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My favourite oral surgery professor in dental school posed a trick question one day as I was assisting him. While using an elevator to retrieve a buried root of a mandibular molar, he asked me what anatomical structure the tip of the elevator would hit if it slipped as he applied pressure. Before I could muster a response, he snappily answered his own question with “my finger, and never forget it.”

Flash forward 20 years and I am in my clinic removing a molar from a patient who has declared in his health questionnaire that he is HIV positive. The broken-down crown snaps off as I apply the forceps. As I reached for the Cryers elevator, the words of my teacher echoed in my mind. I wondered what would happen if I punctured my finger during the procedure. I thought of my wife and how our life might be altered if I became infected. I lived moments of fear as I carried out the rest of the procedure.

The fears I experienced in this situation are well known to every dentist. Unfortunately, as a result of such fears, some colleagues may be refusing to treat patients who declare themselves HIV positive, or else they or their staff members may make HIV/AIDS sufferers feel very unwelcome in their offices. Such actions have serious implications for our profession. In today’s climate, dentists simply cannot discriminate against HIV/AIDS sufferers and refuse treatment on the basis of this health condition.

In the mid-1980s in another country, I overheard a shocking conversation between 2 dentists discussing homosexual patients. One described how he had recently chased from his waiting room 2 men who had been holding hands while one waited for treatment. He indicated that he didn’t want any AIDS patients in his office and that they should find some “liberal” practitioners who would treat them. Perhaps this was an extreme case, but it reflected the prejudices of the time held against risk groups for HIV/AIDS.

Those prejudices are simply wrong and are totally misplaced today. It is estimated that there are currently almost 20,000 Canadians unaware that they are living with HIV. While in western developed countries a large proportion of early cases were homosexual men, the epidemiology of the disease has changed dramatically. Today the incidence among male homosexuals has dropped significantly and heterosexual women are the fastest growing group of HIV sufferers. As dentists, we must assume that every patient is potentially HIV positive.

Canadian courts consider HIV/AIDS a physical disability and we are not allowed, by Canadian human right laws and our professional codes of ethics, to discriminate against anybody on the basis of a disability. Yet some advocacy groups claim that a significant percentage of people with HIV/AIDS still have difficulty finding a dentist to treat them in a comfortable environment.

Besides provoking human rights cases against dentists individually and collectively, such discrimination could discourage patients with HIV from declaring their condition on our health questionnaires. Driving HIV underground in the dental office has potentially greater consequences for the providers and recipients of care.

To prevent these consequences, we must be completely up to date in our knowledge and implementation of standard precautions for preventing the spread of bloodborne pathogens. We must also ensure that office staff are trained and knowledgeable in this area. We have a duty to be completely familiar with comprehensive resources such as CDA’s Infection Control Manual and the Guidelines for Infection Control in Dental Care Settings produced by the Centers for Disease Control and Prevention.

As I was extracting the tooth for my HIV-positive patient, I should have been thinking that my risk of acquiring the condition due to a percutaneous injury is just 0.3%. I should have been more focused on providing a compassionate service to a person who has a much heavier burden to carry in life than I do. I believe it is a matter of urgency for our profession to work with HIV/AIDS advocacy organizations to promote accessible oral health care for people who are living with this condition.
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Canada is basking in the afterglow of the Winter Olympics, celebrating the tremendous successes that our athletes achieved in Turin, Italy. People are full of national pride as these men and women embraced the Olympic spirit, showcasing to the world a determination, dedication and commitment to be the best they could be. These values, although not unique to Canadians, are somehow ingrained in our collective psyche and help to define our national identity.

With this, my final column as CDA president, I have cause to reflect upon the incredible successes that CDA has accomplished in the last 12 months, working as a unified team to overcome obstacles and meet the challenges that threaten our profession on a daily basis.

The highlight of the year has to be our own “Dental Olympics,” the FDI World Dental Congress held last August. For those who came to Montreal, I’m sure you share my feelings of what a proud time it was for Canada as we hosted this monumental dental event — the largest held on Canadian soil. Dental colleagues from more than 130 countries came to Montreal; they were very impressed with the quality of the venue and meetings and voiced their appreciation of Canada’s contributions to global dentistry. These meetings demonstrated the connections that underpin our profession. No matter where we practise, we are all part of the bigger picture — we are all connected.

Another theme that resonated during my presidency was how we give and receive value when we choose to support our educational institutions as involved alumni or join our professional associations at the local, provincial, national and international levels. In other words, we must give in order to receive.

This has been a watershed year in terms of excellence in effectiveness at CDA. Accountability, relevancy and transparency have become solidified as the guiding tenets of the Association. Accountability is the key ingredient in achieving results and, as such, focusing on strategy has become the cornerstone of our organizational effectiveness. This year, the Board of Directors operationalized the Association’s main strategy document, the Strategic Plan, through to 2010. We place great emphasis on defining and tracking outcomes, to the ultimate benefit of our members. This renewed focus allows CDA to build and foster enhanced, synergistic relationships with our corporate members.

For our individual members, I see a clear parallel between the enormous demands imposed on today’s dental practitioner and the subsequent expectations from CDA. We recognize this and have risen to the challenge, increasing our responsiveness to member concerns while highlighting the supportive side of the Association. We have honed our ability to deal effectively and efficiently with issues arising from a rapidly changing marketplace, ensuring that our members will always have the opportunity to provide quality and accessible oral health care in an environment that allows for professional success and growth.

During the last 12 months, we rolled out many new tangible member benefits, such as ITRANS and eQualifID, LexiComp and the Member Savings Centre. This list will grow substantially in the coming year as we fulfill our commitment to develop and deliver a comprehensive portfolio of indispensable value to our members.

All of these successes would not have been possible without the efforts of a talented team of committee and elected volunteers who work tirelessly on your behalf each and every day. I wish to express my sincere gratitude for their unwavering commitment. I have equally marvelled at the hard-working staff at CDA who dedicate themselves to the betterment of our profession and to furthering our goals. In our association world, the men and women in these groups are the true Olympians.

Finally, and most importantly, my thanks to all of you for the encouragement and support you demonstrated during my time as CDA president. It has been a tremendous honour and privilege to serve you.

Jack Cottrell, BSc, DDS
president@cda-adc.ca
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International Volunteering: Long-Term Vision Required

We noted the paper by the Dicksons with great interest. It must be the spirit of time. Just recently, another paper addressed similar critical marginal notes about international dental volunteering. One feels uneasy criticizing activities that are done with great personal effort, sacrifice and the best of intentions. These acts of solidarity and compassion need to be recognized and valued very highly. But developmental aid is a complex activity and we should not close our eyes to its negative side effects. Addressing these side effects is done in the spirit of improving the impact of those selfless volunteering efforts by many of our colleagues.

The reality is that many dental NGOs and volunteers have not followed the evolution of approaches that resulted from frustrating experiences in earlier decades. The key words of this evolution are integration, sustainability, ownership, participation, appropriate technology, education and empowerment, to name just a few.

A survey of more than 200 NGOs active in international oral health revealed some striking facts that are of great concern: lack of proper project planning, poor integration of projects into existing health systems, no criteria for volunteer selection, lack of guidance and policies to manage volunteers, weak links with other NGOs, and only little interest in following sound dental public health approaches. There are, of course, exceptions and NGOs that do outstanding work. The impact of most dental NGOs active in international oral health remains, however, very limited.

It was recently proposed that the WHO-endorsed Basic Package for Oral Care could provide dental NGOs with tools and opportunities to maximize their impact. In future, the focus of NGOs in the health sector will shift toward health advocacy and broad health promotion. This entails increased responsibility to act on best evidence and to train the volunteers deployed appropriately. Dental NGOs and volunteers should not miss this trend.

Mahatma Gandhi said: “It may be that you can do very little. But it is important that you do that very little.” But it should be the best possible little.

Dr. Habib Benzian
Development and public health manager
FDI World Dental Federation
Professor Wim van Palenstein Helderman
WHO Collaborating Centre
Nijmegen, The Netherlands
Member
FDI World Dental Development and Health Promotion Committee

References

very much appreciated the recent article on international volunteering. It was an eloquent airing of many of the issues that we have come to understand after 15 years of mission dentistry in Kenya and Nepal.

In our work with the United Mission to Nepal (1991–2000), we helped develop, with our Canadian colleague Robert Yee, a public health approach to Nepal’s oral health problems. This revolved around research and advocacy for fluoride, with the introduction of locally made and affordable fluoride toothpaste. We always attempted to obtain good epidemiology as evidence for our actions. Nearly 7 years elapsed before we could claim that 95% of Nepal’s toothpaste was fluoridated to international standards.

Yes, we still pulled teeth and fixed broken jaws. And yes, alongside the generous support of colleagues from the U.K., North America and Australasia, we also received hardened composite, bent explorer probes and 110V appliances! We too had numerous requests from well-intentioned dentists to give us 2 weeks of their high performance skills.

At first sight (and always needing more hands to help), it would have seemed churlish and impolite to turn this assistance down. However, we learned over a long period of time to align ourselves with the local situation and make haste slowly. I joked on many occasions that my most essential piece of kit was a ball of string to tie my hands behind my back. I couldn’t then impose my solutions before analyzing the local expectations and self-sustaining resources.

When the great Western doctor is gone, what then?

There is much debate in the dental press about sabbatical opportunities...
Letters

in less fortunate places across the world. Unless one actually spends a more prolonged period in the developing world, it’s hard to understand the logic of not simply boarding a flight with a clever suitcase full of tricks.

Dr. Neil McDonald
Assistant clinical director
Salaried primary dental care service
Truro, Cornwall
United Kingdom

Reference

I found the Dicksons’ article on volunteering1 anecdotal, opinionated and belittling to many good people who volunteer internationally with humility, humanity and even love. While it undoubtedly contains truths, it makes the mistake of painting


Response from the Authors

Dr. Shapka’s letter comes as no surprise. His perspective is common and one we purposely wanted to address in the article.1 We welcome a dialogue with the chair of an organization that arranges overseas experiences for others. It is at the organizational level that responsibilities for volunteer orientation reside. It is important that organizations prepare volunteers and influence supporters to see the bigger picture and where their efforts interface with those of the host country. In this way, what is planned and ultimately done by volunteers will complement the country’s own oral health strategies to reach the greatest number of its citizens. While specific realities differ from country to country, certain core principles for volunteering are common and that is what we put forward in the paper.

Dr. Shapka’s concern for a child or adult up all night with a toothache is genuine, and though he yearns for practical responses, he claims “there are no cookbook, one recipe solutions.” In most cases, his concern is shared by host country authorities who, in fact, have designed oral health plans (the cookbook) with strategies (recipes) for training and widening service delivery. At a minimum, volunteers and their organizations must study such health plans to know what the country is trying to do and what resources (human and material) are required. Consultation with local authorities will also go a long way in making volunteer contributions compatible with the host countries’ programs.

Good will and the best intentions can have short-term benefits. But if the objective is longer term development, then volunteerism has to be done differently. We need to change how we have been trained to practise and what may be most comfortable for us. In Mozambique, health authorities have told us that they like the way Canadians work because, as the saying goes, we are not giving them fish but rather teaching them the best way to fish. That is the difference between short-term benefits and longer term development.

Projects, organizations and volunteers make a difference when they strengthen the host country’s health system by coordinating with local health programs, training and sharing skills with local personnel, and setting up small ongoing partnerships. A volunteer on the ground in a developing country can indeed help to relieve the daily patient load of the overworked primary care dental worker, but the longer, greater benefit is by strengthening the host system. When we share with that intent, we become better global citizens and extend compassion and concern to others less privileged than ourselves in a sustainable, respectful manner.

Dr. Murray Dickson
Dr. Gerri Dickson
Saskatoon, Saskatchewan

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Infection Control in the Dental Practice

The November 2005 edition of JCDA contained a series of policy statements adopted by the FDI General Assembly in August 2005.1 One of these statements, titled Sterilisation and Cross Infection Control in the Dental Practice, is based on the concept of “standard precautions.”

In August 2000, I prepared a literature review and recommendations on infection control for the Royal College of Dental Surgeons of Ontario (RCDSO). A copy of the document was forwarded to CDA. The review alluded to the significance of “standard precautions,” which were introduced in 1996. These were to be used when treating hospitalized patients and contained 3 essential elements:

- hand washing
- use of personal protective equipment
- safe disposal of sharps and wastes.

The review suggested that, with slight modifications, the precautions should be used in dentistry. These changes were:

- vaccination of clinical staff against certain infectious diseases
- hand washing before and after all intraoral procedures
- cleaning and disinfecting of all non-surgical instruments, with only surgical or critical items being sterilized
- careful handling and disposal of sharps
- maintaining visibly clean and tidy offices
- wearing of short-sleeved uniforms to simplify hand washing.

The review suggested that for most patients and their dental care providers, these standard precautions would provide effective, practical, simple and economically viable infection control.

It is not known to what degree the RCDSO or CDA accepted, in 2000, the concept of “standard precautions.” However, it is reassuring that 5 years after publication of the review, the FDI has accepted the concept of “standard precautions.”

Dr. John Hardie
Lisburn, Northern Ireland

Reference

Response from CDA
Thank you for your letter regarding the concept of standard precautions in infection control and your interpretation of them for the practise of dentistry.

As you mention, standard precautions were introduced in 1996 by the Centers for Disease Control (CDC) in the United States to reduce the risk of transmission of microorganisms in hospitals. Standard precautions integrate and expand the elements of universal precautions (designed to reduce the risk of transmission of bloodborne pathogens) into a standard of care designed to protect health care providers and patients from pathogens that can be spread by blood or any other body fluid, excretion or secretion. Standard precautions apply to contact with 1) blood; 2) all body fluids, secretions and excretions (except sweat), regardless of whether they contain blood; 3) nonintact skin; and 4) mucous membranes.

In December 2003, CDC published new infection control guidelines for dentistry that included the application of standard precautions rather than universal precautions. However, as saliva has always been considered a potentially infectious material in dental infection control, no operational difference exists in clinical dental practice between universal precautions and standard precautions.

CDA has accepted the concept of standard precautions and is in the process of incorporating them into its infection control documents and resources.

Dr. Euan Swan
Manager of dental programs
Canadian Dental Association

Erratum
As a result of a technical problem, the concluding section of Dr. Daniel Haas’ article on administering local anesthetic to children,1 published in the March edition of JCDA, did not appear properly. The last paragraph of the article should have read:

“In conclusion, knowing the weight of the child and the recommended maximum doses allows us to calculate how much local anesthetic can be given safely. The selection of a low-concentration local anesthetic appears to be the most prudent choice for a young child.”

JCDA regrets the error and has corrected the PDF version of the article, which is posted on the JCDA website at http://www.cda-adc.ca/jcda/vol-72/issue-2/125.pdf.

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Long-term pain management tool?

Current Canadian Consensus Report on dentin hypersensitivity recommends a long-term approach to management, with desensitizing toothpaste as first-line treatment.†

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

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Oral Jewellery Position Statement

The CDA Board of Directors approved a position statement on oral jewellery at its meeting in February. The increased popularity of soft tissue piercings has resulted in more information requests on the subject from members of the public and the media.

The position statement was originally drafted by CDA’s Committee on Community and Institutional Dentistry, and subsequently refined and updated by CDA’s Committee on Clinical and Scientific Affairs. The new position statement is reprinted below and can be downloaded from CDA’s website at www.cda-adc.ca/en/dental_profession/practising/position_statements.asp.

CDA Position on Oral Jewellery

Body art is increasing in popularity within a largely unregulated industry. It includes tattooing, body piercings and oral jewellery, which consists of soft tissue piercings and/or objects attached to teeth. All body piercing presents a level of risk of infection. Because of the presence and variety of bacteria in the oral cavity, oral piercings are considered to have higher risk and are therefore strongly discouraged.

