Villeneuve, PO Box 1000, Hearst, ON P0L 1N0; tel. (705) 372-1601, fax (705) 362-8170. D1703

**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. Luc, tel. (450) 370-7765. D1674

**ONTARIO - Cambridge:** Part-time associate required for 2-3 days in a 9-year-old, fast-growing, family-oriented, multilingual general dental practice. Please fax resume to (519) 622-3608, e-mail sgeorgn625@rogers.com. D1682

**ONTARIO - Northwestern:** Associateship available immediately. Full-time as-

sociateship with option to purchase. Busy family practice located in Northwestern Ontario, conveniently located on Trans Canada Highway. Twenty-eight-year-old, well-established clinic, 2 full-time hygienists, 4 operatories. Excellent opportunity for someone who enjoys the outdoors and a low-stress enjoyable work situation with flexible hours and vacation time. Reply to: CDA Classified Box # 2846. D1684

**ONTARIO - Niagara Region:** Full-time dental associate position available for a family-oriented, well-established practice. Please fax your resume to (905) 871-3977. D1689

**ONTARIO - Amherstburg/Windsor Area:** Full-time dentist wanted to associate in our busy, well-established dental practice in Amherstburg, Ontario. Our office is just a 20-minute drive from Windsor. Presently retain over 6,000 active charts and growing. Looking for a kind, active, professional and highly motivated individual. Offering up to 50% compensation. Excellent opportunity



## REQUEST FOR APPLICATIONS DIRECTOR, SCHOOL OF DENTISTRY

The Faculty of Medicine & Dentistry at The University of Western Ontario is inviting applications for the position of Director of the School of Dentistry.

The School of Dentistry is responsible for a 4-year DDS program (56 students per year), a 2-year qualifying program for foreign-trained dentists (12 students per year), and a 3-year graduate program in orthodontics (3 students per year). With the teaching hospitals of The University of Western Ontario, the School also offers a dental fellowship program (4 students per year). Major expansion of the Dental Sciences Building was completed in 2002, and comprehensive renovation of the main clinic has begun. The School of Dentistry has a strong tradition of excellence in undergraduate dental education and has research strengths in mineralized tissue biology (<http://www.fmd.uwo.ca/research/Skeletal-web/>) and dental biomaterials.

The Director will be responsible for all academic and clinical programs of the School. S/he will maintain strong relationships with alumni, community partners and other units in the Faculty of Medicine & Dentistry. The Director is expected to provide visionary leadership in renewal of the academic programs, enhancement of scholarly activities and recruitment of additional faculty. For further information, please visit <http://www.fmd.uwo.ca/dentistry>.

With a full-time enrollment of 29,000, The University of Western Ontario is a research-intensive university that graduates students from a full range of academic and professional programs. The campus is in London, a city of 340,000 located midway between Toronto and Detroit. With parks, tree-lined streets and bicycle trails, London is known as the "Forest City" (<http://www.city.london.on.ca>). London boasts an international airport, art galleries, theatres, and a variety of music and sporting events.

Interested candidates should submit 1) a CV outlining their research, teaching, leadership and administrative experience and interests, 2) a brief description of proposed future directions and visions for the School, and 3) the names and addresses of three referees to:

**Dr. Carol Herbert, Dean  
Faculty of Medicine & Dentistry  
Health Sciences Addition  
The University of Western Ontario  
London, Ontario N6A 5C1  
Fax (519) 850-2357**

The competition will remain open until the position is filled.

Positions are subject to budget approval. Applicants should have fluent written and oral communication skills in English. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. The University of Western Ontario is committed to employment equity and welcomes applications from all qualified women and men, including visible minorities, aboriginal people and persons with disabilities.

D1694



for any associate willing to commit themselves to long-term relationship and future growth in this wonderful community. Tel. (519) 980-4073. D1639

**ONTARIO - West of Toronto:** Full-time associate position in a well-established practice, replacing associate who is returning to school for graduate studies. Your schedule will be booked from day 1 and you will have the opportunity to be exposed to all aspects of dentistry such as cosmetics, implants and much more as we have a team of specialists working alongside of us! If you are a team player and are looking for a positive working environment, fax to (905)846-5593. D1641

**ONTARIO - Brockville and Morrisburg:** Experienced associate required for 1 of 2 well-established, busy practices. Enjoy a small-town atmosphere and the scenic beauty of the 1000 Islands region with easy access to large city centres. Only 30 minutes to Kingston and 60 minutes to Ottawa. For more information contact: Dr. George Christodoulou, Altima Dental Canada, tel. (416) 785-1828, ext. 201, e-mail drgeorge@altima.ca. D1269

**QUEBEC - Abitibi:** Rouyn-Noranda. Our family practice offers you a unique opportunity to join our team for a replacement during a maternity leave starting mid-April for a period of six months. Very busy practice, booked over two months in advance, full-time position guaranteed thereafter. Excellent work schedule; 4 days/week Monday to Thursday, no weekends. Very nice area, with lakes and forests nearby for the nature lover. For more information, please contact Aline at (819) 762-1972. D1659