However, research indicates that knowledge of risks associated with body art is not a deterrent even for persons who have had complications. Documented complications are related either to (a) the jewellery (aspiration, allergy or chronic injury to adjacent teeth/mucosa, including tooth fracture and gum recession, which can lead to tooth loss) or to (b) the piercing procedure (local bleeding, swelling, nerve damage, toxic shock, permanent drooling, impaired sense of taste, or distant infections of the liver, heart or brain). Serious infections led Health Canada to issue Infection Prevention and Control Practises for Personal Services, Tattooing, Ear/Body Piercing, and Electrolysis in 1999. These may be accessed at: http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s3e.pdf.

CDA offers the following recommendations:

1. Dental practitioners should discuss with patients the potential risks of oral piercings and jewellery, as well as recommendations for hygiene and management of existing piercings to help reduce damaging effects. Useful information includes the recognition and management of oral and systemic side effects and the use of appropriate materials and adhesives for tooth jewellery.
2. Dental patients wishing to have oral piercings should be advised to obtain information about (a) experience of the artist, including complication rate (b) infection control practices and (c) after-care instructions.

January 12, 2006

This information was created by the Canadian Dental Association for use by CDA member dentists. It should not be used as a replacement for professional dental or medical advice. If you have questions about this position statement, please consult your dentist or contact the Canadian Dental Association.
CDA Adds New Tooth Whitening Seal of Recognition

CDA’s Consumer Product Recognition program has added a new category for tooth whitening products. This new CDA Seal of Recognition is intended to educate the public about the importance of the appropriate selection and use of these over-the-counter products.

The new category and related guidelines emphasize that tooth whitening products should be used as directed along with an appropriate consultation from a dentist. The guidelines apply exclusively to whitening products that reduce or remove extrinsic stains from teeth. Tooth bleaching products, or those that alter the intrinsic colour of teeth, are not discussed.

More information about CDA’s Consumer Product Recognition program can be found at www.cdaadc.ca/en/cda/seal_of_recognition/about/index.asp.

JCDA Policy on Advertising: Finding the Right Balance

J CDA deals fairly with potential advertisers by maintaining certain reasonable standards, by reviewing proposed advertisements and by explicitly declaring any relationships between authors and commercial sponsors.

It is important for readers to remember that the CDA does not endorse any product or service advertised in the publication or in its delivery bag. Furthermore, CDA is in no position to make legitimizing judgments about the contents of any advertised course. The primary criterion used in determining acceptability is whether the providers have been given the ADA CERP or AGD PACE stamp of approval.

I have confidence in the intelligence of our readers and trust they can make their own judgments about claims made in the articles and advertisements published in JCDA.

Dr. John O’Keefe
1-800-267-6354, ext. 2297
jokeefe@cda-adc.ca

DAT Once Again Sets Record

R egistration figures for the February 2006 Dental Aptitude Test (DAT) were the highest ever for the winter version of this assessment exam.

Following a record-breaking number of applicants for the November 2005 DAT, 954 people registered to write the February 2006 test. Of these 954 applicants, only 22 failed to register using the online registration process successfully implemented by CDA in 2004.

The DAT program is conducted by CDA to help students assess their aptitude for a career in dentistry and to assist dental schools in selecting first-year students. This year marks the 40th anniversary of the program.

More information on the DAT can be found at www.cda-adc.ca/dat.
Is Tooth Loss Linked to Heart Disease?

A recent study\(^1\) found an association between tooth loss and an increased risk for coronary heart disease (CHD). The study’s authors demonstrated that a higher extent of tooth loss significantly increased the risk for CHD, even after adjusting for socioeconomic and chronic disease factors, such as tobacco and alcohol use.

Those with 1 to 5 missing teeth or 6 to 31 missing teeth or those who were edentulous were more likely to have heart disease than those with all of their teeth. The study looked at data compiled from the Behavioral Risk Factor Surveillance System telephone survey in the United States. The population group consisted of 41,891 adults aged 40 to 79 years.

The study’s authors demonstrated that a higher extent of tooth loss significantly increased the risk for CHD, even after adjusting for socioeconomic and chronic disease factors, such as tobacco and alcohol use.

Those with 1 to 5 missing teeth or 6 to 31 missing teeth or those who were edentulous were more likely to have heart disease than those with all of their teeth. The study looked at data compiled from the Behavioral Risk Factor Surveillance System telephone survey in the United States. The population group consisted of 41,891 adults aged 40 to 79 years.

The study by Okoro and others\(^1\) was trying to determine whether there was an association between tooth loss and heart disease. It is commonly believed that periodontal disease is the major cause of tooth loss in adults. However, many studies have demonstrated that periodontal disease accounts for only 30% to 35% of all tooth extractions, whereas caries and its sequelae account for 50% to 60%. Furthermore, in cases where all teeth are extracted, the principal reason for extraction is generally caries and not periodontitis.\(^2,3\) However, one study\(^4\) has shown that 60% of tooth extractions were due to periodontitis and 30% due to caries in the 40–59 age group.

The data collected by Okoro and others did not distinguish the different reasons for tooth loss. Tooth loss may be due to caries or periodontal disease. Therefore, the use of tooth loss as an indicator of periodontal disease in this study is flawed. Because of this confounding factor, there is no significant value in linking tooth loss to heart disease. One is not able to extrapolate that tooth loss was due to periodontal disease and that periodontal disease is associated with heart disease.

Periodontal Diseases and Cardiovascular Disease

A recent meta-analysis based on 9 cohort studies determined that there was a modest relative risk of 1.19 for future cardiovascular events in individuals with periodontal disease compared with those without.\(^5\)

Similarly, a systematic review by Scannapieco and colleagues\(^6\) concluded that there is a moderate amount of evidence to suggest that periodontal disease is associated with cardiovascular disease, but causality is unclear.

Furthermore, there is currently insufficient evidence to show that treatment of periodontal disease reduces the risk of heart disease. Large-scale longitudinal epidemiologic and intervention studies are necessary to validate this association and to determine causality.

References


 Commentary

Dr. Jim Yuan Lai, BSc, DMD, MSc (Perio), FRCD(C), is an assistant professor and head of periodontology at the faculty of dentistry, University of Toronto. JCDA sought the insights of Dr. Lai about this news item.
**Awareness of Mouth Cancer**

A recent study in Great Britain found that while a number of people are aware of mouth cancer, very few are familiar with its early warning signs or contributing factors, such as smoking and alcohol consumption.

The study, published in the *British Dental Journal*, was conducted in 2001 by researchers at University College London and Guy’s King’s & St. Thomas’ Dental Institute.

Researchers interviewed 3,384 adults about their smoking habits, alcohol consumption and awareness of mouth cancer, and assessed respondents’ knowledge of early signs of mouth cancer and risk factors.

Results showed that 95.6% of those interviewed had heard of mouth cancer, but a much smaller number actually recognized the early signs, including patches or ulcers in the mouth. A very high number of respondents were aware that smoking and chewing tobacco could cause mouth cancer (84.7% and 80.1% respectively), but only 19.4% recognized that alcohol consumption could be a risk factor. In general, those who were most at risk for mouth cancer because of smoking or drinking habits were least familiar with the early signs.

The study suggests that doctors, dentists and increased public awareness campaigns could play a greater role in providing information to patients about the potential risks and warning signs of mouth cancer.

**Reference**


**Digitized Dental Historic Collection**

Dental history enthusiasts have access to a new resource. The University of Michigan Digital Library Production Service (DLPS), in conjunction with the University of Michigan Dentistry Library, recently announced the availability of their Dental Historic Collection.

The digitized collection contains almost 400 items of important historical dentistry books and journals, including rare and unusual titles. Highlights of the collection include *Transactions of the American Dental Association*, which date back to the preliminary meeting in 1860, as well as issues of dental journals that date back to the early part of the 20th century. Visit the collection at www.hti.umich.edu/d/dentalj/.

**Supportive Cancer Care Symposium**

A range of topics relating to supportive care for cancer patients, including oral care, will be explored at the 18th Annual MASCC/ISOO Symposium on Supportive Care in Cancer to be held June 22–24 in Toronto, Ontario.

Organized by the Multinational Association of Supportive Care in Cancer (MASCC) and the International Society for Oral Oncology (ISOO), the symposium is intended for any health care provider involved with the care of cancer patients.

Founded in 1990, MASCC is an international, multidisciplinary organization dedicated to research and education in all aspects of supportive care for patients with cancer at any stage. More information about MASCC and ISOO and the symposium can be found at www.mascc.org.

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**To access the websites mentioned in this section,**
go to April’s JCDA bookmarks at www.cda-adc.ca/jcda/vol-72/issue-3/index.html.
Better positioning is paramount to productive dentistry, no matter what delivery style you choose. Which is why we created A-dec 500 at 12 o’clock. In addition to a round, rotating, and height-adjustable worksurface, A-dec 500 features pivoting instrument holders that position virtually anywhere around the worksurface—which means better visibility, less stretching, and reduced motion for you and your assistant. Add the ability to seamlessly integrate electric motors, intraoral cameras, as well as other small equipment, and you have a completely flexible system that offers better ergonomics and efficiency than any other 12 o’clock delivery solution available today.
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Another First Class Service from CDA
So you’ve made the (wise) decision to come to Newfoundland and Labrador (NL) in late August for the 2006 CDA Annual Convention. As a native Newfoundlander, I have been getting a lot of questions from colleagues across Canada about how to get here and what to do once you arrive. I’ve prepared this brief travelogue that I hope you will find useful in planning your trip.

**Getting to St. John’s**

Air Canada, Canjet and WestJet all have flights arriving daily in the capital city. St. John’s airport is about a 20-minute drive from the downtown hotels. While most of you will choose to fly, others might consider coming by ferry. Marine Atlantic runs a ferry service from North Sydney, Nova Scotia, to both Port Aux Basques and Argentia, NL. The ferry trip to Port Aux Basques takes 6 hours, followed by a 10-hour drive to St. John’s. The ferry trip to Argentia is 16 hours, but driving to St. John’s from there takes only 3 hours. I recommend booking your ferry and cabin reservations as early as possible with Marine Atlantic as space can be limited. If you do book an overnight cabin, ask for one on Deck 5, as this is the best place to be.

**Local Attractions**

You’ll find plenty to do in St. John’s but some of the “must-see” attractions include Signal Hill, Johnson Geo Centre, The Botanical Gardens at Memorial University and The Rooms. Several boat tours are available, but at this time of year you might not see any of the icebergs that NL is known for. Just outside St. John’s is Cape Spear, a national historic site that is the most easterly point of land in North America. If you’re feeling really ambitious, go early in the morning and be the first to see the sun rise on the continent!
Further Afield — Avalon Peninsula

Venturing outside of St. John’s will really make your time in NL memorable. If you choose to drive up the Avalon Peninsula, head to Cape St. Mary’s Ecological Reserve, the most accessible and spectacular sea bird colony in North America (a 2-hour drive from St. John’s). You could also visit Placentia, the former French-speaking capital of Newfoundland, or the unique animal enclosure at Salmonier Nature Park. If you enjoy live theatre, another must-see is the city of Trinity on Route 239 (a 3-hour drive from St. John’s). The New Founde Lande Trinity Pageant walking tour makes it well worth the trip.

Great Northern Peninsula

A slightly more adventurous trip consists of touring the Great Northern Peninsula. The city of Deer Lake is the jump-off point for the Great Northern Peninsula and it’s about an 8-hour drive from St. John’s. If you take the Viking Trail (Route 430) along the peninsula, you will see 2 UNESCO World Heritage Sites: Gros Morne National Park and L’Anse aux Meadows National Historic Site. Gros Morne is great hiking country, but come prepared with full gear and provisions if you intend to hike. There are several excellent boat tours in the park, most notably Western Brook Pond, where I would recommend taking the 1.00 pm sailing. Book the Western Brook Pond tour in advance by contacting BonTours.

On the drive between Deer Lake and St. John’s, it’s worth stopping in Grand Falls to visit the Salmonid Interpretation Centre. In Gander, you can visit the North Atlantic Aviation Museum and the International Airport Exhibit. Along the highway from Port Aux Basques, the Codroy Valley is quite a scenic area, while Corner Brook has many attractions including the Corner Brook Stream walking trails and the Model Forest tour.

Driving Tips

Renting a car will really expand your horizons in NL, but it is critical that you book your rental car early! When driving at night in areas outside St. John’s, be careful of moose and caribou as there are an estimated 120,000 moose on the island. Most road signs use the acronym T.C.H. to indicate Route 1 of the Trans Canada Highway instead of the regular numerical designations you may be used to. My last bit of driving advice: in some remote areas there can be a long distance between gas stations, so keep the tank above half at all times.

I know you’ll have a wonderful time in NL. Come and experience the legendary Newfoundland charm and hospitality for yourself. And remember, Screech is really as bad as they say it is and that cod that you’ll be kissing at a “Screechin” is likely about 10 years old!

Best regards and have a great trip,

Dr. Bob Sexton
CDA Board of Directors
Corner Brook, NL

CDA is pleased to be partnering with McCarthy’s Party Ltd. (“McCarthy’s”) in offering dentists a wide range of pre- and post-Convention travel excursion options. The 2006 CDA Annual Convention Preliminary Program has details on all of the specially arranged tours, which include many of the sites mentioned in Dr. Sexton’s travelogue.

A PDF version of the Preliminary Program can be found on CDA’s website at http://www.cdaadc.ca/_files/cda/news_events/featured_events/events/annual_convention06/ac06_program_prelim_en.pdf

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Good Dentistry is Good Communication

The following article highlights common communication problems in the dental office and provides answers to enhance communication and team-building skills. “We all care about good communication,” says Klaus-Christian Hofer. “We all try hard, yet the symptoms of communication breakdown are apparent everywhere. It is possible to develop productive communication skills. In a nutshell, if you listen with method, answer questions professionally and maintain a positive office environment, you will be well on your way to successful communication.”

Question

How can I improve my communication skills with my patients and staff?

Answer

Have you heard comments such as these in your office: “I thought you said…” or “Yes, I heard you, but I thought that you meant that…” or “Isn’t anybody listening around here?”

If these sound familiar, communication problems could be putting your professional image and your practice at risk. What was actually said and what we thought was said often differ. Since many of our actions depend on what we hear or understand, we must pay close attention to how we communicate.

Harnessing Collective Intelligence

It is important to create an office environment where everyone feels they can contribute and share information they know. Each stakeholder has a unique understanding and perspective of a situation. I always recommend considering this valuable “collective intelligence” in your decision-making process and to use all the brainpower available (Fig. 1).

Communication tools allow us to harness this collective intelligence in the dental practice. For instance, face-to-face conversations, phone calls, emails, bulletin boards and meetings are all used to communicate with staff and patients. But the real question is whether or not these tools are being used properly or consistently. Few people understand the relative strengths and weaknesses of these tools and use them interchangeably.

Emails are used to convey information that would be better addressed in a meeting. Meetings are called to solve problems that would be better solved by a taskforce. The resulting minutes might create a documentary record about what took place, but generally they do not serve as a catalyst for action. Other decisions are made individually that should have been tabled in a meeting. Conflicts can become emotionally infected if email is used to try to resolve a personal dispute.

All too often, well-intended communications result in misunderstandings, a waste of precious time and increased stress at your practice. Table 1 illustrates how to optimize the
use of common communication tools in your office. Improving communication can begin by selecting the right tool for the right purpose in the right manner. Implementing guidelines on the use of these tools will help eliminate potential problems before they occur.

**Enabling Communication**

We all want to achieve good communication. Ideally, we would like to say or write a directive once and achieve the desired result. We often fail because nobody taught us how to communicate for the purpose of enabling people to do things. Such “enabling communication” works to minimize the risk of misunderstanding while maximizing comprehension. When we communicate to enable, we always answer questions. The answer enables us to act or to come to a decision. Yet this type of communication is rarely used effectively in a dental practice.

The results of modern communications research show that all questions can be classified into categories of question types and their answer patterns. Understanding these patterns helps to minimize the chance of misunderstanding. To optimize our communications we need to match the right question type with the correct answer pattern.

Here is a very basic example. Examine the following question and answer scenario where somebody is requesting a justification.

“Why should I hurry eating my breakfast?”

1. “You know that the bus schedule has been adjusted to the winter schedule and if you don’t hurry you’ll have to wait for an extra hour.”
2. “Well, if you don’t hurry you will miss the bus.”
3. “Because the bus leaves in 10 minutes and you need 3 minutes to get to the bus stop.”

While all 3 answers are logically correct, the third answer is optimized for comprehension. The best way to answer a “why” question is with “because.” Starting your answer with “because” offers the strongest question–answer relationship.

Providing clear instructions to others is another way to improve your enabling communi-

<table>
<thead>
<tr>
<th>Communication tool</th>
<th>Dos</th>
<th>Don’ts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulletin board</td>
<td>Post schedules, announcements and messages affecting all staff.</td>
<td>Avoid posting vacation pictures, complaints or messages to individuals.</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>State its purpose, offer choices, encourage comments, protect people's privacy. Adopt a quality standard.</td>
<td>Refrain from asking loaded questions. Avoid lecturing.</td>
</tr>
<tr>
<td>Staff meeting (calendar driven)</td>
<td>Prepare an agenda and always make it interesting. Insist that all staff attend. Focus on the group, not the project. Reinforce a team mentality.</td>
<td>Avoid wasting staff time and using staff meetings for individual project issues. Never exceed the allotted time.</td>
</tr>
<tr>
<td>Team meeting (needs driven)</td>
<td>Set a specific agenda. Request that participants come prepared. Focus on the project, not the group.</td>
<td>Keep 'guests' from peeking in. Avoid coming to the meeting unprepared.</td>
</tr>
<tr>
<td>Face-to-face interview</td>
<td>Apply 'empathetic listening' strategies and recall techniques.</td>
<td>Avoid rushing things. Don’t perform other tasks such as taking notes or answering the telephone.</td>
</tr>
<tr>
<td>Email</td>
<td>Request meetings or teleconferences. Organize an event. Publish or confirm issues of concern. Exchange documents and files.</td>
<td>Don’t delegate or set deadlines. Refrain from committing people to tasks without feedback. Don’t try to resolve emotionally charged issues.</td>
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cation skills. Medical professionals must employ disciplined question and answer patterns. Questions that ask “How do I do this?” should be answered by using denotations such as ‘first’, followed by an action verb (e.g., place, close, select, push, etc.). Don’t say, “The instruments must first be placed in the autoclave.” Instead try saying, “First, place the instruments in the autoclave. Second, close the door.”

To minimize misunderstanding we should aim not only to answer questions logically, but to optimize our answer for comprehension.

**Empathetic Listening Style**

It sounds so simple but nobody ever asks, “Can you teach me how to listen?” Our schools and universities teach writing, reading, and sometimes even public speaking skills. However, they almost never pay attention to listening skills.

Yet when we examine the distribution of day-to-day communication activities, listening accounts for over 50% of our interactions. Most of your daily office activities are based on something you read or hear from someone. Every dental practice could benefit from reviewing and honing the listening skills of the dentists and support staff.

Learning how to become an empathetic listener takes practice (Box 1). It is an activity that requires good timing and recall skills. Practise with a partner and allow others to observe and critique you while learning this skill.

Communication skills at your dental practice should be learned, practised and standardized. Make communication in writing and in conversation a larger priority at your office. Harnessing the collective intelligence, understanding the principles of enabling communication and honing your empathetic listening skills will make your office shine. Remember, good dentistry is good communication.

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**Box 1** How to be an empathetic listener

Empathetic listening can be achieved by following certain rules:

- Stop, look and listen
- Paraphrase content
- Use minimal encouragement
- Show empathy and feeling
- Hold pauses with forced silence
- Use minimal enquiry

Avoid a provocative listening style. Be sure NOT to:

- Attack: Some try to search for the speaker’s weakest point and attack it.
- Ambush: Others take the speaker’s argument and turn it against him or her.
- Monopolize: Avoid dominating the conversation and therefore keeping the speaker off track.
- Ignore: Performing unrelated tasks while the person is trying to communicate shows that you are not really interested in what is being said.

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**Further Reading**


Hofer K. From black ink to gray matter. Mississauga (Ont.): Chiotti Inc.; 1996.


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**THE AUTHOR**

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St. John’s, Newfoundland
August 24 – 26, 2006

Wed. Aug. 23 – Pre-Convention
• Golf Tournament with Aurum Ceramic/Classic Million Dollar Hole-In-One Challenge in support of the Dentistry Canada Fund
• Tour St. John’s, City of Legends (AM)
• Tour Cape Spear, the Far East of the Western World (PM)

Thurs. Aug. 24 – Day 1
• Limited Attendance Courses
• Spouses - Bird Island Tour (AM)
• Spouses - North Head Trail Hike (PM)
• Evening Welcome Reception

Fri. Aug. 25 – Day 2
• General Attendance Sessions
• Dentsply Student Table Clinics
• Trade Show (with complimentary Lunch)
• Spouses - Conception Bay Tour (AM)
• Spouses - A Taste of Newfoundland (PM)
• Newfoundland Fun Night

Sat. Aug. 26 – Day 3
• General Attendance Sessions (cont’d)
• Trade Show (with Complimentary Lunch)
• Spouses - Colony of Avalon Tour (All Day)
• Evening Closing Gala
Buying and selling a dental practice on the open market in Canada was a rare occurrence prior to the 1970s. That was a time when, upon graduation, a dentist could simply move to the community of his or her choice, open a practice and be immediately busy providing dental care. Many practice transitions at that time involved the retiring dentist ‘giving’ the practice to a colleague in the hope that the new owner would pay a token amount for the equipment, perhaps assume a premise lease and look after the patients.

But times have changed. As more areas of the country have become better served by the profession, there has been a recognition of the many benefits to a practitioner of buying an existing practice and paying the departing dentist a significant sum for the goodwill in their operation (in addition to monies for the equipment, leasehold improvements, instruments and supplies). As a result, the marketplace has become very active. Hence the importance of focusing on the best way to sell a dental practice. Some dentists wonder if an associate buy-in is the answer. Based on my experience as a practice appraiser, I will answer the often asked question: “How does having an associate in my practice affect its sale?”

**Attracting an Associate**

With the average age of practising dentists from the baby boomer cohort continuing to increase, and the seemingly younger age when they choose to sell, one can safely predict that there are several hundred practices on the market at any given time. While there are about 450 new graduates in Canada each year, only a fraction of them are looking to buy a practice right out of school. An owner might rightly be worried about competing for this limited pool of potential buyers. This is especially true in rural and remote regions of Canada, where fewer young dentists are willing to locate and where it can take years to sell a practice.

One long-standing perception is that the best way to sell a dental practice is to attract an associate as a potential buyer. In the ideal scenario, this person works collaboratively for a few years under the mentorship of the senior practitioner, gradually becoming more confident and accepting of more responsibility. The owner continues under the illusion that the associate is eventually going to buy him or her out. It has been my experience that this belief often proves false and most owners are disappointed that the hoped for buy-in doesn’t occur. The (usually) younger dentists in these situations thrive by virtue of being able to gain valuable experience while enjoying a level of security and limited risk. If you do attract an associate and get assurances that he or she will buy the practice, remember that anything can happen. If the associate leaves, you will have to start the process all over again, but you’ll now be further along your retirement timeline. You’ll also have to assume any additional financial investments you may have made to expand the practice when you found an associate.

If attracting an associate for a buy-in isn’t such a good idea, what about an associate who is already in place? It has been my experience that long-term associates are often not good buyers of the practice they work in. If a dentist has been an associate for more than 5 years, it’s usually because he or she does not want to own a practice — ever. Consider this true story: 3 associates were asked to make an offer on the practice they worked in. The owner had made it
clear for years that he wanted to retire ‘soon’. These associates were great practitioners and were successful by all measures. They also had an excellent rapport with their senior colleague. When the request for an offer to purchase was made, the owner naturally thought all of them would be very interested. One associate declined outright. The second, who was a newer graduate, thought the practice was overvalued, while the third simply left (there had been no written associate contract) and moved a kilometre down the road, even attempting to take patient records as he left. So much for perceptions and collegiality!

**The Impact of Having An Associate in the Practice**

From an appraiser’s perspective, having an associate in a practice usually impacts negatively on the goodwill value, for several reasons:

1. **In the absence of a written associate agreement, goodwill values will be adversely affected.** Although the enforceability of such an agreement is not certain, the existence of non-competition and non-solicitation clauses will go a long way toward protecting an owner from sudden departures from the practice. Without a robust agreement which stipulates that the associate(s) cannot simply move ‘next door’ after leaving or after a new owner takes possession of the practice, there is a great risk to the purchaser of paying for something (cash flow based on a certain number of clinical hours and patients) he or she may not receive.

2. **A long-tenured associate may feel as though he or she ‘owns’ some of the practice, simply by virtue of having treated patients that the owner has never seen.** Furthermore, the associate’s efforts may be the reason behind the growth of the practice (revenues, patient base, staff numbers, etc.). Potential buyers may see this perceived ‘ownership’ issue as a risk to them, so they are generally less willing to pay as much for goodwill in a situation where there are long-term associates in a practice.

3. **Assuming that there are adequate agreements in place and that the associate desires to stay with the practice after the owner sells, there remains the issue of compatibility.** Every one of us is an individual, and we just might not get along with someone new for professional or personal reasons. If these differences are material, the new owner may have to seek out another associate to work in the practice. This can prove difficult in geographically challenged remote and rural areas. If no one can be found, the new owner may be forced to work longer and harder than planned, or to refer some patients to another office — patients who have contributed to the cash flow of the practice and who would have been part of the patient base included in the purchase of the practice.

There will always be debate about the benefits of grooming your buyer. If you need an associate in your practice, either to handle increased patient flow, to allow you more opportunity for time off, or to fulfill your desire to mentor a promising young practitioner, then hire one. However, don’t automatically think of your associate as your successor.

**THE AUTHOR**

Dr. Williams is ROI Corporation’s associate for Atlantic Canada and its director of corporate affairs and development. He is also a consultant with TriProv Practice Management Advisors Inc. and sits on the Board of Directors of CDSPI.

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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. 21

Fatima Jadu, BDS; David J. Psutka, DDS, FRCD(C); Michael Pharoah, DDS, MSc, FRCD(C)

Case History

A 15-year-old male patient was referred to the radiology department, faculty of dentistry at the University of Toronto for investigation of the delayed eruption of his right mandibular second molar.

At the time of presentation, the patient was being treated for pneumonia. Extraoral examination produced no significant findings. Intraoral examination revealed partial eruption of tooth 47 with its occlusal surface tipped toward the buccal aspect of the alveolar process, unlike tooth 37, which had erupted normally.

In the panoramic image (Fig. 1), a radiolucent lesion was evident in the right body of the mandible. The lesion extended from the distal root of the first molar to the mesial surface of the developing third molar and from the alveolar crest to the inferior border of the mandible. It was well defined with a thin cortex at the periphery and was completely radiolucent internally.

The occlusal radiograph (Fig. 2) revealed a smooth curved buccal expansion with maintenance of a thin cortex. In addition, the roots of the second molar had been tipped into the lingual cortical plate.

What is your interpretation?

Figure 1: Panoramic radiograph showing a well-defined, thinly corticated, radiolucent lesion related to the right mandibular second molar. The epicentre of the lesion appears to be the furcation area of the involved molar.

Figure 2: Standard mandibular occlusal radiograph showing the radiolucent lesion buccal to the involved molar with tipping of its roots into the lingual cortical plate.
Diagnostic Challenge

Answer to the CAOMR Challenge No. 21

The clinical and radiographic features of buccal bifurcation cysts (BBCs) were first described by Stoneman and Worth in 1983. The cyst has also been known as the mandibular infected buccal cyst, inflammatory collateral cyst and inflammatory paradental cyst. The World Health Organization includes this lesion under the category of inflammatory cysts.

The BBC is an uncommon lesion that is site and age specific. To arrive at a correct diagnosis in this case, it is important to determine that the epicentre of the lesion was in the buccal bifurcation area of the second molar, which was indicated by the buccal expansion and tipping of the roots into the lingual cortical plate, as demonstrated in the occlusal film. Generally the teeth that can be involved with the BBC include the permanent mandibular first or second molars; first molars are more commonly involved than second molars. The cyst is occasionally bilateral. This cyst usually occurs during the first 2 decades of life, specifically between the ages of 6 and 11 years. The involved tooth has a buccally tilted crown associated with deep periodontal pockets on the buccal aspect. Swelling may be present on the buccal aspect of the involved tooth. However, the tooth is vital. If the cyst becomes secondarily infected, the patient may complain of pain and a profound periosteal reaction (periostitis) may occur, visible on an occlusal film.

Radiographically, the cyst may vary from a subtle radiolucency superimposed over the roots of the molars to a well-defined radiolucency with a thin curved, cyst-like cortical border. The diagnostic characteristic of a BBC, however, is the tipping of the involved molar so that the roots are pushed into the lingual cortical plate, an observation that requires the inclusion of an occlusal projection in the radiologic work-up. Clinically, the lingual cusps may be seen to be erupting through the gingiva first. Occasionally, the lesion may grow to a size large enough to cause displacement and/or resorption of the adjacent teeth. The lesion may also cause a smooth hydraulic expansion and thinning of the buccal cortical plate. If the cyst becomes secondarily infected, periosteal new bone formation may be seen along the buccal surface adjacent to the involved tooth.

The histopathologic features of this cyst are nonspecific: a nonkeratinized stratified squamous epithelium lining with areas of hyperplasia. A prominent chronic inflammatory infiltrate may be present in the connective tissue wall if the cyst is inflamed from secondary infection. When this happens, bacteriology reports have shown a mixed flora. As the histopathologic appearance is nonspecific, the radiologic appearance serves as the primary basis for the diagnosis.

Although the clinical and radiographic characteristics of a BBC are diagnostic, the differential diagnosis includes a periodontal abscess, Langerhan’s cell histiocytosis and dentigerous cyst.

Management of BBCs has evolved over time. Usually conservative enucleation without extraction of the involved molar is sufficient, as they do not recur. Cases of resolution without treatment have been reported; however, if the cyst is secondarily infected, osteomyelitis is a possible sequela.

Further Reading


The Authors

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From Oslo to Toronto: Dr. Asbjørn Jokstad Sets His Sights on Canada

In November 2005, Professor Asbjørn Jokstad of Oslo, Norway, became the second Nobel Biocare chair in prosthodontics at the University of Toronto. Dr. Jokstad’s primary fields of research are restorative dentistry, temporomandibular disorders (TMD) and prosthodontics. He is also actively involved with the FDI World Dental Federation (FDI), serving as FDI scientific affairs manager since 2002.

In this month’s JCDA, Dr. Jokstad contributes 4 “Point of Care” articles (see p. 223). He also took time to sit down with JCDA to reflect on his academic career in Norway and to offer his perspectives on Canadian dentistry.

JCDA: Tell us about your time in Norway and how you became involved in dental academia.

Dr. Asbjørn Jokstad (AJ): I graduated from the University of Oslo dental faculty in 1979 determined to never go back to school. From there, I went straight into Norway’s 12-month mandatory military service and continued to work in the dental corps until 1982. After military service, I worked part-time in private practice and in a dental clinic for children in the public health system. Not long after, I became an instructor at the pre-clinical dental materials course at the faculty and enrolled in post-graduate courses.

Several twists of fate led me down a variety of academic avenues, and I emerged with a unique combination of knowledge in anatomy, computing, electron microscopy and clinical trials on dental materials.

I was eventually drawn to the multidisciplinary environment at the Nordic Institute of Dental Materials, a phenomenal, high-quality institute under the directorship of Dr. Ivar Mjor. One of Dr. Mjor’s fundamental beliefs was that clinical trials should always be carried out in realistic settings to reflect real life dentistry. This posed major problems in terms of external and internal study validity, so I spent many hours reading up on statistics, trying to devise a clever approach that combined scientific rigour with uncontrolled general practice settings. Statistics expertise was soon added to my growing list of required competencies.

This proved to be valuable when I submitted my PhD thesis in 1991 — a longitudinal trial on amalgam restorations placed in general practice settings and followed over 10 years. My thesis was initially rejected by my opponent committee due to an unfounded dispute on the statistical analyses.