**QUEBEC - Eastern Townships:** Windsor, near Sherbrooke. We are giving an associate the opportunity to become part of a mature and fully competent team. Pleasant and motivating work atmosphere. Please fax resume to (819) 845-7854. Tel. Dr. Jacques Vaillancourt, (819) 845-3080. D1371

**SASKATCHEWAN - Regina:** Full-time associateship available in a busy, established orthodontic practice. Excellent, oriented, energetic staff. Buy-in option. Please call (306) 586-3222 in confidence. D1665

**YUKON - Whitehorse:** Full-time dentist required for busy 5-operator practice. Great staff and friendly environment. Come and enjoy the great wonders of the North. Starting date is negotiable. Reply to: Pine Dental, 5110 5th Ave., Whitehorse, YT Y1A 1L4; tel. (867) 668-2273, fax (867) 668-5121. D1677

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D1611

**TEXAS - Dallas:** Growing dental company in and around Dallas is seeking full-time associates. Must be licensed or qualified to be licensed in Texas. Highest compensation package in the state; earn \$200,000 - \$400,000. Company to handle all immigration matters. Please call (630) 788-7167. D1513

**VERMONT, US:** Dentists and oral surgeons. Opportunities for general dentists in Rutland, Montpelier and Lake Champlain areas. Openings available for employment, private practice and practice acquisitions. Enjoy the splendor of the Green Mountains and Lake Champlain, all part of the unbeatable Vermont lifestyle. Contact: Lynn Harris, tel. (800) 288-1730, fax (518) 266-9289, e-mail lynnharris@harrisbrand.com. D1538

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<b>CDA CANADIAN GROWTH FUNDS</b>					
Aggressive Equity fund (Altamira)	up to 1.00%	1.9%	14.2%	5.9%	10.7%
Common Stock fund (Altamira)	up to 0.99%	8.9%	6.9%	0.8%	8.2%
Canadian Equity fund (Trimark) <sup>†1</sup>	up to 1.65%	9.3%	6.5%	9.0%	9.5%
Special Equity fund (KBSH) <sup>†2</sup>	up to 1.45%	10.9%	9.1%	-7.3%	16.0%
TSX Composite Index fund (BGI) <sup>††</sup>	up to 0.67%	11.3%	9.5%	2.2%	10.1%
<b>CDA INTERNATIONAL GROWTH FUNDS</b>					
Emerging Markets fund (KBSH)	up to 1.45%	4.8%	11.8%	-0.8%	1.7%
European fund (KBSH)	up to 1.45%	-4.9%	-9.3%	-13.4%	4.5%
International Equity fund (KBSH)	up to 1.45%	-5.1%	-4.6%	-13.3%	3.9%
Pacific Basin fund (KBSH)	up to 1.45%	-7.4%	-1.8%	-21.5%	0.6%
US Equity fund (KBSH) <sup>†3</sup>	up to 1.20%	-7.5%	-8.5%	-10.1%	9.2%
Global fund (Trimark) <sup>†4</sup>	up to 1.65%	0.8%	1.9%	8.4%	10.2%
Global Stock fund (Templeton) <sup>†5</sup>	up to 1.77%	5.4%	1.6%	0.9%	n/a
S&P 500 Index fund (BGI) <sup>††</sup>	up to 0.67%	-3.1%	-4.9%	-4.8%	9.3%
<b>CDA INCOME FUNDS</b>					
Bond and Mortgage fund (Fiera)	up to 0.99%	2.9%	5.6%	6.2%	7.0%
Fixed Income fund (McLean Budden) <sup>†6</sup>	up to 0.97%	4.7%	6.3%	7.0%	8.0%
<b>CDA CASH AND EQUIVALENT FUND</b>					
Money Market fund (Fiera)	up to 0.67%	1.6%	2.0%	2.9%	3.7%
<b>CDA GROWTH AND INCOME FUNDS</b>					
Balanced fund (KBSH)	up to 1.00%	4.0%	3.3%	0.4%	7.8%
Balanced Value fund (McLean Budden) <sup>†7</sup>	up to 0.95%	6.6%	5.8%	6.8%	9.8%

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: <sup>1</sup>Trimark Canadian Fund, <sup>2</sup>KBSH Special Equity Fund, <sup>3</sup>KBSH US Equity Fund, <sup>4</sup>Trimark Fund, <sup>5</sup>Templeton Global Stock Trust Fund, <sup>6</sup>McLean Budden Fixed Income Fund, <sup>7</sup>McLean Budden Balanced Value Fund.

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

For current unit values and GIC rates call CDSPI toll-free at 1-800-561-9401, ext. 5024 or visit the CDSPI Web site at [www.cdspi.com/funds](http://www.cdspi.com/funds).





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