As a young aspirant, I was devastated by this rejection and lost all faith in so-called “scientific truths” and ambiguous theories upheld by senior professors in dentistry with impressive academic titles. I quickly became a strong believer in evidence-based medicine — what I considered to be the most anti-authoritarian stance one could take toward traditional academia and science.

Only some gentle coaching by a wonderful professor, the late Dr. Jacob Valderhaug, brought me back into the university environment. After slowly recovering from my days as a disillusioned academician, I completed my specialty training in prosthodontics, which led to an engagement as research fellow in the department assisting on several projects in TMD.

The restorative dentistry and cariology department eventually offered me tenure as an associate, and subsequently, full professor. In 2003, the prosthodontics department was looking for professors and I felt committed to support the discipline that had brought me
back into academia and clinical research. I held this position for less than a year when I received the first enquiries from the University of Toronto due to the imminent retirement of Professor George Zarb.

**JCDA:** What prompted your decision to accept the chair position at the University of Toronto?

**AJ:** If you ask any dentist, at least those in Europe, what they associate with the University of Toronto and dentistry, 2 themes are usually mentioned: dental implants and Professor George Zarb. I’m not sure whether dentists in Canada truly grasp what a profound impact Dr. Zarb has had in dentistry worldwide. The reputation of Canadian dentistry has benefited to a large extent from his scholarly and scientific achievements. It is a great honour and a fantastic challenge to try to follow in his footsteps.

**JCDA:** What are some of your priorities during your tenure as chair?

**AJ:** One of Dr. Zarb’s many legacies are the detailed recordings of the clinical performance of prostodontic treatments provided at Toronto’s implant prostodontic unit (IPU). This documentation is one of the most comprehensive and detailed in the world dating back to 1979. I anticipate that research data extracted from this database will form the foundation for many research projects to come.

Another area that I think warrants attention is how the curriculum in dental materials and dental technology has been minimized to the point where some new graduates know less about biomaterials than dental technicians! Developments in the advanced use of biomaterials allow modern dental laboratories to offer innovative technical solutions that some dentists either simply aren’t aware of, are sceptical about because they can’t judge their merits, or perhaps don’t want to use because the learning curve becomes too steep. Whatever the reason, our patients are the ones that will ultimately suffer.

**JCDA:** What are some of the most promising areas for research in dentistry?

**AJ:** I believe that establishing research networks that allow dentists to work and generate clinical data in their own clinical settings can dramatically open up the possibilities for more meaningful and relevant knowledge platforms that will aid practitioners in their treatment planning. Several networks like this are in existence today amongst physicians as well as among some dentists.

Data from many operators can be amassed on a range of procedures and material properties, which allows statistical analyses and estimates of diagnostic and therapeutic intervention outcomes. The Internet and other communication technologies can have a synergistic effect by allowing participating clinicians to access the database at any time and compare their own performance with average values.

For example, in this month’s “Point of Care” (p. 223) I write about root posts in endodontically treated teeth. As a practitioner, wouldn’t you just love to know which posts to avoid and which one to use in your grandmother’s tooth? This sort of practical information can be corroborated if there is a collective effort to report one’s own results in a central database. Conversely, there is no other way to uncover clinically what works or does not work in practice. The profession needs to set up a system to record and document clinical performance of products and procedures in realistic, everyday settings.

**JCDA:** What are some of the greatest challenges facing dental academia?

**AJ:** The biggest challenge for the academic community worldwide is the lack of clinician scientists. There is a screaming need for more clinician scientists in dental schools. They are sorely missed here in Canada, so I believe they need to be attracted from abroad. If there is a genuine wish to expose Canadian dental students to proficient dentists who can provide high-quality clinical care based on scientific merits, regional and local barriers should be minimized to ensure these scientists can come to Canada.

**JCDA:** How can Canadian dental academia raise its profile on the global scene?

**AJ:** This can be answered by first trying to establish who dental researchers should primarily be serving. Research
that is required to demonstrate outcomes of clinical interventions in dentistry is given relatively low priority in Canada and elsewhere. Nobody seems to be willing to pay for this type of research. Canada can play a leading role internationally if its professional dental organizations can establish research funds and mechanisms to support clinical research that will have direct relevance to the practising community of dentists.

**JCDA:** Can you talk about your involvement with evidence-based clinical practice guidelines in dentistry?

**AJ:** The biggest challenge facing proponents of evidence-based dentistry (EBD) is how to get relevant research results incorporated into our daily practices in the shortest amount of time. I believe that formulating and maintaining clinical practice guidelines is an effective way to translate new research to practical ends. My contribution has been to develop an extensive database of guidelines in dentistry to support FDI’s member national dental associations worldwide (http://www.fdiworldental.org/resources/2_0guidelines.html).

The profession itself — either dental associations, dental educators, practice owners or individual general practitioners — must assume the responsibility of developing clinical practice guidelines. The alternative is that outside parties will impose guidelines upon us.

**JCDA:** How can dentistry bridge the gap and convince practitioners to incorporate evidence-based guidelines into everyday practice?

**AJ:** EBD is not going to thrive until the general practitioner realizes that the concept will actually result in improved patient care, more effective interventions, less remakes and stress, and more clinical freedom in the selection of alternative interventions. In fact, these factors will combine to increase revenues for the dentist.

When EBD emerged, the insurance industry instantaneously recognized the benefits of implementing its principles in health care and therefore endorsed EBD. This was unfortunate in retrospect, as the deep-rooted scepticism amongst health professionals toward the insurance industry prevailed. There are still segments amongst professionals who erroneously regard EBD as some hidden scheme invented by the industry to restrict patient care.

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**JCDA:** How does the Canadian experience compare to that in Europe?

**AJ:** The strong focus on biocompatibility of dental biomaterials and nutrition that we have in Scandinavia and many countries in Europe seems to be non-existent in North America. Of course there are the anti-amalgam and anti-fluoride groups, but there seems to be very little focus on the health and safety of other dental biomaterial usages. I’m aware of the mandatory reporting processes in Canada on the side effects of drugs, but it seems that the side effects from medical devices are given less prominence — which I find baffling, as we all know that these side effects exist.

**JCDA:** Will you continue your involvement with the FDI World Dental Federation?

**AJ:** I am honoured to fulfill my duties as FDI scientific affairs manager, acting as the executive director’s advisor on all issues that relate to science in dentistry. The work is mostly honorary, although I am fortunate to partake in scientific conferences and meetings that require the presence of an FDI representative. The position has opened an exhaustive network of contacts within the dental research and practising communities. I strongly believe that an organization such as FDI has great merits and that the important work is done through the exchange of information.

**JCDA:** What exciting adventures are on the horizon for you during your time in Canada?

**AJ:** My wife and I are excited about the prospects of seeing all parts of Canada. I believe Norwegians and Canadians share the same awe and respect for nature since we are often exposed to its harsh realities. Truly being close to nature is achieved by trekking, hiking and skiing, and not through watching the Discovery Channel on television. We hope to get as far east, west and north as possible. The Roald Amundsen Hotel in Gjoa Haven, Nunavut, is a must, as are the Vinland settlements at L‘Anse aux Meadows in Newfoundland. We will love the discoveries!
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What are some considerations to keep in mind if I want to start using full-ceramic restorations instead of metal–ceramics?

**Background**

Ceramic is second only to gold as the restorative material with the longest history of use in dentistry. However, this material is brittle and carries a well-known risk of fracture. Despite the documented risk, many dentists now wonder whether current research favours the use of the latest generations of full-ceramic restorations rather than metal–ceramic restorations.

Since 1960, when the porcelain-fused-to-gold technique was developed, new approaches have continually emerged, including ceramic reinforced with aluminum oxide or magnesium and aluminum, prefabricated ceramics, leucite-reinforced ceramic, and the lost-wax technique. Today, the zirconium oxide ceramics, introduced in 2001 for computer-aided design and computer-aided manufacture (CADCAM) of restorations, are regarded as “the ultimate in ceramics,” and there is a wide spectrum of production possibilities, including traditional sintering, casting, pressing and infiltration (Fig. 1). Novel methods for machining prefabricated ceramic blocks are also being developed, and some high-strength ceramics have emerged. However, manufacturers’ claims for the benefits of the newest ceramic products and techniques are usually based on extrapolation from laboratory and early clinical data, rather than solid long-term clinical data.

Metal–ceramic constructions can of course be aesthetically pleasing, but the technician must be highly skilled in all aspects of the manufacturing process, especially the manual addition and subtraction of multiple layers of ceramic powders, and must be able to control dimensional changes during the process. This requirement also applies to full-ceramic constructions, for which these skills are even more critical. Therefore, any dentist who is considering a switch to the provision of full-ceramic restorations must take care in choosing a dental technician, although developments in the industry (specifically the creation of ceramic cores that fit well) have been an aid to the technician (Fig. 2). It is no coincidence that less than 10% of all full-ceramic constructions are now made from conventionally sintered ceramics.

One recent alternative to traditional metal–ceramic fixed partial dentures (FPDs) is the use of veneered and milled zirconium oxide substructures (Fig. 3), but concerns have been raised about microsurface damage introduced during the
CADCAM milling. Moreover, small variations in the zirconia family of materials have been shown to cause dramatic and unexpected problems (e.g., with hip implants), and the initial enthusiasm for their use in medicine has been dampened. In dentistry, zirconium oxide implant abutments made by one company (3i) seem to function well, whereas another company (Astra) withdrew its first-generation zirconium oxide abutments and reintroduced another version in 2005. The long-term results with these implant abutments and zirconium oxide substructures are unknown.

Some Considerations in Choice and Preparation of Ceramic Restorations

A small proportion of dental patients have been persuaded that they should avoid having metals in their mouths for toxicological reasons. Although the dentist should explain that toxic effects are unlikely to occur, we must respect a patient’s decision if he or she is determined to avoid metals. However, patients must also be made aware of the inadequacies of ceramic materials, which impose their own requirements on cavity and tooth preparations.

The strength of ceramic restorations depends on the support. The strength of a ceramic veneer cemented to etched enamel relates to the strength of the veneer itself in the same way that the strength of thin ice over concrete relates to the strength of thin ice over open water. Thus, if the ceramic restoration is not entirely supported by etched enamel, additional bulk is required because of inherent brittleness.

Full-ceramic FPDs should be considered only if there has already been a large loss of tooth substance and the work field is readily accessible; in this situation, one of the new high-strength CADCAM ceramics should be used. If the final restoration is to be made entirely of ceramic, more tooth tissue must be removed than would be the case if other biomaterials were used. This contravenes the modern restorative approach of minimal intervention. For single crowns, some full-ceramic systems do not require removal of additional tooth substance, but others do

An essential element of prosthodontic care is a comprehensive evaluation of full mouth occlusion. The occlusion must be correct right from the start. Use full tray impressions and obtain the correct bite index for the retruded contact position. It is difficult to adjust the occlusion during the try-in before cementation, and surface polishing afterward will never achieve the degree of surface glaze that can be obtained directly by the dental technician. Furthermore, there is a tendency to forget to correct the occlusion and articulation before restoring single teeth, which may result in load concentrations that increase the risk of fracture with a full-ceramic restoration.

References

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What is the best luting cement for fixed prostheses?

**Background**

For more than a century, zinc phosphate cement has been the most common luting cement for retention of crowns and fixed partial dentures. Glass ionomer luting cements were introduced in the mid-1980s, and their longevity is comparable to that of zinc phosphate cement. The subsequent incorporation of a resin into the polycarboxylate matrix of glass ionomer cements (in the mid-1990s) improved compressive and diametrical tensile strengths. It is generally assumed that improvements in physical and mechanical properties of the cement will reduce the risk of adverse clinical events and extend the longevity of fixed prostheses. However, longitudinal clinical data on the relevance of various cement properties to longevity are sparse, and for some products data are lacking entirely.

Resin cements have better physical and mechanical properties, but their effectiveness is sensitive to technique, and an elaborate multistep procedure is needed for optimal cementation. The strong adhesion of the resin-modified glass ionomer cements to enamel and dentin and their fluoride release pattern suggest that these cements may have some cariostatic potential and resistance to marginal leakage. Both these and traditional glass ionomer cements are advocated on the basis of claims that the risk of caries is reduced. However, the notion that a particular cement may hinder caries in patients who cannot maintain adequate plaque control is flawed. Secondary caries develop on the enamel surface, not in the microgaps between the restoration and tooth, whether or not a fluoride-rich environment is present. Thus, it is difficult to understand how a luting cement can by itself provide protection against tooth demineralization.

The excellent track record of zinc phosphate cements suggests that the cement film along a well-fitting cast does not deteriorate with time. Long-term observations of various cements will show if this is also the case for resin cements and resin-modified glass ionomer cements.

**Considerations in Choice of Cement**

For cementation of restorations that are limited to enamel surfaces, there are no options other than acid etching, bonding and use of a resin-based cement. The surface treatment of the restoration is equally important and will depend on whether the restoration is made of ceramic or electrolytically etched metal.

For cementation to a dentin surface, the choice is complicated by the type of restoration surface. The inner surface of crowns made from conventional sintered ceramic must be treated with hydrofluoric acid to increase the surface area. This should be done in the dental laboratory. It is advisable to re-etch the inner surface with ordinary phosphoric acid and to rinse well after completing the try-in and making any necessary adjustments. Subsequent silanization must be done immediately before cementation because of the uptake of humidity from the air, and a resin cement is required. The surface of the dentin must be treated according to the manufacturer’s instructions.

If the inner surface consists of a reinforced ceramic (e.g., Procera [Nobel Biocare, Richmond Hill, Ont.] or InCeram [Vident, Brea, Calif.]), etching with hydrofluoric acid will not increase the...
Almost any cement type can be used, including a traditional water-based cement. For the newest zirconium oxide ceramics it appears that 4-methacryloxyethyl trimellitate anhydride (4-META) resin cements seem to give the best results (Fig. 4).

For all nonaqueous cements, the handling procedure varies from product to product, and it is therefore important to follow the manufacturer’s instructions. Moreover, some components of these cements have a short shelf life, so the shelf life of each individual component must be checked.

In the hands of a gifted clinician, polycarboxylate cement is an excellent choice. However, near-perfect fit of the cast is required. Zinc phosphate cement is a little more forgiving, and glass ionomer cements are even more forgiving if there are inadequacies in marginal fit. There are no clinical data suggesting that conventional metal ceramics should not be fixed with these water-based cements.

References
How can I obtain a perfect impression?

**Background**

In most situations, the dental practitioner can readily obtain an adequate impression, but dental laboratories often receive flawed impressions. Some studies from countries other than Canada (e.g., the United Kingdom) indicate that the major problems associated with impressions relate not to the properties of the materials, but rather to a lack of attention to procedural details before, during and after the impression is taken.

**Selection and Use of Impression Material**

Avoid any impression material that does not comply with the standards set by the International Organization of Standardization (ISO) (Fig. 1). The manufacturer should provide information about compliance on the package. All of the products currently available in Canada exceed these standards in terms of accuracy and stability, and the small differences among brands are relatively unimportant. Do not deviate from the manufacturer’s instructions for preparing the material. Although ad hoc “modified procedures” were common with more traditional materials, this approach is no longer acceptable. Manufacturers usually offer a product range based on one composition that has been modified to suit different purposes. The question of whether polyvinyl siloxanes should be preferred to polyethers or perhaps even reversible hydrocolloids cannot be answered definitively, because so many factors influence a clinician’s choice of material; however, any material that is handled properly will give adequate results.

**Preparation of Field of Operation**

If the operating field is not dry and accessible, no impression material will prevent the problems that are sure to occur, regardless of manufacturers’ claims. There is no need to use adrenaline-impregnated cord in every situation, but aids for preparing a dry and accessible work field include other types of gingival cords, some of the newer gel types or pastes, plain cotton, and electrosurgery, radiosurgery or laser surgery; copper tubes may also have a place. Gingival cords may or may not be impregnated and can be obtained in twinned, braided or woven versions. These cords may contain one or more solutions including adrenaline; aluminium chloride; potassium, aluminium or iron sulphates; lignocaine; hydrochloric acid; and zinc phenol sulphonates. There is little research indicating which combination is best, so the clinician’s subjective preference usually prevails.

**Selection of Tray for Application of Impression Material**

The 2 most common types of problems in the dental laboratory relate to flexibility of trays and detachment of material from the tray (Fig. 2). These problems can be avoided by shunning cheap plastic trays and by coaching auxiliary staff to follow instructions for correct use of fixatives. The use of individual trays should be encouraged. Trays can be fabricated from a wide range of materials suitable for chemical polymerization, heat and light curing, or vacuum polymerization.

**Technique for Application of Impression Material**

Other problems encountered by the dental laboratory include drag in the impression, lack of definition of the finishing line and poor reproduction of details. The traditional problem of nonhomogeneous mixes, which tended to occur when materials were mixed by hand, can be avoided by using...
Point of Care

mixing pistols or automatic table mixers. Problems associated with reduced access and moisture control may remain, however.

The dual-arch impression technique is preferred by many because patient comfort is enhanced, the time required is shorter than for other methods, and it is simple for laboratory staff to pour the models (Fig. 3). Also, with practice, it is possible to make such impressions while having the patient bite in centric occlusion. The critical issue with this impression technique is the possibility of erring in the vertical dimension. Infrapositioned constructions cannot be corrected, whereas supracontacts (e.g., on gold alloys) can be adjusted. Any post-cementation adjustment on ceramic surfaces will lead to suboptimal glazing of the surface (regardless of the claims of the manufacturers of ceramic polishers). The clinician must therefore evaluate the circumstances when deciding if a dual-arch impression is adequate. Full-jaw impressions combined with a correct bite index will be more predictable. The choice between a monophase technique and a dual-phase technique is a matter of personal preference. A potential problem with the latter is poor compatibility between the putty and the wash (in terms of viscosity). It is important to verify in the final impression that the putty has not displaced the wash in the preparation area, as this is the least precise component (Fig. 4). Some proficient clinicians prefer to first take a putty impression and then to apply the wash in a second impression. This approach is rather sensitive to technique, and the operator needs to pay attention to surface contamination and correct re-placement of the hardened putty with the added wash while avoiding build-up of hydraulic pressure and escape of surplus wash material.

Routines and Solutions for Disinfection

Disinfection of the impression between the clinic and the laboratory should be mandatory to avoid cross-contamination. Metal impression trays must be meticulously cleaned and sterilized before reuse. Flexible plastic trays should not be reused.

References
What are the merits of various types of post and core under fixed prostheses?

**Background**

The traditional method of cementing a cast post and core is still an excellent choice and can be done relatively easily through the indirect approach, but an adequate impression and a skilled technician to model the cast are required (Fig. 1). In addition, some clinicians adept in the direct intraoral technique are now using the new resin materials, which can be invested directly.

Alternatively, prefabricated posts are available in both metal and nonmetal materials. Some posts come with a preformed extracoronal part, while others rely on build-up with a “core material.” About 30 core products are available, but there is little evidence that cores made from such materials should be preferred to other alternatives. Initially, most prefabricated metal posts were made from steel, which was later replaced by titanium. However, pure titanium is relatively brittle, and the producers have now changed to titanium alloys. The question of whether metal posts are so-called “active” or “inactive” remains controversial. The term “active” is ambiguous, but this characteristic is supposedly minimized by a design that has parallel or stepwise parallel walls rather than conical walls and a smooth or structured surface instead of threads. Some designs incorporate slots and grooves to “dissipate” active forces, and others feature a conical or ovoid post apex rather than a flat end. Most claims of effectiveness for post designs represent extrapolations from laboratory studies and computer simulations, and the validity of such measurements remains to be confirmed in long-term clinical trials.

There are about 20 brands of nonmetal posts, which can be grouped into 5 main categories. Ceramic posts, the first of which appeared around 1990, are either prefabricated or made in the dental laboratory. The first “black post,” which was made from carbon fibres dispersed in resin, also appeared around 1990. Today, these black posts have been replaced by “white posts,” which consist of inorganic fibres (quartz, zirconium or fibreglass) dispersed in a resin (Fig. 2). The so-called “translucent posts” are based on a polyester matrix and are meant to be combined with light-curing composite resin for permanent restoration or to be invested and cast.

The longevity of nonmetallic posts remains unknown but is usually thought to depend on the amount of dentin height remaining after preparation. Given the lack of long-term clinical data, advertising for nonmetallic posts focuses on other virtues: colour (white is preferred); ease of removal (not usually a concern with prosthodontics); resistance to corrosion and cracking (which is in fact rare for metal posts); reinforcement of the root (an unnecessary feature that is virtually impossible to measure and compare); compressive, tensile, or transverse strength (also difficult to measure and compare).

In general, then, the question of whether nonmetallic posts are better or worse than metallic posts remains unanswered.

**Technique for Post Preparation**

Teeth that have undergone root treatments are at risk for 2 major adverse effects, which must always be considered, regardless of the choice of post and core type: tooth fracture (because the amount of tissue has been reduced) and reinfection of the root canal via the mouth (which will compromise the tooth’s survival and its use as an abutment).

Thus, always preserve as much of the tooth tissue as possible, and use a post and core restoration only when added vertical dimension is needed. Removing endodontic material and dentin to accommodate a post will actually weaken the tooth. Moreover, unless there is enough tooth substance nearby, none of the core materials will be strong enough for the post to function properly.
to create a ferrule effect, it is questionable whether a crown should be made at all.

If a post is needed, use clinical judgement to balance the minimum length of post required for retention against the risk of reinfection. In the past, the minimal length of endodontic filling material has ranged from 3 to 6 mm (depending on the source of data, laboratory or epidemiological). In any case, strive for the best possible seal (to prevent leakage of both fluids and bacteria) by avoiding unnecessary removal of any root-filling material. When removing the root-filling material, be careful not to displace the remaining apical part; for example, twist drills can inadvertently displace the remaining gutta-percha.

Create a ferrule by placing the preparation margin at least 2 mm gingival to the core margin. The post must be sufficiently strong to resist distortion. Class 3 gold alloy that has been correctly heat-treated presents a minimal risk of bending or fracturing.4

Rebuilding a tooth with a nonmetallic post combined with composite resin is a good option if the only alternative is to extract the tooth because of uncertain prognosis.6

References

Dr. Jokstad is the scientific affairs manager of the FDI World Dental Federation. He also serves as a JCDA editorial consultant. Dr. Jokstad is featured in “The JCDA Interview,” found on page 219.

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“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. If you would like to propose a case or recommend a clinician who could contribute to this section, contact editor-in-chief Dr. John O’Keefe at jokeefe@cda-adc.ca.

Predictable Fabrication and Delivery Technique for Full-Coverage Hard Acrylic Non–Sleep-Apnea Dental Orthotics

Michael J. Racich, DMD, Dip ABOP

Dental orthotics for the treatment of conditions other than sleep apnea, also known as non–sleep-apnea dental orthotics (NADOS), are removable occlusal appliances that completely or partially cover either dental arch. NADOS are widely used by most general and rehabilitative dental practitioners, as well as those who treat orofacial pain, for the treatment of temporomandibular disorders. This article describes a predictable fabrication and delivery technique for full-coverage hard acrylic NADOS. A full-coverage maxillary hard acrylic NADO of minimal thickness (about 1 mm in the posterior) has the potential to maximize all the possible mechanisms of action for NADO therapeutic usage (Fig. 1).1,2,3

Fabrication, Delivery and Maintenance of Full-Coverage Hard Acrylic NADOS

In fitting restorations and prostheses, including NADOS, dental practitioners work to exacting tolerances. The fabrication process for a full-coverage hard acrylic NADO begins with a precise impression of the dental arches. To assure correct fit, crown and bridge impression materials such as reversible hydrocolloid (Fig. 2) must be employed; irreversible hydrocolloid (alginate) is not acceptable. An interocclusal record (i.e., the bite) is then obtained. Before the interocclusal record is taken, it is recommended that some form of anterior muscle deprogrammer be applied for at least 10 to 20 minutes.4–6 Leaf gauges, which allow for minimal posterior disclusion, are commonly used for this purpose (Fig. 3). This type of device is believed to facilitate muscle relaxation, thus allowing for greater accuracy in record-taking, regardless of the technique used.6

Once the interocclusal record has been obtained, the casts are mounted on an articulator of choice, at the vertical dimension and with the anteroposterior relationship that will be used in fabrication of the NADO (Figs. 4 and 5). For

Figure 1: Flat-plane full-coverage hard acrylic maxillary non–sleep-apnea dental orthotic (NADO).

Figure 2: Reversible hydrocolloid impressions.

Figure 3: Intraoral application of leaf gauge deprogrammer.
Figure 1: Casts mounted on a semiadjustable articulator with interocclusal record.

Figure 2: Casts mounted on a semiadjustable articulator showing adequate posterior clearance (at least 1 mm) for NADO fabrication.

Figure 3: The articulator pin set at “0”. This vertical dimension must not be changed during NADO fabrication.

Figure 4: NADO fitted on mounted study casts. The pin setting has not been changed.

Figure 5: Posterior contacts and minimal anterior contacts are verified with the NADO positioned on mounted casts with the pin set at “0.”

Figure 6: This NADO has uneven posterior contacts and heavy anterior contacts. It was returned to the laboratory for correction.

Figure 7: Armamentarium for delivery of NADO: thick blue paper (Mynol, ADA Products, Milwaukee, Wis.), thin green and red silk ribbon (Madame Butterfly, Almore International, Portland, Ore.), cotton rolls (Richmond Dental, Charlotte, N.C.), acrylic bur (H795GA, Brasseler, Savannah, Ga.), and 7404 bur (Midwest, Dentsply International, Des Plaines, Ill.).

Figure 8: Posterior adjustments with thin red silk ribbon are done second.
most patients, casts of the dental arches will be mounted, preferably with a facebow, and a true hinge axis technique will not be used; therefore, there must be no changes in the cast relationship. In other words, the pin must stay at “0” or remain unchanged, since any changes in vertical dimension will change the arc of closure of the articulator relative to that of the patient (Fig. 6). If this rule is not followed, the bite will be off when the NADO is delivered, a most frustrating situation that necessitates unnecessary chair time.

After the fabricated device has been received from the laboratory, the interocclusal record is fitted between the mounted casts, and accuracy of mounting and pin position (“0”) is verified (Fig. 6). The dental casts and the NADO are soaked in water for about 10 minutes, and the NADO is then placed on the articulator (Fig. 7). Contacts are studied with the dentition in centric occlusion. The practitioner should observe even bilateral posterior contacts that hold a shim, with minimal anterior contact (Fig. 8). Any discrepancy necessitates return to the laboratory for correction (Fig. 9). If the accuracy of fabrication is verified in advance, delivery to the patient will flow smoothly.

At chairside, the NADO is placed on the dental arch intraorally and is checked for rocking, with adjustments made as indicated. Next, the patient is asked to evaluate comfort without interarch contact. If the NADO is uncomfortable and the patient feels that it is too tight, for example, then compliance might be an issue. Appropriate adjustments are made if necessary. The mandible is then guided into contact with the NADO in place. Adjustments to gain even bilateral posterior contact and anterior fremitus relief are made if required (Figs. 10–14). The NADO should have no dimples around the contact points; it should be completely flat, with shallow anterior guidance in lateral and protrusive excursions (Figs. 15–17). Delivery time if all the technical steps are meticulously followed should be
about 15 minutes and should not exceed 30 minutes (Fig. 18).

For a full-coverage hard acrylic NADO, nighttime wear only is advocated. As teeth are ideally apart and only contact during chewing and swallowing, daytime appliance usage is discouraged. Nighttime wear can be routine, or the patient can use the device as needed. Patients usually know when they will benefit from use of the orthotic. In some cases, changing the pattern of nighttime wear can beneficially alter proprioceptive input.

Maintenance of NADOs is simple. They should be kept moist when not in use, either by soaking in water or wrapping a moist paper towel around the orthotic is sufficient. Weekly immersion in undiluted white table vinegar for about 10 minutes will help to sanitize the device and remove deposits. Daily cleansing with a soft toothbrush and nonabrasive emulsifier such as facial soap or toothpaste is mandatory.

Conclusions

Full-coverage hard acrylic NADOs are commonly employed as an aid for diagnosis, treatment and maintenance. Used effectively, they can lead to positive outcomes. For all types of practitioners (restorative dentists, prosthodontists, periodontists, orthodontists and orofacial pain specialists), they are an important part of dental practice.

References


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

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Also in this issue:

Read Dr. Racich’s complementary debate article, titled “A Case for Full-Coverage Hard Acrylic Non–Sleep-Apnea Dental Orthotics,” on page 239.
Self-etch adhesives: Beyond the quest for low post-operative sensitivity

With the advent of self-etching adhesives in the 1990s, dentists now have an option for bonding dentin and enamel without the need for a separate etchant. This innovation simplifies the bonding procedure and reduces the potential for patient sensitivity.

That reduction in sensitivity has been the primary appeal of these materials to date. Recently, however, researchers have begun to focus attention on the real adhesion performance of these materials on dentin and enamel – particularly intact enamel.

Self-etch adhesives rely on the use of acidified methacrylate monomers that become acidic when combined with water. These acidic adhesives demineralize, or “etch” tooth surfaces, while simultaneously penetrating into the tooth, forming a strong micromechanical bond.

On dentin, this simultaneous etching and penetration, without rinsing, helps reduce the potential for sensitivity because dentinal tubules are more likely to remain sealed.

Virtually all self-etch systems offer reduced sensitivity. Where they differ is in their pH levels. To provide an adequate etch, particularly on uncut enamel, an adhesive must maintain a strong acidity. Without a low pH, a self-etch system may lack the ability to sufficiently etch and penetrate enamel surfaces.

The lower the pH, the deeper the etch. The pH of a typical phosphoric acid etchant is about 0.7. Most self-etch adhesives measure significantly higher.

Single-bottle self-etch adhesives may seem convenient – but research shows that their higher pH makes them less effective on uncut enamel.

3M™ ESPE™ Adper® Prompt™ L-Pop™ Self-Etch Adhesive, with its pH of 0.8, can provide a deep etch pattern on enamel surfaces, as indicated in the SEM images.

Less acidic self-etch adhesive systems cannot provide as deep an etch pattern. In fact, most of these products actually require that a separate phosphoric acid etch be performed on uncut enamel surfaces, prior to adhesive placement.

These products are often specifically designed to be less acidic to prolong shelf life. Once acidified adhesive components are combined with water, their acidic characteristics are activated. This causes the methacrylate monomers to become prone to hydrolytic degradation, resulting in decreased performance and shorter shelf life.

Systems like Adper Prompt L-Pop adhesive avoid degradation by delaying the mixing of water and adhesive, until just prior to use. As a result, they can be formulated at a lower pH.

Some manufacturers prefer to combine water and adhesive components to eliminate the need for mixing. To slow down hydrolysis, the adhesive is formulated to a higher pH. Even so, many still require mandatory daily refrigeration to reach the stated shelf life.

Newer single-bottle self-etch products and the acidic-based primers of two-component systems fall into this second category. As a result, they are less effective on uncut enamel surfaces, and generally require a separate phosphoric acid treatment on enamel, prior to placement of the adhesive.

Conclusion

The development of self-etch adhesives was driven by the desire to reduce patient sensitivity. Now, the bigger challenge is to find a self-etch adhesive that can also form a strong bond consistently to uncut enamel, prepared enamel and dentin surfaces, but maintains the benefits of a longer shelf-life.

Currently, only self-etch adhesives that maintain a low pH, like Adper Prompt L-Pop Self-Etch Adhesive, can offer strong bond performance on intact enamel surfaces without a separate etch step. That makes them the best choice for true convenience and versatility.

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In the context of human dentition, an orthotic device is “any removable artificial occlusal surface used for diagnosis or therapy affecting the relationship of the mandible to maxilla.”¹ Dental orthotics for the treatment of conditions other than sleep apnea, also known as non–sleep-apnea dental orthotics (NADOs), are removable occlusal appliances that completely or partially cover either dental arch. Usually made from hard acrylic, they are also called splints, dental orthotics, orthotic devices, occlusal devices, bite guards, night guards or interocclusal appliances. NADOs are widely used by most general and rehabilitative dental practitioners, as well as those who treat orofacial pain. Many practitioners believe that NADOs are effective in the treatment of temporomandibular disorders, especially of myogenous origin,² ³ but evaluation of the literature on NADOs has not supported this belief,⁴ ⁶ and all too often the devices are used without any evidence of efficacy.⁷ The potential for a placebo effect must also be taken into consideration.⁸ NADOs are also used before and after oral rehabilitation as a diagnostic aid, a treatment aid or a protective device.⁹ ¹¹ They are routinely prescribed to reduce occlusal wear, as in bruxism associated with sleep disorders.¹² ¹⁵

Numerous styles of NADOs are available, and claims of superiority in effectiveness and efficacy for some of these forms have been published.¹⁶ ¹⁷ NADOs made of hard acrylic are available as full-coverage stabilization devices, full-coverage anterior repositioning devices, partial-coverage posterior or anterior devices, and pivoting devices. The most common of these is the full-coverage stabilization device (Fig. 1). Devices of this form can be directly fabricated at chairside or indirectly fabricated (processed in the laboratory). Directly fabricated full-coverage hard acrylic NADOs save both time and money. However, because they are made in situ, the unpleasant aspects of the technique (e.g., taste, tissue irritation, odours) lead to an unfavourable patient response. Indirectly processed full-coverage hard acrylic NADOs require a higher degree of operator skill to ensure accurate fit, not only on the arch for which they are fabricated but also in terms of the preciseness of the interarch relationship. Indirectly processed full-coverage hard acrylic devices (Fig. 1) also potentially maximize the possible mechanism of action for NADO therapy as listed in Table 1 of all the styles available.⁷ ¹⁸ ¹⁹ Furthermore, not only are these indirectly fabricated devices more durable than directly fabricated hard acrylic NADOs, but they are also safe, reliable and reversible.

Partial anterior-coverage dental orthotics (PACDOs), another style of NADO, have been used by practitioners for muscle deprogramming when taking interocclusal records for decades (Fig. 2)²⁰ and have become very popular in recent years. Contact inhibition effected by these devices is one of the proposed (although unsubstantiated) mechanisms for muscle deprogramming and relaxation.²¹ These orthotics have been advocated not only for the treatment of masticatory muscle disorders but also for treatment of neurovascular...
conditions such as migraine.16,17,22 Either indirectly fabricated hard acrylic appliances can be relined at chairside (Fig. 2), or direct fabrication with cold-cure acrylic can be performed (Fig. 3). Quick and easy to fabricate, hard acrylic PACDOs offer the practitioner a turnkey treatment. Nevertheless, complications can occur, such as aspiration of the appliance because of its small size. Furthermore, continuous long-term wear may cause intrusion of loaded teeth and extrusion of unloaded teeth.23 The practitioner should also be cognizant of the potential for overloading the temporomandibular joint (TMJ).24 Such overloading can be diagnostic in cases of TMJ inflammation, in which short-term application of the device causes TMJ soreness. However, TMJ overload may also exacerbate unstable situations.25 I recently examined 2 new patients in which short-term nocturnal use of a hard acrylic PACDO has resulted in irreversible changes to the TMJ, associated with dysfunction and discomfort.

Case 1

An 18-year-old female with no prior history of masticatory muscle pain or TMJ noises presented with neurovascular-type headaches. She had previously sustained trauma to her right chin during a sporting event, but no associated sequelae had been reported. Approximately 2 months after the trauma, during a stressful period (preparation for school examinations), the patient experienced a masticatory muscle disorder characterized by pain and dysfunction. The patient and her dental team recalled no joint noises after development of the disorder. Her family dentist fabricated a hard acrylic PACDO for nighttime wear. Self-help daytime therapy was discussed (including keeping teeth apart, no testing of function, application of moist heat packs, and soft diet). After approximately 2 months of nocturnal use of the PACDO, she awoke one morning with acute closed lock. Magnetic resonance imaging confirmed bilateral dislocated disks.

Table 1 Potential mechanisms of action of full-coverage hard acrylic non–sleep-apnea dental orthotics (NADOs)

<table>
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<tr>
<th>Changes in vertical dimension</th>
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<tr>
<td>Optimization of occlusion</td>
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<tr>
<td>Occlusal protection</td>
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<td>Unloading of temporomandibular joint</td>
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<td>Mandibular repositioning</td>
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<td>Influences on growth and adaptation</td>
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<td>Alteration in sensory input</td>
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<td>Change in patient’s cognitive awareness</td>
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<td>Placebo</td>
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Case 2

A 34-year-old woman presented with continuous dull, achy, low-level left-side facial and cervical discomfort, which was associated with audible TMJ noises on the left side. Her symptoms were exacerbated with function, which also resulted in unilateral headache on occasion. She reported that she had always been aware of clenching her teeth. Approximately 3 years before, a hard acrylic PACDO had been fabricated for her, but after only a couple of nights’ use, her present symptoms and left TMJ noises had developed. She was referred from another dental office seeking a better understanding of her condition and desiring to minimize any further sequelae.

Discussion

Practitioners must be aware of the indications for the use of nocturnal dental appliances and must apply that knowledge skillfully. Evidence-based care, today’s standard of care, must be exercised at all times, that is to say “conscientious, explicit, and judicious use of the current best evidence in making decisions about the care of individual patients . . . including integrating individual clinical expertise with the best available external clinical evidence.”26 Given the ready availability of high-quality peer-reviewed information (e.g., through MEDLINE and the Cochrane Database of Systematic Reviews, both of which are avail-
able through the Internet) there is no excuse for lack of informed practice treatment or informed patient consent. So-called “GO appliances” (“Get Out Of Our Office”) are contraindicated in today’s dental care environment. The practice of fabricating such devices for quick financial gain, without appropriate knowledge on the part of the operator, or simply to “do something” in response to the patient’s demand for treatment, must cease. Contemporary dental practice must follow time-honoured techniques with proven, evidence-based outcomes. Techniques with the potential to cause irreversible detrimental changes and morbidity, be they anatomic, physiologic or psychologic, are contraindicated. An approach to care such as the Precautionary Context Clinical Practice Model is therefore recommended. Such questions as “How little harm is possible?” rather than “How much risk will be allowed?” will help the practitioner balance the best scientific evidence, apply personal experience, and incorporate patient needs and preferences to improve decision-making and minimize potential hazards.

As exemplified by the 2 cases reported here, hard acrylic PACDOs have the potential not only for aspiration but also for irreversible anatomic changes; they therefore have limited value in daily practice and are indicated for judicious short-term use only. Hard acrylic PACDOs are in widespread but often inappropriate use. Learning the technical skills to fabricate a safe, reliable and reversible full-cover hard acrylic NADO is not difficult, and techniques that can be employed by all dental teams can be easily learned with minimal training. An article describing fabrication of full-cover hard acrylic NADOs appears on page 233 in this issue of JCD A.

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Perceptions and Attitudes of Canadian Dentists toward Digital and Electronic Technologies

Carlos Flores-Mir, DDS, Cert Ortho, MSc, DSc; Neal G. Palmer, DDS, MSc, FRCD(C); Herbert C. Northcott, PhD; Fareeza Khurshed, BSc; Paul W. Major, DDS, MSc, FRCD(C)

Many obstacles need to be overcome if digital and electronic technologies are to be fully integrated in the operation of dental offices. If dentists perceive that digital and electronic technologies are valuable for practice management or practice efficiency, there will be a greater chance of their more general acceptance.

Objectives: To determine dentists’ perceptions of the usefulness of digital technologies in improving dental practice and resolving practice issues; to determine dentists’ willingness to use digital and electronic technologies; to determine the perceived obstacles to the use of digital and electronic technologies in dental offices; and to determine dentists’ attitudes toward Internet privacy issues.

Methods: An anonymous, self-administered survey of Canadian dentists was conducted by mail. The mailing list was compiled from the 2003 records of provincial regulatory bodies. A total of 14,052 general dentists were registered as active in that year. From each province 7.8% of the dentists were randomly selected with the help of computer software. The surveys were mailed to this stratified random sample of 1,096 dentists. The survey collected demographic data and information about dentists’ perceptions and attitudes toward computer and Internet use in dental practices.

Results: Two hundred and eighty-three surveys were suitable for analysis, although 21 of these had incomplete responses in the section on perceptions and attitudes. More than 60% of the dentists indicated that computer technology was quite capable or very capable of improving their current practice by increasing patient satisfaction, decreasing office expenses, increasing practice efficiency, increasing practice production, improving the quality of office records, and improving case diagnosis and treatment planning. More than 50% of the respondents regarded digital photography and digital radiography as quite useful or very useful. More than 30% of the respondents thought that electronic or virtual models were quite useful or very useful, and about one-quarter of the respondents suggested that electronic referral forms and paperless charting were quite useful or very useful. Respondents were asked to report their willingness to use digital and electronic technology to consult with dental specialists. The most important factors viewed as significant or insurmountable obstacles were the cost of equipment (63%) and lack of comfort with technology (47%). About 40% of the respondents indicated that differences in legislation between provinces and countries, lack of cooperation among dentists, need for technical training and unclear remuneration guidelines for consultations were significant or insurmountable obstacles. Lack of face-to-face communication, incompatible software or hardware, problems with scheduling for videoconferencing, and security or privacy issues were significant or insurmountable obstacles for less than 40% of the dentists.

Conclusions: The dentists who responded to this survey generally viewed digital and electronic technologies as useful to the profession. Increased office efficiency and production were perceived as positive effects of digital and electronic technologies. There seemed to be a greater trend toward consulting electronically with colleagues than with patients. The major obstacles to the general use of these technologies were related to cost, lack of comfort with technology and inter-provincial/international legislation. Privacy issues were not perceived to represent a significant barrier.
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Comparative Analysis of Microleakage and Seal for 2 Obturation Materials: Resilon/Epiphany and Gutta-Percha

Allen Aptekar, BSc; Ken Ginnan, BA, BSc

Microleakage continues to be a main reason for failure of root canal therapy, where the challenge has been to achieve an adequate seal between the internal tooth structure and the common obturation material, gutta-percha. Resilon/Epiphany (R/E) (Pentron Clinical Technologies) is a new system — consisting of Epiphany primer, Epiphany sealer and Resilon core material — that provides not only the advantages of gutta-percha, but also the ability to chemically bond with the tooth, thus decreasing the possibility of microleakage. In the R/E system, the root canal is flushed with 17% ethylenediaminetetraacetic acid (EDTA) for 1–2 minutes to remove residual sodium hypochlorite. The canal is then dried with paper points, although complete drying is not necessary as the sealer is hydrophilic. The canal is coated with primer to prepare the surface, then sealer is applied. The core material (Resilon points) is then used to obturate the root canal space. On completion of obturation, the coronal surface is cured to provide an immediate seal in this area. During obturation, a seal is created with the dentinal tubules within the root canal system; in essence, the core material, sealer and dentinal tubules become a single solid structure.

Objective: The purpose of this study was to investigate dye leakage over time in root canals obturated using either gutta-percha or the R/E system.

Methods and Materials: Pulpectomies were performed on 105 randomly chosen single-rooted human mandibular incisors. The teeth were then randomly divided into 7 groups of 15 teeth. Three groups were obturated with gutta-percha and 3 with R/E using the lateral condensation technique. For each obturation material, the 3 groups were incubated for a different period — 10 days, 1 month or 3 months — in a heated water bath containing dye. The seventh (control) group was incubated for 3 months. The extent of microleakage was then evaluated by sectioning the roots and observing dye penetration, seal and bonding under a dissecting microscope and a scanning electron microscope.

Results: Resilon as the main obturation material consistently resulted in less microleakage than gutta-percha at all 3 time intervals. When the data were subjected to comparative regression analysis, Resilon proved superior over all time intervals with an R value of 0.8928 compared with gutta-percha with an R value of 0.8161.

Conclusion: Problems associated with the inadequate seal formed by gutta-percha used as an obturation material have been recognized for decades. The R/E system provides a new material for root canal treatment that not only creates a chemical bond with the internal tooth structure over the entire root area, but also maintains a seal over time. Further studies on R/E will help validate its use. In vivo studies showing long-term success of this material would be particularly beneficial.
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Persuasive Evidence that Formocresol Use in Pediatric Dentistry Is Safe

Alan R. Milnes, DDS, PhD, FRCD(C)

Casas and others have questioned the safety of formocresol as used in pediatric pulp therapy on the basis that the formaldehyde it contains might induce toxic effects at distant sites, including genotoxicity, immunotoxicity and cancer. However, this argument is based on evidence that has been either misinterpreted or replaced by better science. Moreover, this argument is biologically implausible on the basis of current evidence.

Formaldehyde is a biological compound that occurs naturally in mammalian tissues, cells and bodily fluids. It is also found in or released from many products, including antiseptics, dishwashing liquids, fabric softeners, carpet cleaners, nail polish, nail hardener, paper products, adhesives, latex paint, plastics, permanent press fabrics and various wood products.

In rats, monkeys and humans, the normal endogenous concentration of formaldehyde in the blood is approximately 0.1 mmol/L (2.70 µg/g), and these levels are unaffected by external formaldehyde exposure. A large body of scientific evidence has shown that inhaled or ingested formaldehyde is metabolized rapidly, with the carbon atom being rapidly incorporated into macromolecules throughout the body. Glutathione-dependent and glutathione-independent dehydrogenases catalyze the oxidation of formaldehyde to formate in the nasal and oral mucosae, hepatocytes and erythrocytes, which is the major route of detoxification.

Genotoxicity: Numerous studies have shown that formaldehyde is genotoxic or mutagenic to mammalian cells, but only after prolonged exposure at specific contact sites such as the nasopharynx. There is no evidence that microgram quantities of formaldehyde applied to pediatric pulp tissue for a few minutes will induce distant-site toxicity. Cytogenetic abnormalities such as DNA–protein cross-links, chromosomal aberrations, sister chromatid exchanges or micronuclei have not been observed in the bone marrow of normal rats exposed to formaldehyde labelled with radioactive hydrogen [1H] or carbon [14C] at concentrations as high as 15 parts per million (ppm); in the bone marrow of glutathione-depleted (metabolically inhibited) rats exposed to [1H]formaldehyde and [14C] formaldehyde at concentrations as high as 10 ppm; and in the bone marrow of rhesus monkeys exposed to [14C]formaldehyde at concentrations as high as 6 ppm. No cytogenetic abnormalities were observed in peripheral blood lymphocytes obtained from children who underwent at least one formocresol pulpotomy or in the lymphocytes of rats exposed to formaldehyde concentrations as high as 15 ppm for 5 days.

Immunotoxicity: Immune sensitization after formocresol pulpotomy has been observed in dogs, but in a study of 128 children who underwent formocresol pulpotomy, there was no increase in immune response or allergic reactions.
Carcinogenicity: Formaldehyde causes nasal squamous cell carcinoma in rodents with long-term exposure to a minimum concentration of 6 ppm. However, this concentration is more than 1,000 times the typical environmental exposures for humans and 8 times the maximal occupational exposure limit established by the U.S. Occupational Safety and Health Administration. There is no convincing evidence from 7 long-term inhalation bioassays and 3 drinking water studies in rats, mice and hamsters or from 3 long-term epidemiology investigations of industrial workers with occupational exposure to formaldehyde that this material can induce cancers at distant sites. Potentially supportive evidence that formaldehyde induces cancer at distant sites can be regarded as inconsequential for several reasons: lack of reproducibility, inadequate reporting of experimental methods or insufficient analytical sensitivity.

Conclusions: The abundance of negative evidence strongly suggests that there is no delivery of inhaled, ingested or topically applied formaldehyde to distant sites. Combined with the fact that formaldehyde occurs naturally throughout the body and that only microgram quantities of formaldehyde are applied to pulp tissue during pulpotomy procedures for very short periods, these negative findings provide convincing evidence that exposure of children to the formaldehyde component of formocresol during pulpotomy is both inconsequential and safe.

Reference
Transmigration of Impacted Mandibular Canines — Report of 4 Cases

Ajit Auluck, MDS; Archna Nagpal, MDS; Suhas Setty, MDS; Keerthilatha M. Pai, MDS; James Sunny, MDS

ABSTRACT

Impacted canines are not uncommon in clinical practice, but intraosseous movement of impacted canines crossing the midline (transmigration) is a rare phenomenon. We report 4 cases of mandibular canine transmigration to emphasize the need to supplement periapical radiographs with a panoramic radiographic examination in patients with over-retained deciduous canines or missing permanent canines.

MeSH Key Words: cuspid/physiopathology; mandible; tooth, impacted/etiology; tooth migration/complications

Pre-eruptive migration of a tooth across the midline is termed transmigration. Transmigration typically affects the mandibular canines, but occurs rarely in maxillary canines as well. Transmigrated canines usually remain impacted and asymptomatic or they ectopically erupt at the midline or on the opposite side of the arch. Transmigrating teeth can cause pressure resorption of roots or tilting of adjacent teeth and neuralgic symptoms or these teeth migrate to adjacent structures like the coronoid process causing pain and discomfort to the patient. We report 4 cases of mandibular canine transmigration to highlight the importance of early detection by panoramic radiographic examination. Early diagnosis with a timely orthodontic or surgical intervention can help dentists preserve the canines, which play an important role, in both esthetics and function, in human dentition.

Case Reports

Case 1
A 25-year-old man reported for postoperative evaluation of a single-tooth implant prosthesis placed in the 43 region 1 year earlier.

The patient had had a mobile tooth 73, which was extracted and an implant was placed (at a different hospital).

A periapical radiograph of the 43 region and a panoramic radiograph were requested. The periapical radiograph showed no abnormalities and adequate marginal bone support. The panoramic radiograph revealed the presence of a canine apical to the mesial aspect of tooth 48 (Fig. 1). The migrating canine showed no evidence of resorption or pericoronal radiographic changes suggestive of cystic degeneration. Adjacent teeth appeared normal. The panoramic radiograph revealed bilateral flattening of the posterior slopes as well as superior–medial portions of condyle together with bird-beak–shaped condyles and decreased joint spaces indicative of degenerative joint disease. The patient was asymptomatic; he was informed of the condition and was scheduled for periodic follow-up.

Case 2
A 25-year-old man underwent a panoramic radiographic examination before orthodontic treatment. Teeth 13, 23 and 43 were missing. The radiograph showed that both maxillary
impacted canines as well as an impacted mandibular right canine had crossed the midline. The transmigrated tooth 43 could be seen below the apices of teeth 33 and 34 (Fig. 2).

Case 3
A 20-year-old woman presented with pain in the left mandibular molars over the previous 3 days. A periapical radiograph showed an ill-defined periapical radiolucency, the extent of which could not be completely determined. Subsequently, a panoramic radiograph was obtained for evaluation of the extent of the lesion (Fig. 3). It showed grossly decayed molars with periapical abscess, widening of the periodontal ligament space and inter-radicular bone loss. It also revealed the presence of an impacted tooth 33 below the apices of the mandibular incisors. Tooth 43 was in place, but tooth 73 was over-retained. Teeth 37 and 46 had gross carious lesions, and significant periapical rarefying osteitis was present in teeth 37, 36, 46 and 47. Tooth 47 also had condensing osteitis. A supernumerary tooth apical to tooth 24 was noted as well.

Case 4
A 40-year-old man presented with pain in the upper right first molar over the previous week. Oral examination revealed a tooth simulating a 43 in the midline; the tooth was rotated and a root stump was evident in the tooth 43 region (Fig. 4a). A periapical radiograph of teeth 44, 43, 42, 41 and 31 region revealed the presence of the over-retained root stump of tooth 83 (Fig. 4b). A second periapical radiograph of teeth 31, 32, 41, 42 and the tooth simulating a 43 at the midline showed a permanent mandibular canine between the mandibular central incisors (Fig. 4c). Tooth 83 did not show any signs of physiologic resorption.

Discussion
Canine impaction is more prevalent in the maxilla than in the mandible, but canine transmigration is more frequent in the mandible.\textsuperscript{6} The mandibular canine is the only tooth in which migration and crossing of the midline has been documented.\textsuperscript{1–3,7} The larger cross-sectional area of the anterior mandible compared with the anterior maxilla may be a reason for the higher frequency of mandibular canine transmigration.\textsuperscript{6} Transmigration of maxillary canines is uncommon due to the shorter distance between the roots of maxillary incisors and the floor of the nasal fossa and restriction of the path of tooth movement by the roots of adjacent teeth, the maxillary sinus and the mid-palatal suture, which act as a barrier.\textsuperscript{3}

In the first 3 cases described above, impacted mandibular canines transmigrated. In case 3, a maxillary canine was impacted but did not transmigrate. In case 4, a transmigrated canine had erupted in the midline.

Studies have suggested that transmigration of canines is a rare phenomenon with an incidence of about only 0.31%.\textsuperscript{4} Mupparapu\textsuperscript{7} reported an incidence of 1.5% for Type 4 canine transmigration. Transmigration of canines has been reported more frequently in females than males in the ratio 1.6:1.\textsuperscript{8} The mandibular left side is affected more than the right side.\textsuperscript{9} The etiology of transmigration is unknown; however, abnormal displacement of the tooth bud or deviation during development is the most commonly accepted explanation.\textsuperscript{10}

Javid and others\textsuperscript{10} suggest that the conical crown shape and long root of the mandibular canine aid in transmigration. The migratory passage of the canine through the mandible is in the direction of its long axis.
with the tip of the crown leading the way. The movement takes place along the path of least resistance. The crown deviates to a more horizontal position and an abnormally strong eruptive force directs it through the dense mandibular symphysis. Other local and pathologic factors implicated in the etiology of transmigration include premature loss of primary teeth and subsequent occupation of the space by adjacent teeth, unfavorable alveolar arch length, discrepancies in tooth size, fractures with displacement of tooth buds, odontomas and cysts. The 3 cases of transmigration of impacted mandibular canines and 1 case of erupted transmigrated mandibular canine we report here had no associated pathology. In the absence of previous clinical and radiographic records, the exact cause of the transmigration could not be determined.

Javid and others propose that transmigration should be considered when half the length of the crown crosses the midline. Recently, it has been suggested that it is not the distance of migration after crossing the midline that is important but rather the tendency of canines to cross the midline, which is significant as the distance can vary according to the stage of transmigration. In 3 of the cases the crowns had crossed the midline and, in the first 2 cases, the impacted mandibular canines had even migrated a significant distance on the contralateral side.

Mupparapu proposed a classification of mandibular canine transmigration based on the migratory pattern and position of the canines in the jaw: Type 1 for a canine impacted mesio-angularly across the midline, labial or lingual to the anterior teeth; Type 2 for a canine horizontally impacted near the lower border of the mandible inferior to the apices of the incisors; Type 3 for a canine erupting on the contralateral side; Type 4 for a canine horizontally impacted near the inferior border of the opposite side; and Type 5 for a canine positioned vertically in the midline with the long axis of the tooth crossing the midline. Our first 2 cases are Type 4, the third case is a Type 2 variant and the fourth, a Type 5 variant.

The absence or delayed eruption of permanent mandibular canines in the arch or over-retained primary canines are common clinical findings suggestive of impacted or transmigrated canines. In cases of impacted mandibular canines where periapical radiographs fail to detect any abnormality (with no history of extraction), transmigration of canines should be suspected. These canines lie horizontally below the inferior alveolar canal or migrate toward the midline and, as a result, may not be visible in periapical radiographs. This emphasizes the need for a panoramic radiograph. In cases 1 and 2, transmigration was only detected on panoramic radiographs.

Even though the teeth have transmigrated to the contralateral side, they maintain their nerve connection to the originating side. Therefore, it is important to anesthetize the nerve on the originating side. One case report described a patient who had severe pain during extraction of the transmigrated canine when the contralateral inferior alveolar nerve was not anesthetized.

Treatment options proposed for transmigrated mandibular canines are surgical removal, transplantation and surgical exposure with orthodontic alignment. Surgical extraction is the most favoured treatment. If the patient is symptomatic and has any associated abnormalities, such as a developing apical cyst, neuralgia, resorption of an adjacent tooth root or displacement of teeth, then surgical extraction should be planned immediately. If the patient is asymptomatic, the transmigrated canine can be left in place; however, regular follow-up with radiographs is required to monitor movement of these teeth.
If the mandibular incisors are in a normal position and space for the transmigrated canine is sufficient, transplantation may be undertaken. Howard transplanted a transmigrated canine when there was enough space to accommodate the tooth. Surgical exposure with orthodontic realignment can also be done for labially impacted transmigrated canine. However, if the crown of the transmigrated canine moves past the opposite incisor area or if the apex is seen to have migrated past the apex of the adjacent lateral incisor, it might be mechanically impossible to bring the tooth back into place. In such cases, extraction is preferred.

In cases 1 and 2, the canines had migrated to the opposite molar and premolar regions, respectively. But as the patients were asymptomatic, extraction was deferred and patients were kept on periodic recall. Case 3 was referred for orthodontic consultation but was lost for follow-up. As for the patient in case 4, he was not willing to undergo any treatment for the malpositioned tooth.

Conclusions

The presence of an over-retained mandibular deciduous canine or missing permanent canines should always be clinically and radiographically investigated. An intraoral periapical radiograph may not be sufficient to detect transmigration except in cases where the transmigrated tooth has erupted and should be supplemented by a panoramic radiograph. Before extraction, care must be taken to administer proper anesthesia on the side from which the transmigrated tooth originated.

References

Longevity of a Maxillary 2-Unit Cantilever Fixed Partial Denture: Clinical Report

Usama Nassar, DDS, MS; Shawn Russett, BSc, DDS

ABSTRACT

In this clinical report, we discuss the length of service and subsequent replacement of a maxillary anterior 2-unit cantilever fixed partial denture (FPD). The FPD provided 53 years of service to the patient and was finally replaced with a 2-unit porcelain-fused-to-metal (PFM) FPD. The original prosthesis replaced a missing maxillary lateral incisor using a partial coverage metal retainer, whereas the new FPD was designed with a complete coverage PFM retainer.

Clinical Report

A 75-year-old patient had a cantilever FPD that had replaced a left maxillary lateral incisor using the left canine as a partly covered abutment. The FPD, which had been in service for an amazing period of 53 years, required replacement due to formation of mesial marginal caries (Fig. 1). The patient was examined and treated in the department of dentistry at the University of Alberta. Clinical examination was carried out and resulted in treatment plan options that included the replacement of the existing cantilever prosthesis with a 2-unit or 3-unit complete coverage prosthesis.

Figure 2 shows a palatal view of the original FPD. The design had 2 classical features of the era: enlarged connector size and decreased labio-palatal dimension of the gold–resin pontic.

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This article has been peer reviewed.

MeSH Key Words: biomechanics; dental abutments; dental restoration failure; denture, partial, fixed
A 2-unit porcelain-fused-to-metal (PFM) FPD using a complete-coverage retainer was made as a replacement (Fig. 3) with a retentive groove placed along the mesial surface of the canine.

Discussion

Years of Service of the Original Prosthesis

The interesting part of this clinical report is the lifespan of the original cantilever prosthesis. A prosthesis that has become unserviceable after 53 years cannot truly be considered a failure.10,15 There are no longitudinal data in the dental literature that deal specifically with the longevity of 2-unit maxillary anterior cantilever restorations. However, as part of studies of restorative failure or years of service, a few report the longevity of 2-unit cantilever FPDs without information on their location or design. In a study that involved 406 patients with unserviceable FPDs during a 3-year period, Schwartz and others10 report that 20 2-unit cantilever prostheses had a mean service period of 14.9 years, which was longer than the mean of all FPDs (11.2 years) and 32 2-unit splint cantilever prostheses (13 years). This indicates that splinting retainers in cantilever prostheses may not necessarily increase their longevity. Antonoff2 suggests adding the premolar as a splinted retainer to replace a missing incisor, even though the canine can be used as a single retainer in ideal situations.

In a study similar to that of Schwartz and others, in 1986 Walton and others11 reported that 9 2-unit FPDs had a mean length of service of only 3.7 years — the shortest period among all restorations examined. It was pointed out, however, that the small sample size prevented further extrapolation of these figures. The mean length of service for all FPDs in that study was 7.7 years. In another study, Cheung and others9 recalled and examined 143 patients with 169 FPDs of which 15 were the cantilever type. Of these 15, 11 were anterior prostheses and 3 replaced the canine. Two out of the 3 cantilever FPDs that replaced maxillary canines failed technically (fractured porcelain and fractured abutment tooth). The authors, therefore, concluded that replacement of canines, particularly in the upper arch, with a cantilever bridge was contraindicated. Finally, Roberts13 indicated an acceptable failure rate where anterior three-quarter crowns (retainers) were used in fixed removable and cantilever bridges. The failure rate of 1.63% a year was lower than the failure rate of all types of anterior retainers at 3.49% a year.

Reasons for Failure

Recurrent caries that formed at the mesial margin of the retainer was the reason for failure of the FPD reported here. The caries was not extensive, but large enough to justify removal of the prosthesis rather than repair. This is particularly interesting as loss of retention or gingival irritation beneath the pontic was not the cause of failure as one would expect in such restorations, especially when a partial coverage retainer was used.

Caries and loss of retention have been among the major causes of failure in fixed prosthodontic treatment. Although marginal caries account for failure rates ranging from 14.9% to 36.8%, loss of retention (or loose retainer) account for 12.1% to 27% of the failures studied.10–12,16 The original FPD was solid despite the recent caries. The patient was happy to have it replaced with a similar prosthesis; however, the patient chose complete coverage this time to enhance the esthetics. Additional design features included subgingival labial margins and a mesial retentive groove.

The Role of Occlusion and Periodontal Health

Because the success of the cantilever FPD depends largely on proper occlusion and the health of the supporting periodontium and abutment teeth,2,5,6,14 the clinical assessment was consistent with these recommendations. The vital abutment tooth had healthy periodontal and alveolar supporting tissues, favourable
root length and morphology, favourable crown-to-root ratio and sufficient clinical crown length.

The occlusion of the new cantilever prosthesis excluded any contacts on the pontics in protrusion and lateral excursion.3,14

Conclusion

The longevity and replacement of a maxillary 2-unit cantilever FPD is presented in this clinical report. The length of service of the prosthesis was 53 years. The original retainer consisted of partial palatal coverage, whereas the replacement prosthesis was designed with complete coverage PFM material.

References


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The authors have no declared financial interests.
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QUEBEC – Montreal: Oral and maxillofacial surgeon required for bilingual, solo, well-established, boutique practice. Will consider salaried position, associateship, partnership or purchase arrangement. Confidential resume to: CDA Box #2103. D2103

SASKATCHEWAN – South East: This 20-year rural practice has a very large patient base and a terrific stable staff. With no other dentists for 112 km (70 miles) you are unopposed in your endeavours. Professional appraisal and photos are available to interested parties. Superior four-season recreation in the heart of Saskatchewan’s oil patch. Call: (306) 577-2031 (evgs.) or email: cpt.kl@sasktel.net to discuss. D1824

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


Positions Available

ALBERTA – Lloydminster: Busy, modern clinic looking for a full-time associate. We are fully computerized, including charts and radiographs. All equipment is new. Office hours are weekdays only – no nights or weekends. This non-assignment practice will pay the associate 40% of collections. The associate will have sole use of two brand-new operatories and a large office. Position available immediately. Please fax resumes to Dr. Dean Sexsmith at: (780) 875-2097 or email them to: westlakedental@shaw.ca. D2023

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

ALBERTA – Calgary Area (Black Diamond): Associate required for well-established small town family practice one half hour commute south of Calgary. Owner relocating, very real opportunity for purchase. Current technology, fully computerized, digital radiography, etc. No weekends or evenings. New grads welcome! Fax resume to: (403) 933-4619 or email to: absolute.dentistry@telus.net. D2000

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

ALBERTA - Calgary: Associate, full-time, in high-traffic mall location.
EXCELLENT LOCATION FOR FAMILY PRACTICE. FAX: (403) 269-3800. DISCRETION ASSURED.

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

ALBERTA – EDMONTON: Excellent opportunity for a dentist who has exceptional interpersonal skills and motivation to succeed. We invite you to join our team at a busy, well-established dental office in West Edmonton. Modern office with high-tech equipment e.g. digital radiography, CEREC 3D, laser, digital cameras, CAESY, etc. Great support team. High remuneration. Email resume to: smile_doc@shaw.ca or fax to: (780) 486-7328.

ALBERTA - EDMONTON: We are seeking a confident and conscientious associate to join our expanding practice located in Edmonton, Alberta. The newly renovated/enlarged office is nearly complete and features some of the most current practice technologies available. Excellent growth potential, as we are in a major mall located in an aggressively developing residential area of the city. Inquiries from recent graduates welcome. Please fax CV in confidence to: (780) 472-9835 or email: drdch@compuserve.com.

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

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

ALBERTA - EDSON: Full-time associate needed for busy, well-established family practice. Edson is centrally located between Jasper and Edmonton, and is rapidly growing. New graduates are welcome. Interested applicants please contact: Dr. Shari Jean Robinson, tel: (780) 723-3084. res: (780) 723-5221, bus. fax: (780) 723-2402, email: sorbin 11@telus.net.

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

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

ALBERTA – MEDICINE HAT: We are looking for a full-time associate to join our progressive family practice located in Medicine Hat, Alberta. Our well-established, modern clinic currently has 3 dentists, and we need to grow to meet our patients’ needs. This is an excellent opportunity to practise multi-faceted dentistry including: rotary endo, esthetic C & B, orthodontics, and implants. All operatories are computerized, and we have digital radiography. Our office is non-assignment, and presents excellent income potential. New grads welcome to apply. If you are interested in meeting with us, please contact Dr. Kirk Ewasechko, Dr. Jenelle (Norek) Hyland or Dr. Troy Suelzle at: (403) 529-1300, or email: dentist@telusplanet.net.

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

BRITISH COLUMBIA – Castlegar: Great recreational area and affordable housing. Easy access to Victoria and Vancouver. Tel: (250) 748-1322, fax: (250) 746-4342. D1827

BRITISH COLUMBIA – Duncan: Southern Vancouver Island, 50 km north of Victoria, part-time/full-time associate required. Fantastic opportunity to join solo dentist in a well-established and rapidly growing general and cosmetic practice. Committed to new technology and CE. Future buy-in welcome. Great recreational area and affordable housing. Easy access to Victoria and Vancouver. Tel: (250) 748-1322, fax: (250) 746-4342.

BRITISH COLUMBIA – Chemainus: Great practice offers a bright future for dentist dedicated to maintaining the high standards set by the departing associate. Future buy-in potential for the right candidate, three years experience preferred. Abbotsford, a rapidly growing community still placing high priority on family values, is surrounded by the natural beauty of mountains and the Fraser Valley. There are highly esteemed private two Bible colleges and a public university college. A new hospital/cancer centre is under construction down the street from the practice. The office is strategically located in an impressive new brick professional building one minute off the Trans-Canada Highway. The waiting room welcomes you with a fireplace and wingback chairs. There are six operatories, four of them offering a view of Mount Baker, Washington. A strong hygiene program is in place and harmonious staff await you. The city is an hour east of Vancouver, a mile from the U.S. border, and within easy driving distance of many ski resorts including Whistler Mountain. If you are drawn to this first-class opportunity, please email: abbdent66@hotmail.com. D1836

BRITISH COLUMBIA – Castlegar: Full-time associate required for a busy general practice. Well-established patient base, long-term staff, six operatories. Castlegar is a wonderful caring community. We enjoy all the seasons have to offer. We have a community college, sports and pool complex and the regional airport. If this is the place for you, owner would like to arrange for a future buy-in or purchase of the practice. Email: donellis @shaw.ca. D1859

BRITISH COLUMBIA – Duncan: Southern Vancouver Island, 50 km north of Victoria, part-time/full-time associate required. Fantastic opportunity to join solo dentist in a well-established and rapidly growing general and cosmetic practice. Committed to new technology and CE. Future buy-in welcome. Great recreational area and affordable housing. Easy access to Victoria and Vancouver. Tel: (250) 748-1322, fax: (250) 746-4342. D1827

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

British Columbia – Penticton: Unique opportunity to join thriving established practice in a beautiful new building. Possibilities for transition to partner makes this perfect for either a new grad or experienced dentist. Cerec 3D, intraoral camera, computerized office, committed staff, etc., make this practice worth looking at. Lifestyles unlimited. Email: ericruby@shaw.ca.

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

BRITISH COLUMBIA - Vancouver: Opportunity for a part-time position in successful Vancouver periodontal practice. Scope of practice includes implant therapy and cosmetic periodontal procedures. Up-to-date practice facilities with surgical microscope, laser, excellent staff and solid referral base. Please fax resume to: (604) 602-0474 or email: drkngeorgasinc@telus.net.

BRITISH COLUMBIA - Richmond: Associate required for a well-established family practice. Excellent staff, 5 days/wk. Cantonese/Mandarin mandatory. Fax: (604) 821-0764.

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

BRITISH COLUMBIA – Vancouver: A unique and exciting opportunity is available for a certified oral & maxillofacial surgeon who wishes to locate in beautiful Vancouver, B.C., Canada. Please submit your CV to: tmmluckhart@telus.net or to: CDA Classified Box #2029.

NORTHWEST TERRITORIES - Yellowknife: Ultra-contemporary and extremely busy clinics seek dynamic associates. Long established and efficiently run, the clinics provide all aspects of dental care in warm and professional environments. Comprehensive, experienced support staff and all current dental toys in place. Yellowknife is a sophisticated city, replete with all amenities and offers outstanding outdoor life. If you seek a busy, great, satisfying dental career with excellent remuneration, send resume to: Administration, PO Box 1118, Yellowknife, NT X1A 2N8, tel: (867) 873-6940, fax: (867) 873-6941. Visit our website: www.adamdentalclinic.ca.

NUNAVUT - Iqaluit: Associate position(s) available for immediate start. Established clinic offers generous package and full appointment book to associates. All round clinical skills are your ticket to a wide range of recreational activities! No travel required and housing available in Canada’s newest and fastest growing capital city. Please apply to: Administration, PO Box 1118, Yellowknife, NT X1A 2N8, or tel: (867) 873-6940, fax: (867) 873-6941.

ONTARIO - Eastern: Oral maxillofacial surgery. Busy full-scope practice looking for associate leading to partnership. OR time available and GA suite in office. One hour east of Toronto. If interested reply to: CDA Classified Box #1858.
ONTARIO - Kirkland Lake/Englehart: Require full-time associate(s) in busy general practice. We have 16 operatories, four hygienists, one preventive dental assistant. Flexible hours and work schedules. Office has a proven track record for associate support. New graduates welcome to apply. Start date is negotiable. We welcome your inquiries. tel: (705) 567-3214 or fax: (705) 567-3218.  

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

ONTARIO – Toronto: Associate for hourly, part-time, required for downtown office. tel: (416) 922-1161, bus: (416) 233-5616, evgs fax: (416) 960-3298, email: kacinik@interlog.com.  

ONTARIO – Toronto: Large, busy family practice in North Toronto. Looking for an experienced associate leading to partnership. Fax: (416) 398-7863.  

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

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

ONTARIO - Barrie: Associate needed for a family practice south end of Barrie (Ontario) 2 - 4 days/wk. Experience preferred but not required. New grads welcome to apply. For more information please respond to CDA Classified Box #2001.  

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

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

ONTARIO - West Toronto: Excellent associate dentist opportunity you don’t want to pass up! Full- time/part-time working in a well-established practice with a positive environment and a foundation based on respect, equality and valuing others. From being busy and fully booked on day one, to ongoing
professional development, you will have the chance to practice dentistry at its finest! This modern and progressive practice will keep you exposed to many different aspects of dentistry, like cosmetics, implants and the ability to refer within, as we have many specialists working alongside of us! If you are a team player and are looking for the perfect practice...fax: (905) 846-8854. D1815


Saskatoon Health Region

Applications are now being accepted for the General Practice Residency Program offered in conjunction with the Department of Dentistry, Saskatoon Health Region and the College of Dentistry, University of Saskatchewan.

This is a one year appointment commencing on July 1, 2006. Residents will be registered as post-graduate clinical students with the University of Saskatchewan.

Applications and Program Details may be obtained by contacting:

Janet at the Office of the Dean, College of Dentistry 306-966-5121 or
Dr. M. Teekasingh, Program Director, Department of Dentistry, Room 1860 103 Hospital Drive, Saskatoon, SK., S7N 0W8, 306-655-1312.

VANCOUVER ISLAND: Associate for Comox Valley family practice. Must be interested in future purchase and transition to owner as associate. Reply: Box 1357, Comox, BC V9M 7Z9 or email: Covaldentist@shaw.ca. D2005

UNITED STATES: Outstanding opportunities across the country for new and seasoned general dentists and specialists. For details contact: Gretchen Neels, tel: (800) 838-6563, ext. 209 or email: gneels@amdpi.com. D1846

VIETNAM - Hanoi: Exciting once in a lifetime opportunity for dentist to travel abroad and experience life in wonderful Vietnam while working in new high-tech office serving multinationals. Person must be outgoing, energetic and willing to relocate for one year. New graduates welcome. Serious enquiries send CV to: admin@maplehealthcare.net. D2112

**Miscellaneous**

TAX PLANNING FOR PROFESSIONALS: Strip your corporate surplus tax free! Our strategy has recently been Tax Court tested. Solicitor/client privilege is provided. For information call Goates & Associates: 1 (866) mytaxes. D2045

ONTARIO - Toronto: 10% off your video production. Need a cosmetic dentistry office loop, 30 minute TV infomercial, 60 second TV commercial or 30 second TV commercial? Flow Pictures can help. Email us NOW at: request@flowpictures.com or contact us at: (800) 696-1343. Special rates applied for emerging dentists. D2104

**Vacations**

UNITED STATES - Florida (West Palm Beach): Stunning 2-bedroom condo, fully equipped. Pool, jacuzzi, barbeque, putting green, gym and business centre, 5 minutes to beach, great shopping and nightlife. Disney/Orlando and Miami within reasonable driving distance. Available year round. Contact: Megan, tel: (416)768-0692, email:megan.f@sympatico.ca. D1825

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To benefit from all of the advantages available through the CDA’s Canadian Dentists’ Investment Program and CDSPI’s division — Dental Edge Investment Solutions, call today to speak with your personal investment planning advisor. Dial 1-877-293-9455 (toll-free) or (416) 296-9455, extension 5023. For information about the plans available through the Canadian Dentists’ Investment Program, call or visit www.cdspi.com/invest.

* Planning advice is provided by licensed advisors at Professional Guide Line Inc. — A CDSPI Affiliate. Quebec residents can speak to a financial security advisor and advisor in group insurance and group-annuity plans.
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**Low Fees**

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### CDA Fund Performance (for period ending February 28, 2006)

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<th>CDA Canadian Growth Funds</th>
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<th>1 year</th>
<th>3 years</th>
<th>5 years</th>
<th>10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggressive Equity fund (Altamira)</td>
<td>up to 1.00%</td>
<td>14.5%</td>
<td>23.1%</td>
<td>12.9%</td>
<td>10.0%</td>
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<tr>
<td>Common Stock fund (Altamira)</td>
<td>up to 0.99%</td>
<td>17.6%</td>
<td>20.3%</td>
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<td>8.1%</td>
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<tr>
<td>Canadian Equity fund (Trimark)†</td>
<td>up to 1.50%</td>
<td>8.0%</td>
<td>15.1%</td>
<td>6.4%</td>
<td>8.8%</td>
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<tr>
<td>Dividend fund (PH&amp;N) †2</td>
<td>up to 1.20%</td>
<td>13.9%</td>
<td>19.1%</td>
<td>11.4%</td>
<td>17.8%</td>
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<tr>
<td>Income Trusts fund (Sceptre)</td>
<td>up to 1.45%</td>
<td>15.7%</td>
<td>25.8%</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Special Equity fund (KBSH) †3</td>
<td>up to 1.45%</td>
<td>14.2%</td>
<td>21.8%</td>
<td>2.6%</td>
<td>13.8%</td>
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<tr>
<td>TSX Composite Index fund (BGI) ††</td>
<td>up to 0.67%</td>
<td>22.2%</td>
<td>22.6%</td>
<td>8.9%</td>
<td>10.2%</td>
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<tr>
<th>CDA International Growth Funds</th>
<th>MER</th>
<th>1 year</th>
<th>3 years</th>
<th>5 years</th>
<th>10 years</th>
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<tbody>
<tr>
<td>Emerging Markets fund (Brandes)</td>
<td>up to 1.77%</td>
<td>17.8%</td>
<td>24.5%</td>
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<td>European fund (Trimark)</td>
<td>up to 1.45%</td>
<td>5.8%</td>
<td>9.3%</td>
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<td>3.1%</td>
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<tr>
<td>International Equity fund (CC&amp;L)</td>
<td>up to 1.30%</td>
<td>1.6%</td>
<td>9.0%</td>
<td>-7.2%</td>
<td>1.7%</td>
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<tr>
<td>Pacific Basin fund (CI)</td>
<td>up to 1.77%</td>
<td>17.9%</td>
<td>12.3%</td>
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<td>-0.3%</td>
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<tr>
<td>US Small Cap fund (Trimark)</td>
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<td>2.3%</td>
<td>-8.6%</td>
<td>n/a</td>
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<tr>
<td>Global fund (Trimark)†4</td>
<td>up to 1.50%</td>
<td>3.7%</td>
<td>10.4%</td>
<td>3.9%</td>
<td>8.4%</td>
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<tr>
<td>Global Stock fund (Templeton) †5</td>
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<td>2.5%</td>
<td>14.2%</td>
<td>0.3%</td>
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<tr>
<td>S&amp;P 500 Index fund (BGI) ††</td>
<td>up to 0.67%</td>
<td>-0.7%</td>
<td>5.7%</td>
<td>-2.9%</td>
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<table>
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<tr>
<th>CDA Income Funds</th>
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<th>3 years</th>
<th>5 years</th>
<th>10 years</th>
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<tbody>
<tr>
<td>Bond and Mortgage fund (Fiera)</td>
<td>up to 0.99%</td>
<td>1.4%</td>
<td>4.3%</td>
<td>4.8%</td>
<td>5.6%</td>
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<tr>
<td>Fixed Income fund (McLean Budden) †6</td>
<td>up to 0.97%</td>
<td>3.9%</td>
<td>5.6%</td>
<td>5.8%</td>
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<tr>
<th>CDA Cash and Equivalent Fund</th>
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<th>1 year</th>
<th>3 years</th>
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<tbody>
<tr>
<td>Money Market fund (Fiera)</td>
<td>up to 0.67%</td>
<td>2.1%</td>
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<td>2.3%</td>
<td>3.3%</td>
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<thead>
<tr>
<th>CDA Growth and Income Funds</th>
<th>MER</th>
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<tbody>
<tr>
<td>Balanced fund (PH&amp;N) †7</td>
<td>up to 1.20%</td>
<td>7.1%</td>
<td>9.6%</td>
<td>2.5%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Balanced Value fund (McLean Budden) †8</td>
<td>up to 0.95%</td>
<td>7.7%</td>
<td>11.7%</td>
<td>6.5%</td>
<td>9.1%</td>
</tr>
</tbody>
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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: †Trimark Canadian Fund, †PH&N Dividend Income Fund, †KBSH Special Equity Fund, †Trimark Fund, †Templeton Global Stock Trust Fund, †McLean Budden Fixed Income Fund, †PH&N Balanced Pension Trust Fund, †McLean Budden Balanced Value Fund.

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

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